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A peer-reviewed journal of
the Association of Resident Doctors
Jos University Teaching Hospital

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All manuscripts must be submitted in MS Word or RTF format using Times New Roman font size 10 and double spacing. Headings must be in **Bold**.

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1. Original research (Between 1000 and 3500 words).
2. Letters to the editor (Up to 400 words).
3. Scientific letters (Less than 600 words); one table or graph and not more than 5 references.
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Acknowledgments

In a separate section, acknowledge any financial support received or possible conflict of interest. This section may also be used to acknowledge substantial contributions to the research or the preparation of the manuscript made by the persons other than the authors.

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Dissertation

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LETTER FROM THE EDITOR

PREAMBLE

We, the Editorial Committee, thank God for the opportunity to serve the congress in the last 1 year. We thank the congress for the support we had received so far. We have made significant progress in many areas; but there is still room for improvement.

ACHIEVEMENTS

We are fully back online and up-to-date with all published manuscripts in the last 3 years (Vols 14-1&2; 15-1&2; and 16-1&2) uploaded on AJOL. We have started sending mails to all authors that have published in the last 3 years to access and disseminate their study findings. You can find *Jos Journal of Medicine* on https://www.ajol.info/index.php/jjm/issue/archive

Our increased advocacy to residents to be submitting articles to our journal had started yielding results with the latest submission rate of 61.5%. We hope this will increase in the years to come. We also hope house officers and students will also key into this opportunity to have their work published. We have more submission, also, this year. No article will be rejected but will pass through series of reviews for quality improvement and publication. The first set of articles and editorials will be published; and others will be rolled-over to the next issue.

We have been able to expand the pool of reviewers for JJM: we have a combination of old and new reviewers. We therefore appreciate all reviewers who have been untiring in improving open access through JJM. We plan to have appreciation certificates given to all reviewers at our AGMs henceforth.

As the editor, experiences gained from reviewing manuscripts for international/local journals (PLOS One, Qeios, JESON, JJM e.t.c.) has been brought to bear in our reviewing calls, response and being a liaison between authors and reviewers. Once again, we are currently operating a *no rejection* policy; and improve articles via cycles of reviews. Feedback from authors has been that of improvement in scientific writings for publications, part 2 proposals and dissertation.

We have also sought to improve spread and quality of the editorial board by reaching out to past board members and editors who are actively publishing. This will be important as we seek to improve the overall quality of our journal. More committee members have also been publishing in local and international journals. This shows that increased experience of board members in publishing will also translate into improved quality of JJM.

AJOL has offered us an opportunity to train us on how to manage our site in-house. We have attended the public presentation of this programme for African journals; and have been billed for training once were ready. This will improve timeliness, regularity, visibility and confidence in our journal. This will also set the pace for further accreditation and indexing of our journal.

We have also been more visible this year with our participation in trainings by AJOL for African academic editors; and an invitation to attend OASPA (Open Access Scholarly Publishing Association) conference extended to the journal. Our journal was also among journals (including BMJ, Lancet e.t.c.) selected by the World Association of Medical Editors to publish two global collaborative editorials which will be included in our online and print versions. The topics are on climate change as a global emergency; and Nuclear risk and health.

Our journal has also achieved some *firsts* this year:

- First time more residents submitting; though with quality challenges
- First time submissions by primary (first) authors resident abroad
- First time we got a reviewer resident abroad volunteering to review for JJM

FUTURE GOALS

- Implementation of *ahead of print* onwards; beginning as soon as articles for this issue are ready.
- Achieving 1-star status under JPPS (Journal Publishing Practices and Standard System).
- Encouraging more residents to submit for publication, and Residents can seek advice about how and where to publish.
- Seek to purchase an in-house plagiarism software to improve originality and quality of our publications.
- Developing a timeline with goalposts of our future plans so as to ensure continuity and sustainability.

Due to the current economic reality, the APC for non-members have been increase from N15,000 to N30,000 per article. APC remains free for resident doctors and house-officers.

CONCLUSION

We can only improve on our mandate; we cannot afford to fail going forward. Thank you for supporting us.

Dr. Egga, Akpomushi

Dr. Adeoye, Philip Adewale
Editors

CONTENT

REDUCING THE RISKS OF NUCLEAR WAR —THE ROLE OF HEALTH PROFESSIONALS

Kamran Abbasi[1], Parveen Ali[2], Virginia Barbour[3], Kirsten Bibbins-Domingo[4], Marcel GM Olde Rikkert[5], Andy Haines[6], Ira Helfand[7], Richard Horton[8], Bob Mash[9], Arun Mitra[10], Carlos Monteiro[11], Elena N. Naumova[12], Eric J. Rubin[13], Tilman Ruff[14], Peush Sahni[15], James Tumwine[16], Paul Yonga[17] and Chris Zielinski[18]*

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In January, 2023, the Science and Security Board of the Bulletin of the Atomic Scientists moved the hands of the Doomsday Clock forward to 90 s before midnight, reflecting the growing risk of nuclear war.[1] In August, 2022, the UN Secretary-General Ant**ó**nio Guterres warned that the world is now in "a time of nuclear danger not seen since the height of the Cold War.[2] The danger has been underlined by growing tensions between many nuclear armed states.[1,3] As editors of health and medical journals worldwide, we call on health professionals to alert the public and our leaders to this major danger to public health and the essential life support systems of the planet—and urge action to prevent it.

Current nuclear arms control and non-proliferation efforts are inadequate to protect the world's population against the threat of nuclear war by design, error, or miscalculation. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) commits each of the 190 participating nations "to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control".[4] Progress has been disappointingly slow and the most recent NPT review conference in 2022 ended without an agreed statement.[5] There are many examples of near disasters that have exposed the risks of depending on nuclear deterrence for the indefinite future.[6] Modernisation of nuclear arsenals could increase risks: for example, hypersonic missiles decrease the time available to distinguish between an attack and a false alarm, increasing the likelihood of rapid escalation.

Any use of nuclear weapons would be catastrophic for humanity. Even a "limited" nuclear war involving only 250 of the 13 000 nuclear weapons in the world could kill 120 million people outright and cause global climate disruption leading to a nuclear famine, putting 2 billion people at risk.[7,8] A large-scale nuclear war between the USA and Russia could kill 200 million people or more in the near term, and potentially cause a global "nuclear winter" that could kill 5–6 billion people, threatening the survival of humanity.[7,8] Once a

nuclear weapon is detonated, escalation to all-out nuclear war could occur rapidly. The prevention of any use of nuclear weapons is therefore an urgent public health priority and fundamental steps must also be taken to address the root cause of the problem—by abolishing nuclear weapons.

The health community has had a crucial role in efforts to reduce the risk of nuclear war and must continue to do so in the future.[9] In the 1980s the efforts of health professionals, led by the International Physicians for the Prevention of Nuclear War (IPPNW), helped to end the Cold War arms race by educating policy makers and the public on both sides of the Iron Curtain about the medical consequences of nuclear war. This was recognised when the 1985 Nobel Peace Prize was awarded to the IPPNW.[10](http://www.ippnw.org).

In 2007, the IPPNW launched the International Campaign to Abolish Nuclear Weapons, which grew into a global civil society campaign with hundreds of partner organisations. A pathway to nuclear abolition was created with the adoption of the Treaty on the Prohibition of Nuclear Weapons in 2017, for which the International Campaign to Abolish Nuclear Weapons was awarded the 2017 Nobel Peace Prize. International medical organisations, including the International Committee of the Red Cross, the IPPNW, the World Medical Association, the World Federation of Public Health Associations, and the International Council of Nurses, had key roles in the process leading up to the negotiations, and in the negotiations themselves, presenting the scientific evidence about the catastrophic health and environmental consequences of nuclear weapons and nuclear war. They continued this important collaboration during the First Meeting of the States Parties to the Treaty on the Prohibition of Nuclear Weapons, which currently has 92 signatories, including 68 member states.[11]

We now call on health professional associations to inform their members worldwide about the threat to human survival and to join with the IPPNW to support efforts to reduce the near-term risks of nuclear war, including three immediate steps on the part of nuclear-armed states and their allies: first, adopt a no first use policy;[12] second, take their nuclear weapons off hair-trigger alert; and, third, urge all states involved in current conflicts to pledge publicly and unequivocally that they will not use nuclear weapons in these conflicts. We further ask them to work for a definitive end to the nuclear threat by supporting the urgent commencement of negotiations among the nuclear-armed states for a verifiable, timebound agreement to eliminate their nuclear weapons in accordance with commitments in the NPT, opening the way for all nations to join the Treaty on the Prohibition of Nuclear Weapons.

The danger is great and growing. The nuclear armed states must eliminate their nuclear arsenals before they eliminate us. The health community played a decisive part during the Cold War and more recently in the development of the Treaty on the Prohibition of Nuclear Weapons. We must take up this challenge again as an urgent priority, working with renewed energy to reduce the risks of nuclear war and to eliminate nuclear weapons.

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FRUCTOSAMINE AS AN INDEX OF GLYCAEMIA OF TYPE 2 DIABETES MELLITUS PATIENTS AT JOS UNIVERSITY TEACHING HOSPITAL.

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ABSTRACT

Introduction: With increasing prevalence of DM worldwide and imported lifestyle changes in our environment, there is a compelling need for adequate treatment and improved/novel monitoring tools. Fructosamine therefore may be useful as a complementary or substitute monitoring index given that is cheaper, technically easier to perform than HbA_{1c} and the assays have now been standardized and automated. This study aimed to determine the serum fructosamine concentration and the albumin adjusted fructosamine in type 2 diabetes mellitus patient as a measure of monitoring plasma glucose.

Methods: A cross-sectional study involving 180 study participants. A structured questionnaire was administered. The analysis was done using SPSS. Descriptive and inferential statistics were used with $p < 0.05$ considered statistically significant. Ethical clearance and informed consent were obtained before the commencement of the study. Participants were T2DM patients of JUTH aged 18-65 years while controls were healthy non-diabetic consenting staff of JUTH/clinical students of University of Jos. Samples collected were assayed for HbA1c, fasting glucose, Fructosamine and albumin.

Results: A hundred and twenty T2DM and 60 controls participated in the study. There were more females (87) than males (33) T2DM patients. The mean Fasting Blood Glucose (FBG), Fructosamine, HbA1c and Albumin amongst patients was 9.4±4.9 mmol/L, 392.5±137.1 µmol/L, 8.6±2.7% and 48.0±5.4 g/L compared to controls of 4.8±0.5 mmol/L, 258.7±21.0 µmol/L, 5.6±0.5 % and 50.9±2.6 g/L respectively. The differences in the mean FBG, fructosamine and HbA_{IC} levels among patients and controls was statistically significant ($P<0.001$). Adjusted fructosamine using three different formulae showed higher adjusted fructosamine in patients than in controls ($P<0.001$). Serum Albumin however was significantly higher in controls than patients with a p-value of less than 0.001.

Conclusion: *This study has shown that serum fructosamine correlate significantly with the FBG among T2DM patients and even revealed a slightly better correlation than HbA_{1c} and can therefore be used to monitor blood glucose level among T2DM patients requiring a shorter period of follow-up and with financial constraints.*

KEYWORDS: Fructosamine, Diabetes Mellitus, Glycated haemoglobin, Fasting glucose

INTRODUCTION

Diabetes Mellitus (DM) is a major public health problem worldwide. It was estimated by the International Diabetes Federation (IDF) to be 451 million people (aged 18-99 years) in 2017. These figures are expected to rise to 693 million by 2045.[1] An estimated 15.5 million adults aged 20-79 years were living with diabetes according to the IDF within the African region in 2017, representing a regional prevalence of 3.3%. Nigeria has witnessed a significant rise in the prevalence of DM over the past two decades. In 1992, the prevalence of DM was 2.2% as reported by the National Non-Communicable Disease (NNCD) survey with Lagos Mainland having the highest rate of 7.2%.[2] The IDF estimated a current overall prevalence of 5% DM in Nigeria.[3] The complications that are often associated with T2DM have a linear relationship with the average plasma glucose and the duration of such elevation. The management of diabetes in therefore hinged on adequate long-term monitoring of glycaemic control. The monitoring of glycaemic control in T2DM is often carried out by means of laboratory investigations such as fasting blood glucose (FBG), random blood glucose (RBG), post-prandial plasma glucose, glycated haemoglobin (HbA_{1c}) and sometimes by fructosamine and 1, 5-anhydroglucitol levels.[4] Fructosamine is a marker of glucose control reflecting the average serum glucose level over the preceding 2-3 weeks.[5] Consequently, it may be more appropriate for monitoring early response to treatment. This study is hopes to contribute to existing body of knowledge on Fructosamine and it seeks to evaluate the fructosamine levels in T2DM in relation to more established markers of blood glucose like plasma glucose and HbA_{1c} as well as the effect of albumin levels on these relationships.

MATERIALS AND METHODS

Jos university teaching hospital (JUTH) is a 600-bed tertiary health institution and serves as a referral centre for many neighboring states. This is a cross sectional study using specimen from consenting T2DM patients attending diabetic clinic in JUTH. The controls were healthy non-diabetic consenting individuals from staff of JUTH and some clinical student of University of Jos who have been instructed to fast overnight prior samples collection.

Inclusion Criteria

Patients aged 18-65 years who gave consent to participate in the study with confirmed T2DM. Controls were consenting adults within the same age bracket with FPG $\leq$ 5.6 mmol/L, not known diabetic nor on anti-diabetic medication(s).

Exclusion Criteria

Non-consenting patients, age outside 18-65 years or those having suspected T1DM. Controls with FPG > 5.6mmol/L or known Diabetics. Ethical approval was obtained from the Jos University Teaching Hospital ethical committee.

SAMPLE COLLECTION AND PROCESSING

The participants were instructed to fast for at least 8-12hours overnight. Sample collection was carried out between 8am and 10am with about 3-5mls each of venous blood collected from a peripheral vein (antecubital venipuncture) into an Ethylenediaminetetraacetic acid (EDTA), Sodium fluoride and plain vacutainer bottles for HbA_{1c}, glucose, fructosamine and albumin respectively. Specimen were centrifuged at 4000 revolutions per minute for five minutes. The serum from the plain bottle was separated promptly transferred to cryovials and stored at -20°C in a non-self-defrosting freezer for at most six weeks before analysis of fructosamine and albumin. Glucose was analyzed on the day of sample collection within an hour of sampling. The samples for HbA_{1c} collected in EDTA bottles were stored at -80°C until assayed within 60 days. The vacutainer needles were discarded into a biosafety box. The centrifuge (Universal 320 Hettich) and Cobas C311 chemistry autoanalyser (Roche® Diagnostic, Mannheim, Germany) were used during this process. The reagents and kits used for the measurement of Serum Glucose, Fructosamine, HbA_{1c} and Albumin

were procured from Roche® diagnostics (ISN).
To ensure adequate quality control samples were analyzed in batches (except for glucose) together with quality control sera from Roche® Diagnostics products. Analytical accuracy and precision was assured by simultaneous analyses of pooled serum and commercial quality control specimen at low and high control ranges. Glucose control was carried out per daily run. The general quality control measures was observed alongside instrument calibration before laboratory analysis

RESULTS

The study involves 180 participants comprising 120 T2DM Patients and 60 controls determined using the Fischer's formula and a prevalence rate of 8.4%[91, 92] in Nigeria. The mean age of the patients was slightly higher than the controls. There were more females than males among the study participants. The differences in the mean FBG, fructosamine and HbA_{IC} levels among patients and controls was statistically significant (P<0.001). Adjusted fructosamine using three different formulae showed higher adjusted fructosamine in patients than in controls (P<0.001). Serum Albumin however was significantly higher in controls than patients with a p-value of less than 0.001. (Table 1)

Table 1: clinical and biochemical characteristics of patients and controls

Characteristics	Patients Mean (SD)	Controls Mean (SD)	t-test	P-value
Age (years)	51.8±9.1	48.4±9.4	2.358	0.019
Sex				
Males (%)	33(27.5)	28(46.7)		
Females (%)	87(72.5)	32(53.3)	6.559	0.010
FBG (mmol/L)	9.4±4.9	4.8±0.5	7.505	<0.001
FRA (µmol/L)	392.5±137.1	258.7±21.0	3.870	<0.001
HbA_{1c} (%)	8.6±2.7	5.6±0.5	8.852	<0.001
Albumin (g/L)	48.0±5.4	50.9±2.6	8.592	<0.001

FRA= Fructosamine, Alb-FRA= Albumin Adjusted Fructosamine, FBG= Fasting blood glucose, BMI= Body mass index, HbA_{1c}= Glycated Haemoglobin
* Alb-FRA1=FRA X 40/ALB, ** Alb-FRA2= FRA + 0.3 (40-ALB), *** Alb-FRA3 =49 X FRA/ALB

The serum fructosamine value of the patients and controls ranged from 170-771 µmol/L and 214-310 µmol/L respectively. The mean fructosamine concentration of patients and controls were 392±137.1 µmol/L and 258.68±21.0 µmol/L respectively. The difference was statistically significant with a p-value of <0.001. The serum fructosamine of controls were Gaussian in distribution while those of patients were skewed to the right. (Figure 1 and 2).

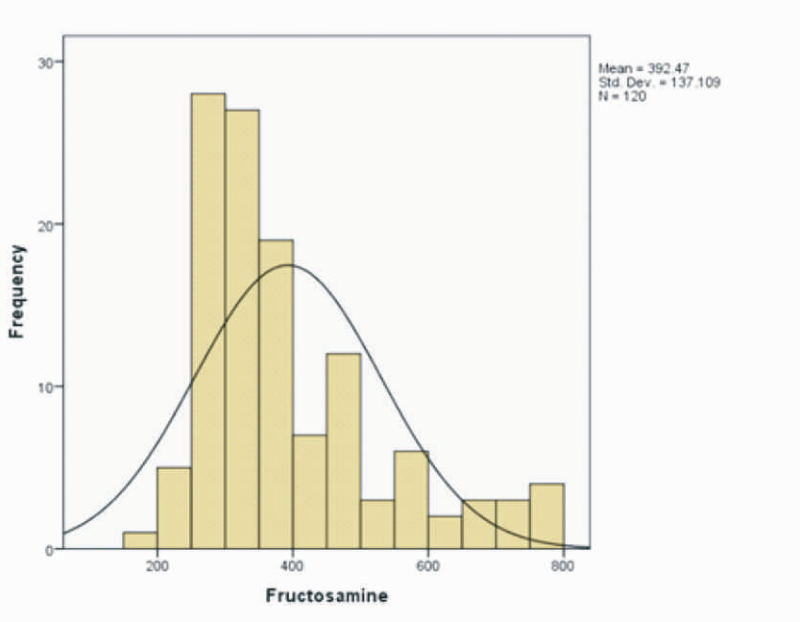

Figure 1: Distribution of Fructosamine in study patients

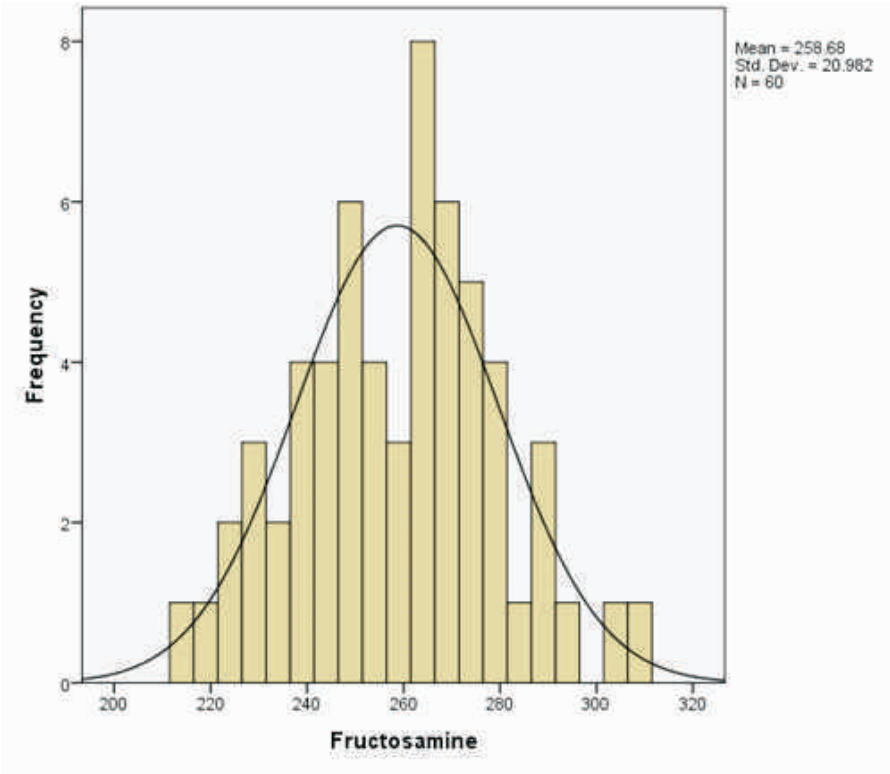

Figure 2: Distribution of Fructosamine in Controls

Table 2: median, range and inter-quartile range of biochemical parameters according to study groups

Parameter	Patients			Control			U-test *(p-value)*
	Median	**Inter-quartile range**	**Range**	**Median**	**Inter-quartile range**	**Range**	
FBG (mmol/L)	7.9	5.9-11.3	3.7-30.5	4.9	4.5-5.1	3.7-5.9	532.0 (<0.001)
FRA(µmol/L)	347.5	295.5-455.0	170-771	261.5	243.3-272.0	214-310	680.0 (<0.001)
Albumin (g/L)	49.0	46.0-51.0	12-59	50.0	49.0-53.0	47-56	2215.0 (<0.001)
Alb-FRA1 (µmol/L)	295.5	244.3-361.75	181-653	201.5	195.0-213.8	176-266	360.5 (<0.001)
Alb-FRA2 (µmol/L)	303.5	251.0-373.5	186-674	206.5	200-218.5	181-270	339.0 (<0.001)
Alb-FRA3 (µmol/L)	362.0	299.3-442.8	222-800	246.5	239.0-261.5	215-341	395.5 (<0.001)
HbA_{1C} (%)	8.0	6.0-11.0	5-15	6.0	5.0-6.0	5-6	814.5 (<0.001)

FBG= Fasting Blood Glucose, FRA= Fructosamine, Alb-FRA= Albumin Adjusted Fructosamine, HbA_{1c}= Glycated Haemoglobin, U = Mann-Whitney U test

* Alb-FRA1=FRA X 40/ALB, ** Alb-FRA2= FRA + 0.3 (40-ALB), *** Alb-FRA3 =49 X FRA/ALB

The median, inter-quartile range and range of biochemical parameters are shown in **Table 2.** This is also depicted using the Box-Whiskers Plot in **Figure 3**. The Box-Whiskers plot showed a better presentation of the spread and cluster of fructosamine among patients and controls. The plot showed a wider spread among the diabetic patients compared to controls. Mann-Whitney U test (non-parametric method) was used to compare the median fructosamine levels among cases and control. Except for Serum Albumin, the median levels of all biochemical parameters assessed were significantly higher among cases than controls (P< 0.001). The median albumin however was slightly higher among controls than cases. (p<0.001).

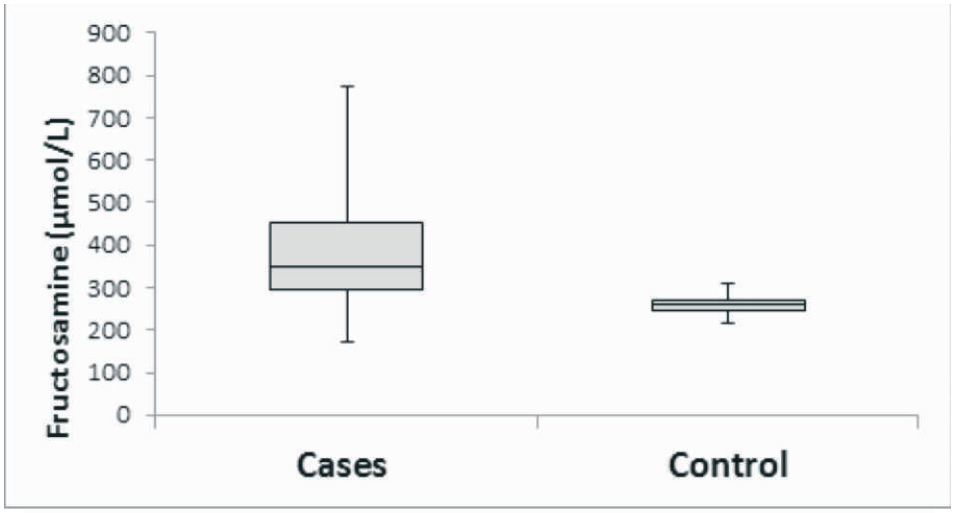

Figure 3-: Box-Whisker Plot showing the distribution of Fructosamine according to study groups

There was a positive correlation between fructosamine and all the parameters, ($p<0.05$). Fructosamine had a higher correlation with glucose (0.829) compared to HbA_{1c} (0.796) among the diabetic patients. The result among the control group was quite different when compared to that seen among patients. There was a negative correlation between fructosamine and HbA_{1c} while the correlation between fructosamine and glucose was 0.459.

The association between fructosamine (Adjusted and unadjusted) and FBG was significant (p-value is <0.001) as seen in **Table 3.** When 7.0 mmol/L was used as cut off value, fructosamine and FBG identified equal number of patients with glucose value of <7.0 mmol/L as 'normal'. However fructosamine classified only 42% of patients with **≥ 7.0 mmol/L as having elevated glycaemia. This may be explained by the different duration of glycaemia measured by both parameters. While FBG measures the spot glucose level, fructosamine measures the average of glucose over 2-3 weeks.**

Table 3: association between fructosamine and fbg of t2dm patients

Parameter	**FBG (<7.0mmol/L) n=49**	**FBG (≥ n=71**	Total **n=120**	Fishers p-value
Fructosamine				
Elevated	0(0.0)	30(42.3)	30(25.0)	
Normal	49(100.0)	41(57.7)	90(75.0)	<0.001
Adjusted Fructosamine 1				
Elevated	2(4.1)	28(39.4)	30(25.0)	
Normal	47(95.9)	43(60.6)	90(75.0)	<0.001
Adjusted Fructosamine2				
Elevated	2(4.1)	28(39.4)	30(25.0)	
Normal	47(95.9)	43(60.6)	90(75.0)	<0.001
Adjusted Fructosamine 3				
Elevated	2(4.1)	28(39.4)	30(25.0)	
Normal	47(95.9)	43(60.6)	90(75.0)	<0.001

Similarly, the association between fructosamine (Adjusted and unadjusted) and HbA_{1c} was equally significant as shown in Table 4. An HbA_{1c} value of 6.5% was used as a cut off. All patients with HbA_{1c} <6.5% equally had a normal fructosamine value, this constitute 28% of the patients. Out of the remaining 72% who had $HbA_{1c} \geq 6.5\%$, 34% of them equally had elevated fructosamine while the remaining patients in this category had a normal fructosamine values. The different time frame of glycaemia measured by these two parameters may also explain some of the statistical differences observed.

Table 4: Association between fructosamine and hba_{1c} of t2dm patients

Parameter	HbA_{1c} (<6.5%) n=33	HbA_{1c} (≥ n=87	Total n=120	Fishers p-value
Fructosamine				
Elevated	0(0.0)	30(34.5)	30(25.0)	
Normal	33(100.0)	57(65.5)	90(75.0)	<0.001
Adjusted Fructosamine1				
Elevated	0(0.0)	30(34.5)	30(25.0)	
Normal	33(100.0)	57(65.5)	90(75.0)	<0.001
Adjusted Fructosamine2				
Elevated	0(0.0)	30(34.5)	30(25.0)	
Normal	33(100.0)	57(65.5)	90(75.0)	<0.001
Adjusted Fructosamine3				
Elevated	0(0.0)	30(34.5)	30(25.0)	
Normal	33(100.0)	57(65.5)	90(75.0)	<0.001

Figure 4 shows the Receiver Operative Characteristic (ROC) curve of fructosamine and HbA_{1c} as predictors of glycaemic control.

The Area under curve (AUC) for unadjusted fructosamine was the highest (0.960) while the lowest was HbA_{1c} (0.878). At 285 µmol/L (upper reference limit used for this study), fructosamine has a sensitivity of 1.000 and a specificity of 0.449 for predicting good glycaemic control among all study participants.

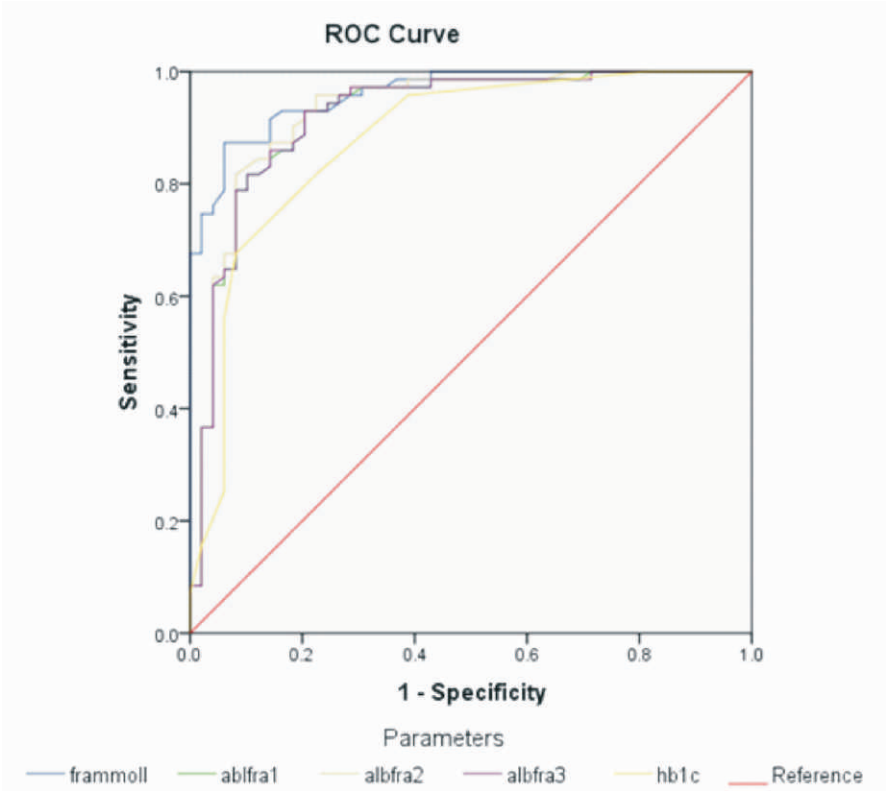

Figure 4: ROC Curve of fructosamine and HbA_{1c} (< 7mmol/L) as a Predictor of glycaemic control

DISCUSSION

The laboratory cut-off values for the diagnosis and management of the DM has constantly being changing over the years. For example, in 2011, WHO and ADA ratified the classification of HbA_{1c} as a diagnostic tool rather than just for monitoring of DM while fructosamine remains a monitoring tool[6, 7]. With the increasing prevalence of Diabetes mellitus and the forecasted increase due to modernization, adequate monitoring of short, intermediate and long-term blood glucose level becomes more important. While the use of FBG and HbA_{1c} for short and long-term monitoring of glycaemia among T2DM patients is relatively well established, the use of serum fructosamine as an intermediate-term glycaemic marker has not gained as much popularity as the earlier two especially in our environment.

The result from this study showed a significantly higher serum fructosamine values among T2DM patients compared to the controls as expected of an index of glycaemia. This is similar to the findings of the study carried out by Isah *et al* in Zaria in 1990 among diabetic and non-diabetic patients which also showed a higher fructosamine levels among T2DM patients when compared to non-diabetic individuals.[8] The study further revealed a significant positive correlation between the serum fructosamine values, FBG and HbA_{1c} among T2DM patients. This is similar to a study by Rosediani *et al* in Malaysia in 2006 which showed a significant correlation between FBG and both HbA_{1c} and fructosamine.[9] In the same study, HbA_{1c} correlated better with FBG than fructosamine. The disparity in the strength of correlation between the older study and this present study may be partly attributed to the relatively smaller sample size of 82 in the older study compared to 120 of the present one. The correlation of fructosamine with FBG and HbA_{1c} among controls was however different. While fructosamine had a weak positive correlation with FBG, it appeared to have no

correlation with HbA_{1c} among this group. This could mean that fructosamine may not adequately predict the glycaemic levels of non-diabetic individuals when compared with FBG and HbA1c according to the findings of this study. This may also limit the usefulness of fructosamine only to confirmed diabetic cases as pointed out also in an article by Justyna *et al*. [10]

Albumin was observed to be slightly higher among control than the diabetic patients. This could be explained by the fact that albumin being a negative acute-phase protein may be reduce in response to inflammatory conditions. These inflammatory conditions will likely be more prominent among the diabetic participants considering the pathophysiology of this ailment.

Fructosamine levels were higher in diabetics but had a positively skewed pattern of distribution when compared with controls with a normal distribution. The higher standard deviation of the cases is likely due to the wider spread of the individual values which is expected considering the different degrees of glucose control in this group of participants.

Our study showed little relationship between fructosamine, FBG and HbA_{1c} in normal participants. While HbA_{1c} had a positive correlation with FBG among the non-diabetic participants, fructosamine showed weak correlation to FBG and HbA_{1c} among this group of participants as against the correlation it had among the T2DM patients. It is therefore unlikely that fructosamine values will be helpful to dichotomize normal from diabetic patients in this population. This finding of a weak correlation of fructosamine with FGB among apparently normal participants was equally noted by Isah *et al* in Zaria Nigeria.[8] HbA_{1c} was not part of that study.

Diagnostic cut-point equivalents for fructosamine could be useful to identify T2DM patients with hyperglycaemia above desirable limits in settings where FBG or HbA_{1c} are not available or where the interpretation of these traditional measures is problematic, such as in settings with high prevalence of haemoglobinopathies. From the regression analysis of the data obtained from the T2DM patients of this study, a fructosamine levels of around 331 µmol/L which correspond to HbA_{1c} value of 7.0% could predict good glycaemic control in this group of patients according to this study. This would mean T2DM patients with fructosamine value of $\leq$ 331 µmol/L are in good glycaemic control while patients with fructosamine values >331 µmol/L would be regarded as having inadequate glycaemic control.

A positive correlation between fructosamine and albumin concentration was also observed in this study. This observation is in agreement with previous reports by Hindle *et al*.[11] It was also reported that serum fructosamine level may not be valid in hypoalbuminaemia, but in individuals with albumin level greater than 30 g/L. The least albumin value among the participants of this study was 38 g/L. Some other studies also found that serum fructosamine concentrations are valid and independent of albumin concentration.[12, 13] Albumin plays a significant role in fructosamine formation, being the most abundant protein in circulation and in view of its relatively long half-life (17-20 days) and possession of several lysine residues.[101] About 80% of the fructosamine in serum is said to be accounted for by albumin.[14]

The limitations of this study included the diagnosis of T2DM based on patient's history and clinical clues alone. Also the study assumed that every adult participant with Diabetes Mellitus had T2DM. Other laboratory tests were not done to properly classify patients as either T1DM or T2DM.

CONCLUSION

This study has shown that serum fructosamine correlate significantly with the FBG among T2DM patients and even revealed a slightly better correlation than HbA_{1c} and can therefore be used to monitor blood glucose level among T2DM patients especially when shorter follow-up and a cheaper test could benefit the patient. The study also revealed that serum fructosamine level of $\leq$ 331 µmol/L (corresponding to HbA_{1c} of $\leq$ 7.0%) could also predict adequate glycaemic control among

T2DM patients.

The study therefore recommends serum fructosamine assay as a complemetary glucose monitoring tool for shorter durations glucose monitoring alongside HbA_{1c} and FBG in the management of T2DM patients especially considering patients who access health care using out of pocket payments.

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FACTORS CONTRIBUTING TO HOME DELIVERY AMONGST WOMEN UTILIZING ANTENATAL SERVICES IN JOS UNIVERSITY TEACHING HOSPITAL

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ABSTRACT

Background: Unskilled home delivery is a threat to maternal and child health and one of the factors associated with the very high maternal and fetal mortality is the occurrence of home deliveries as they are largely unplanned, accidental and unhygienic. The objective of this study was to determine the prevalence of home delivery among antenatal clinic attendees as well as factors contributing to their choice of place of delivery.

Methods: This was a cross sectional descriptive study that sampled the opinions of three hundred and forty (340) consenting pregnant women in Jos University Teaching Hospital using pretested and semi structured questionnaires which were self administered. Chi-squared test of statistical significance was used determine relationships between relevant variables with p value set at 0.05.

Results: The prevalence of home delivery was 23.5% and high cost of hospital deliveries was the most predominant reason for home deliveries by the participants (76.5%). Other reasons for home delivery included unexpected labour (75.6%), long distance from the health facility (66.5%) and unfriendly attitude of health workers (49.1%) amongst others. Home deliveries was significantly associated with low educational attainment ($p<0.0001$), polygamous family setting ($p<0.05$), Hausa Fulani ethnicity ($p<0.0001$), Islamic religion ($p<0.0001$) and petty trading ($p<0.0001$). Obstetric complications were also more likely when respondents delivered at home compared to hospital deliveries.

Conclusion: The high prevalence of home deliveries attributable to the inability of women to afford the cost of hospital deliveries shows the need for a subsidization of maternal and child health services, improved economic empowerment of women and elimination of bureaucracy and bottlenecks that increases the cost of institutional deliveries.

Key Words: Home, Delivery, Knowledge, Complication, Antenatal, Jos, Nigeria

INTRODUCTION

For more than 20 million women each year, pregnancy and childbirth mean suffering, ill health or death[1]. Recent estimates suggest that more than 500,000 women die annually of pregnancy related complications; ninety nine percent (99%) of those deaths occur in less developed regions particularly Africa and Asia.[1]

Labour or human parturition is the physiological process that results in birth of a baby, delivery of the placenta and the signal for lactation to begin.[2] Unskilled home delivery is a threat to maternal and child health. The vast majority of women who deliver outside the health facilities, give birth at home and in developing countries, one of the factors associated with the very high maternal and

fetal mortality is the occurrence of home deliveries as they are largely unplanned, accidental and unhygienic.[3,4,5,6] In Northern Nigeria, many pregnant women attend antenatal care but opt to deliver at home despite knowing the potential consequences.[7] Widespread home delivery amongst women of child bearing age and the low use of reproductive health services ensures that Nigeria continues to witness a high maternal-mortality ratio.[6]

Health facility delivery has been described as one of the major contributors to improved maternal and child health outcomes.[8,9] Eighty five percent of maternal mortality in Africa are a direct result of complications arising during pregnancy, delivery or the puerperium and in sub Saharan Africa where 66% of the global maternal mortality occurred, only 56% of all births take place in health facility[9,10]

Data from 2013 Nigeria Demographic and Health Survey involving 20,192 women revealed that non-utilization of health service for delivery is influenced by individual, community and state level factors, with substantial proportions of women not utilizing such service residing in the Northern Nigeria.[8,9] Factors such as knowledge of pregnancy and health risks, importance given to pregnancy, earlier health facility use, pre-birth visits and pregnancy complications, can affect whether a woman perceives the need for institutional delivery.[11] Culture, local myths and misconceptions about pregnancy and birth have been noted as factors deterring health care seeking. If health care providers are familiar with different ideas, rituals and behavioral restrictions and proscriptions, they will be able to communicate with the women, enabling them make an informed choice.[11]

Access to quality health care during pregnancy and in particular, during delivery is a crucial factor in explaining the huge disparity in maternal and peri-natal mortality and morbidity between developing and the industrialized world.[12] In developing countries, about 35% of women have no antenatal care during pregnancy, almost 50% give birth without skilled attendants and 70% receive no postpartum care.[8,10] Sixty percent of home deliveries in these countries take place in rural areas with unskilled attendants.[10]

A 2013 community based cross-sectional study conducted amongst 140 pregnant women in Russia village of Jos North, Nigeria on the factors determining the choice of a place of delivery among pregnant women revealed that 39.3% of the women opted for home delivery.[6] The determinants of choice of delivery place revealed by the study included the cost of hospital bill (93.6%), unfriendly attitude of health care workers (61.4%), unexpected labour (75%), distance to health care centers (36.4%), and failure to book for antenatal care (10.7%). No reason was given by 3.6% of the women.[6]

A retrospective analysis of the complications of home delivery conducted in Nepal, where attendance at delivery by skilled health workers was only 6%, revealed that complications associated with home deliveries were retained placenta (84.1%), postpartum haemorrhage (10.2%) and peri-natal mortality which was 65.9/1000 births (compared to 29.4/1000 in hospital delivered cases). The study showed that home deliveries were associated with increased maternal morbidity especially the third stage complications.[13]

Home births are always a source of controversy, eliciting strong reactions from proponents and opponents.[14]The ideal place and organization of care provision has not been established[15]. Even though it is an established fact that women need care by a skilled health professional during pregnancy and childbirth to identify, prevent and treat health issues for her and her baby should they arise, we do not know if providing that care at home is as safe as in a hospital, particularly in poorer and developing countries.[15] Studies done in developed countries have shown that home birth is safe for normal, low risk women, with adequate infrastructure and support i.e. given a well trained midwife and facilities to transfer to hospital if necessary.[13]

The World health organization recommends a two-tier maternity care system involving first-level care in community facilities, with back up hospital

care.[15] Outside of high income countries, birth outside of hospitals is more common, and access to medical facilities and obstetricians may be restricted by a lack of many factors such as recognition of need, availability, transport, finances, or culturally or socially appropriate care.[15] According to UNICEF, only 59% of births in west and central Africa are attended by skilled personnel.[16] The unavailability of essential medical services at home, as well as the lack of proper supervision, in low-middle income countries makes home deliveries a significant risk factor for maternal and peri-natal morbidity and mortality.[17] The home environment as a place of delivery in developing countries is shown to be unsafe. As such, monitoring deliveries in health facilities is essential to ensuring that women receive quality care and deliver in an environment that is prepared for an emergency.[16,17] A recent large meta-analysis of mostly cohort studies (500,000 births) showed a doubling of the risk of excess neonatal deaths for home birth from 0.09% to 0.2%- one extra death in 900 births.[17] Sub-Saharan Africa unfortunately has the lowest number of births taking place in a health facility and continues to bear the highest burden of maternal and newborn deaths.[16]

Considering the need for supervised deliveries in achieving the targets of sustainable development goal number 3, which entails ensuring healthy living and promotion of well-being for all at all ages, [16] it is crucial to explore the factors that influence the choice of place of delivery in developing countries and as such availability of skilled attendance and emergency obstetric care when needed. Very few qualitative studies have explored women's need for supervised delivery services.[18]

METHODS

Study design: This study was a cross sectional descriptive study that evaluated the factors contributing to home delivery by pregnant women attending antenatal care clinic. The study was a facility – based study that was conducted in the Jos University Teaching Hospital. The Jos University Teaching Hospital (JUTH) is located in Lamingo, Jos East Local Government Area of Plateau State. It was established in June, 1981 and presently has a bed space capacity of six hundred and thirty-four beds.

Study setting: The Obstetrics and Gynaecology department serves as one of the major providers of antenatal care services in Plateau State which is situated in North Central Nigeria. The state has 904 primary health care facilities, 59 secondary health facilities and 2 tertiary health facilities, one of which is the Jos University Teaching hospital.[19] It serves as a referral center for complicated pregnancies that require expert care both within the state and for neighboring states like Bauchi, Nasarawa and Taraba.[19] The department runs antenatal care clinics from Mondays to Thursdays every week with about four thousand one hundred pregnant women registering for antenatal care clinics annually.[6]

Study Population: The study population for this study comprised of women that register for antenatal care clinics annually in Jos University Teaching Hospital. The women come from within the state and neighboring states, are of different ethnic/religious groups, socioeconomic status, ages, educational background and at different stages of their pregnancies.

Inclusion Criteria: All pregnant women at all gestational ages with at least one prior health facility or home delivery.[7]

Exclusion Criteria: Nulliparous women

DATA COLLECTION TOOL

Data was collected with a pretested questionnaire. The questionnaire had twenty-nine (29) questions distributed into six sections (A – F) namely: socio-demographic characteristics, reproductive characteristics, Outcomes of home delivery, Outcomes of hospital delivery, knowledge of complications of unsupervised home delivery, Awareness of the benefits of hospital delivery.

SAMPLING TECHNIQUE

A consecutive sampling technique was employed for this study. This involved recruiting women that met inclusion criteria for the study on a daily basis as they came for their antenatal care clinic until the required sample size was achieved.

PROCEDURE FOR DATA COLLECTION

The pretested semi structured questionnaires were issued to the consenting pregnant women who met the inclusion criteria by the Nursing staff of the booking clinic, trained for data collection, after the researcher had obtained informed verbal and written consent for the study. The questionnaires were self-administered and clarifications were provided by the researcher whenever requested for. Interviews were given and the questionnaires filled by the Nursing staff for women who could not read and write.

SAMPLE SIZE DETERMINATION

The sample size for this study was estimated from the formulation for determining sample size in observational studies as follows.[20]

$$\text{Sample size} = \frac{Z_{1-\alpha/2}^2\, p(1-p)}{d^2}$$

$Z_{1-\alpha/2}$ = Is the standard normal variate (at 5% type 1 error ($P < 0.05$) it is 1.96.

p = Expected proportion in population based on previous studies or pilot studies. 74.1% is the prevalence obtained for home deliveries in a more recent study in Kano, Nigeria as such p = 0.74. [7]

d = Margin of error or precision. We set the margin of error as 5%.

$$\frac{1.96^2 \text{ X } 0.74 \text{ X } (1 - 0.74)}{0.05^2}$$

$$= 0.73912384 / 0.0025$$

= 295 samples

The minimum sample size therefore required for this study was 295.

An attrition rate of 10% was used to avoid bias and ensure validity of the results.[21] This was added to the minimum sample size obtained. That is 10% of 295 which is equal to 29.5. The total sample size required was therefore 29.5 + 295 = 324.5

This was rounded up to 350 samples**.** Ten questionnaires were not properly filled as such only 340 questionnaires were analyzed.

The data obtained was entered directly into and analyzed using the statistical package for the social sciences software version 23 (SPSS Inc, Chicago, IL). When analyzing the respondents knowledge of birth complications associated with home delivery, individual scores of the respondents were summed up and those who had a score of 70 to 100% were classified as having good knowledge of these complications, those who score 50 to 69%, had a fair knowledge while those who scored less than 50% had a poor knowledge.

Ethical Issues: Ethical approval to conduct this study was obtained from the JUTH Health Research Ethics committee, Jos Plateau state with reference number JUTH/DS/IRE/127/XXXI/547. In addition, verbal informed consent was obtained from each respondent.

RESULTS

TABLE 1: Socio-demographic characteristics of pregnant women interviewed at the Antenatal clinic of Jos University Teaching Hospital (n= 340)

Variables	Frequency (n)	Percentage (%)
Age group (years)		
<20	3	0.9
20-29	155	45.6
30-39	170	50.0
≥40	12	3.5
Religion		
Christianity	180	53.9
Islam	160	47.1
Marital Status		
Unmarried	15	4.4
Married	325	95.6
Occupation		
Civil servant	83	24.4
House wife	101	29.7
Business	69	20.3
Student	30	8.8
Tailor	21	6.2
Others	36	10.6
Level of education		
Primary	36	10.6
Secondary	122	35.9
Tertiary	155	45.6
Islamic	12	3.5
No formal education	15	4.4
Family monthly income (naira)		
6,000 – 10,000	39	11.5
11,000 – 30,000	155	45.6
> 30,000	146	42.9

Type of Family		
Polygamy	109	32.0
Monogamy	231	67.9
Ethnicity		
Hausa Fulani	168	49.4
Berom	36	10.6
Yoruba	21	6.2
Mwaghavul	18	5.3
Taroh	15	4.4
Afizere	15	4.4
Others	67	19.7

From table 1 above, pregnant women aged between 30 – 39 years made up 50% of the study population, with the teenage age group accounting for the least number of those studied. Furthermore, Christian and Muslim population were nearly equal in proportion with the Christians accounting for 52.9% of the population and the Muslims accounting for 47.1%. It can also be seen that most of the respondents (95.6%) were married. Only 4.4% were unmarried. Notably, a significant number of the respondents (45.6%) had completed tertiary education. Only 4.4% of the respondents had no formal education.

Most of the women (45.6%) were from families whose total income did not exceed the current minimum wage of 30,000 naira in Nigeria and monogamous family setting dominated the study population (67.9%) while polygamous setting was 32.1%.

Hausa Fulani ethnic group had the highest number of participants (49.4%). Other ethnic groups were Berom (10.6%), Yoruba (6.2%), Mwaghavul (5.3%), Taroh (4.4%), Afizere (4.4%) and others.

Table 2: Distribution of the participants by obstetric history

Variable	Frequency	Percentage
Parity		
0	6	1.8
1 -2	194	57.1
3 - 4	108	31.8
≥	32	9.4
Number of Booked Pregnancies		
0	9	2.6
1 – 2	205	60.3
3 - 4	105	30.9
≥	21	6.2
No. Of previous Home deliveries		
0	260	76.5
1 – 2	57	16.8
3 – 4	15	4.4
≥	8	2.4
Number of booked pregnancies that were delivered at h ome		
0	260	76.5
1 – 2	60	17.6
3 – 4	15	4.4
≥	5	1.5
Number of home deliveries attended by a health worker		
0	3	3.8
1 – 2	62	77.5
3 – 4	15	18.7

Table two above shows that more than half of the participants had a parity of 1 – 2 and most of them (97.4%) had booked at least one pregnancy in the past. An overwhelming majority had experienced hospital delivery with only 8.8% of the participants delivering entirely outside the hospital.

Figure 1 below shows that twenty three percent of the respondents have had home delivery in the past, whereas 76.5% have never had a home delivery. Although most of the respondents (76.5%) never proceeded to deliver at home after utilizing antenatal care, 23.5 % of booked pregnancies were eventually delivered at home. Notably, most of the respondents (96.2%) had their home deliveries attended by a health worker (Figure 1).

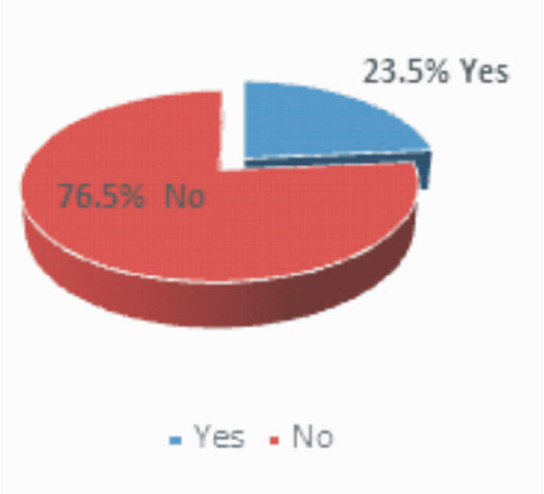

Figure 1: Distribution of Participants by Home delivery

Table 3: Relationship between socio-demographic characteristics and Home delivery

Variable	Total number	Number who had home delivery	Percentage who had home delivery
Age group			
<20	3	3	100
20 - 29	155	39	25.2
30 - 39	170	32	18.8
	12	6	50
$\chi^2 = 14.094$		p= 0.000	
Ethnicity			
Berom	36	3	8.3
Hausa Fulani	168	74	44.0
Mwagavul	18	3	16.7
Others	118	0	0
$\chi^2 = 75.438$		P= 0.000	
Religion			
Christianity	180	12	6.7
Islam	160	68	42.5
Total	340	80	49.2
$\chi^2 = 60.448$		P=0.000	
Occupation			
Civil servant	83	14	16.9
House wife	101	42	41.6

Petty trader	3	3	100
Business	69	12	17.4
Student	30	6	20
Tailor	21	3	14.3
Farmer	6	0	0.0
Others	27	0	0.0
χ^2= **40.411**		P= 0.000	
Level of Education			
Primary	36	15	41.7
Secondary	122	44	36.1
Tertiary	155	15	9.7
Islamic	12	6	50.0
No Formal Education	15	0	0.0
χ^2= **44.775**		P=0.000	
Type of Family			
Polygamy	109	35	32.1
Monogamy	231	45	19.5
χ^2= **6.565**		P=0.037	

Table 3 above shows that statistically significant relationships were established between home delivery and extremes of ages (< 20 years and > 40 years), Hausa Fulani ethnicity, Islamic religion, Petty traders, low educational achievement and polygamous family setting.

Table 4: Comparison of Complications Experienced Following Hospital and Home Delivery

Complications	Following home delivery (n=80)	Following Hospital delivery(n=260)
Neonatal death	21.3%	4.2%
Postpartum haemorrhage	26.3%	5.4%
Birth Asphyxia	3.8%	3.1%
Neonatal Birth Injuries	10.0%	5.8%
Maternal Birth Injuries	22.5%	8.1%
Puerperal sepsis	30.0%	7.3%

Some of the participants had more than one birth related complication. Table 4 above shows that participants were more likely to experience birth-related complications if the delivered at home. Major complication following home delivery were; Postpartum maternal infection (30.0%), Postpartum haemorrhage (26.3%), Maternal birth injuries (22.5%), neonatal death (21.3%) and Neonatal Sepsis (15.0%).

Some of the participants' (11.3%) who attempted home deliveries had to be referred to the hospital due to prolonged labour

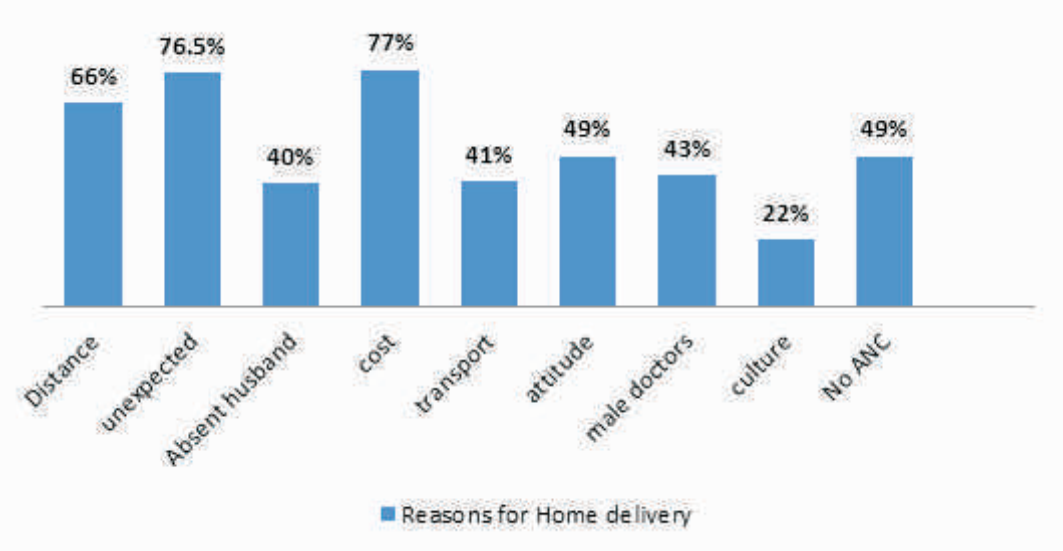

Figure 2: Reasons for Home delivery

Figure 2 above shows that most of the participants (76.5%) considered the high cost of hospital deliveries to be a reason for home deliveries. Other reasons were; unexpected labour (75.6%), long distance from health facility (66.5%) and unfriendly attitude of health workers (49.1%) amongst others.

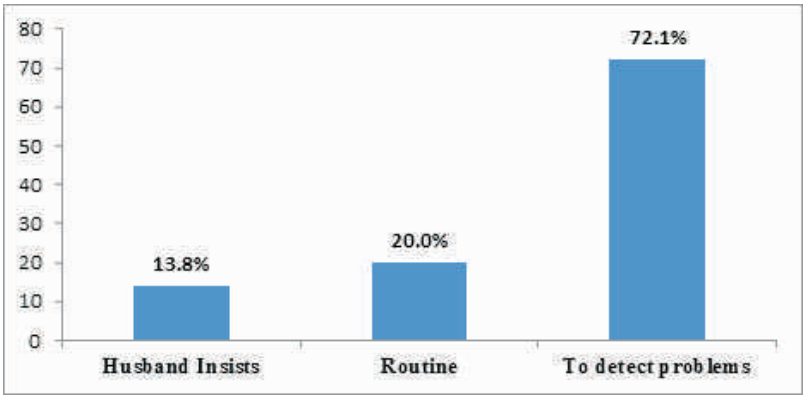

Figure 3: Reasons for Antenatal visits despite intention to deliver at home

Figure 3 above shows that most of the women gave more than one reason for antenatal clinic attendance despite intention to deliver at home. Most of the participants (72.1%) who have had home deliveries in the past attended Antenatal clinics despite their intention to deliver at home because they believed that Antenatal care help to detect any likelihood of complications during the pregnancy, labour and delivery.

Table 5a : General Knowledge of the risks and complications associate d with unsupervised home deliveries

Complications	**Knowledge (%)**
Prolonged labour	78.2%
Obstructed labour	53.8%
Worsening of Hypertension, Diabetes or other medical conditions in the mother	69.4%
Baby might acquire an infection at birth	87.9%
Baby might be injured during the delivery	88.8%
Mother might sustain a tear or be injured at birth	86.2%
Mother might acquire an infection during the delivery	92.1%
The baby might die during the delivery	85.0%
The mother might bleed excessively during/after the delivery	92.1%
The mother might die during the delivery	89.4%

Table 5a above shows that generally, the participants had good knowledge of risk factors associated with home deliveries. Majority (92.1%) were knowledgeable about the fact that mother might acquire an infection during the delivery and that the mother might bleed excessively during/ after the delivery (92.1%). Figure 4 below shows that majority (85.3%) had good knowledge, 7.6% had fair knowledge while 7.1% had poor knowledge respectively (Figure 3).

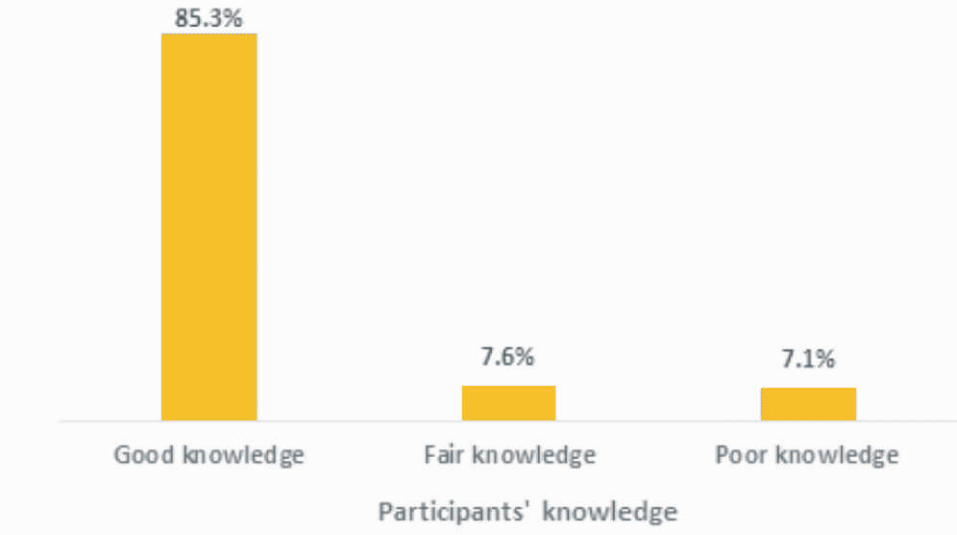

Figure 4: Participants' overall knowledge of the risk and complications associated with unsupervised home deliveries

Table 5b : Knowledge of the complications of home deliveries amongst women who have ever had home delivery

Knowledge	percentage
Good knowledge	20.7%
Fair knowledge	30.8%
Poor knowledge	50%
χ^2= 11.403 p= 0.003	

Table 5b above shows that most of the women who have had home deliveries in the past (50%) had a poor knowledge of the complications of home delivery. This was statistically significant.

DISCUSSION

The prevalence of home deliveries obtained from the study was significantly low when compared to studies done in Jos North[8], Kano[9], Zaria [1], Birnin Kudu[22] , Zambia[7] and Ethiopia[6], but higher than the prevalence obtained from Hausa women in Kaduna South Local Government.[10] Most of these home deliveries were attended by health workers. This finding could be attributed to the fact that majority of the participants demonstrated a good knowledge of the risks and complications associated with unsupervised home deliveries and had completed tertiary education as such either avoided home deliveries completely or engaged a skilled birth attendant to mitigate negative outcomes. Knowledge of the complications of unsupervised home deliveries amongst women who have had previous home deliveries was however poor.

Participants at extremes of ages were more likely to deliver at home. This finding was statistically significant and may not be unrelated to the direct correlation of age with parity and other socio-demographic indices[4]. Younger women are probably less experienced or empowered/influential to resist certain cultural norms and taboos that prohibit hospital deliveries and encourage home delivery. Envuladu et.al and Okeshola et.al, in Jos North and Kaduna south respectively also found similar association between age and home deliveries, with the older women more likely to deliver at home.[8,10] The older women probably have a higher parity and are as such over confident, believing that their long and successful obstetric experience guarantees continued success, irrespective of the location or circumstance of delivery.[10] This could explain the significant association of high parity with home delivery from this study. A similar study in Kano also found that willingness for home delivery was associated with age and parity of the study respondents.[9] In Jos North, however, no significant correlation between parity and home delivery was found.[8]

The Hausa/Fulani ethnic group had the most number of home deliveries and this was statistically significant. This may be attributed to certain socio-cultural beliefs relating to gender empowerment and the rights of women in decision making, affinity for home deliveries, aversion to male involvement in maternity care and financial status.[10] Beliefs that birth is a test of endurance and care seeking is seen as a sign of weakness may be another reason for delivery at home[10]. "Kunya" or shame plays an extremely important role in Hausa childbirth, particularly in the first pregnancy. The newly pregnant girl should not draw attention to her state, and all mention of the pregnancy should be avoided in conversation and action. Older women stand ready to scold her, should her actions deviate from the expected norm.[10] These socio-cultural beliefs might also have religious undertones hence the preponderance of Muslim participants to having home deliveries compared to

their Christian counterparts. Furthermore, in contemporary Nigerian society, most polygamous families are of the Hausa Fulani extraction [42] and the study showed a preponderance of home deliveries amongst polygamous families.

Participants who were housewives and petty traders were more likely to deliver at home, probably due to their relatively meager income and inability to afford health facility delivery. This is noteworthy given that a significant number of the respondents opined that the cost of hospital deliveries is responsible for home deliveries. A similar result was obtained in a study by Envuladu et.al and Okeshola et.al in Jos North and Kaduna South respectively where most of the respondents affirmed that cost of delivery determines women choice of place of delivery.[8,10] In Kano Nigeria though, the women who had delivered at home did not consider the cost of hospital delivery a significant factor, claiming that unfriendly attitude of hospital staffs, presence of male health workers, custom, and safety were more relevant determinants of home delivery.[9]

Level of education was significantly related to the prevalence of home delivery. Women who had only Islamic education or who had only completed primary school were more likely to have home deliveries. Similarly, Idris et.al in Zaria Northern Nigeria, reported that the mother's educational level amongst others was the main determinant of place of delivery.[1] Regardless of their level of education however, some of the participants had booked the index pregnancy and utilized antenatal services before proceeding to deliver at home. Most of them recognized that antenatal care helps to detect any likelihood of complications during the pregnancy, labour and delivery, hence their involvement in antenatal care despite their intentions to deliver at home. In Kano, Nigeria, Salisu et.al discovered that most of the respondents opted out of antenatal care and proceeded to deliver at home citing family issues, attitude of health workers, long distance of health facility, and financial difficulties.[9]

From the study, the most common complication experienced following home delivery was puerperal sepsis characterized by any either high grade fever, severe lower abdominal pain or

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ECHOCARDIOGRAPHIC ASSESSMENT OF PULMONARY HYPERTENSION IN PATIENTS WITH CHRONIC KIDNEY DISEASE SEEN AT THE JOS UNIVERSITY TEACHING HOSPITAL

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ABSTRACT

Background: Pulmonary hypertension (PH) is common in patients with chronic kidney disease (CKD) and is an independent predictor of mortality. It is a major public health issue that can lead to renal failure, heart disease, and early mortality. This study aims to assess the prevalence of pulmonary hypertension in patients with chronic kidney disease seen at JUTH.

Methods: A hospital-based cross-sectional study was conducted where 69 CKD patients were selected using a convenience sampling technique. The mean pulmonary arterial pressure (mPAP) of CKD patients was determined using transthoracic echocardiography. Chi-square and ANOVA were used to test for a significant difference in the prevalence of PH in different stages of CKD and levels of PAP based on severity in CKD patients respectively.

Results: Out of the 69 participants, 18 (26.1%) had elevated mPAP that was >24mmHg, of which 16 (23.3%) were mildly elevated with an mPAP of 29.6 mmHg, 1(1.4%) were moderately elevated with mPAP of 46.0 mmHg, and 1(1.4%) also had severely elevated PAP with a mean value of 58.0 mmHg. Most of the CKD patients were in stage 5 – 13(18.8%) while a few were in stage 2 and stage 3 representing 1 (1.4%) each.

Conclusion: Patients with CKD frequently experience pulmonary hypertension, and this rises as renal failure worsens. Therefore, echocardiography is advised for assessing pulmonary pressures in CKD patients in stage 3 and above, and for subsequent monitoring of the disease progression and response to treatment.

INTRODUCTION

Chronic kidney disease (CKD) is a major public health issue that can lead to renal failure, heart disease, and early mortality.[1,2] Cardiovascular disease continues to be the leading cause of morbidity and mortality in patients with CKD regardless of whether renal replacement therapy (RRT) is required.[3] Pulmonary hypertension (PH) is common in patients with CKD and is an independent predictor of mortality.[4] From several studies, the prevalence of PH ranges from 9 - 39% in individuals with stage 5 CKD, 18.8 - 68.8% in haemodialysis patients, and 0 - 42% in patients on peritoneal dialysis therapy.[5]

Several implicit mechanisms have been put forward to explain the co-existence of PH and CKD. Fibroblast growth factor 23 (FGF-23) is a marker of worsening renal function and has also

lately been intertwined as a causative factor in left heart abnormalities. For people who are genetically more likely to get left heart disease, FGF-23 may have a direct effect on pulmonary vascular remodeling. It may also have an indirect effect by promoting left heart disease, which in turn leads to pulmonary vascular remodeling. Moreover, CKD may contribute to PH through increased renin-angiotensin-aldosterone-system activation and inflammatory response, which have both been shown to be elevated in CKD and contribute to pulmonary vascular remodeling. Other risk factors for PH, such as left ventricular hypertrophy (LVH) and diastolic dysfunction, are common in patients with CKD and may predispose them to high pulmonary pressures.[6]

Pulmonary hypertension in patients with CKD may be induced and/or aggravated by left ventricular disorders and other risk factors typical of CKD. Some of these factors are volume overload, arteriovenous fistula, sleep-disordered breathing, exposure to dialysis membranes, endothelial dysfunction, vascular calcification/stiffening, and severe anemia.[5,7]

In Nigeria, the incidence of CKD is 1.6 - 12.4%8, while several hospital-based studies reported a prevalence of 2.5 - 26%.[1] However, the prevalence of PH in CKD patients in Nigeria is not known. This study aims to assess the prevalence of pulmonary hypertension in patients with chronic kidney disease at the Jos University Teaching Hospital (JUTH), Plateau State, Nigeria.

MATERIALS AND METHODS

Study area: The study was conducted at the medical outpatient clinic and inpatient ward of Jos University Teaching Hospital (JUTH) Jos. Jos is the capital of Plateau State in North-central Nigeria. It is about 1250m (4100 feet) above sea level with an average monthly temperature between 21oC and 25oC (69oF and 77oF). The cold weather and highland resort make it a center for tourist attraction.

Study design: The study was a hospital-based cross-sectional study carried out over 8 months.

Study population: Patients aged 18 years and older diagnosed with CKD attending the Nephrology clinic, or those on admission at the medical wards of JUTH who met the inclusion criteria constituted the study population.

Inclusion criteria: Adults (Aged 18 years and older) born to parents with Nigerian nationality.
Patients diagnosed with CKD in JUTH, defined as evidence of renal damage or eGFR less than 60ml/min/1.73m^2 for three months and above assessed using the CKD-EPI formula.

Exclusion criteria: Patients with renal disease on known pulmonary arterial hypertension medications like prostanoids, endothelin receptor antagonists, phosphodiesterase-5 inhibitors, or appetite-inhibitive medications history (e.g., fenfluramine, dexamphetamine), patients with heart failure, patients who have positive HIV results as obtained from their case notes, patients with a history of chronic lung diseases (Chronic obstructive pulmonary disease, pulmonary tuberculosis, lung fibrosis).

Sample size determination: The sample size was determined using Cochran's formula[9]

$$N = \frac{Z^2(P)Q}{d^2}$$

$$N = \frac{(1.96)^2(0.049)(1-0.049)}{(0.05)^2} = 70$$

The sample size for this research was composed of 70 CKD patients.

Sampling technique: A convenience sampling method was adopted in selecting patients who met the inclusion criteria above. This non-probability technique allowed the recruitment of CKD patients who were available and willing to be recruited consecutively.

Materials: A questionnaire, scanning gel, Tissue papers, Stadiometer, weighing scale, Mercury Sphygmomanometer (Accoson brand), Littman

stethoscope, Portable (2D) GE echocardiography Machine with 3.5mHz transducer probe (Vivid e, weight 4.9kg, serial number 514327wx6, 2016 May).

Study procedure: The purpose of the study was explained to each patient in the language they best understood. Consenting patients were required to sign a consent form or append their thumbprint where appropriate. Participate and were at liberty to withdraw from the study at any stage without consequences. An interviewer-administered questionnaire was completed for each patient, from which data on socio-demographic characteristics, medical history, and other parameters were obtained.

Blood pressure measurement: The blood pressure (BP) was taken after a 5-minute rest to eliminate anxiety10 using standard protocols for the auscultatory method.

Investigations: Electrocardiography was done for each patient. The CKD-epi formula was used to calculate eGFR which determined the stage of CKD as defined below. Patients were stratified into Groups 1-4 as CKD Stages 1-4, and Group 5 for those who were in Stage 5 and not on haemodialysis.

"Glomerular filtration rate: Glomerular filtration rate (GFR) is a test that measures the level of kidney function and determines the stage of kidney disease. It is the best overall index of kidney function that measures the kidney's ability to filter toxins or waste from the blood. Normal GFR varies according to age, sex, and body size and declines with age. The National Kidney Foundation recommends using the CKD-EPI Creatinine Equation (2021) to estimate GFR11 which was adopted for this study.

Determination of Chronic kidney disease: Either of the following had to be present for 3 months and above to be CKD:

GFR less than 60 ml/min/1.73.

Albumin-to-creatinine ratio (ACR) ?30 mg/g or other markers of kidney damage.

1. Stage 1: Normal renal function with eGFR ? 90ml/min/1.73
2. Stage 2: Mild renal impairment with eGFR 60 - 89ml/min/1.73
3. Stage 3: Moderate renal impairment with eGFR 30 - 59ml/min/1.73
4. Stage 4: Severe renal impairment with eGFR 15 - 29ml/min/1.73
5. Stage 5: End-stage renal disease with eGFR < 15ml/min/1.73

Echocardiography: Doppler echocardiography which is an accepted screening tool for pulmonary hypertension and the surrogate of choice for establishing a relationship between pulmonary hypertension and adverse outcomes in ESRD patients12 was used to determine pulmonary arterial pressures in this study. The sensitivity and specificity of echocardiography to diagnose PH are modest at 83% and 72% respectively. A transthoracic echocardiography using a portable (2D) GE echocardiography machine with a 3.5mHz transducer probe (Vivid e, weight 4.9kg, serial number 514327wx6, 2016 May) was performed by the researcher for each patient, with the researcher bearing the cost. The procedure was carried out with the subjects lying in left lateral or recumbent positions. Several images were obtained from the apical four-chamber view, short-axis view, long-axis view, and subcostal views. Five readings for the maximum tricuspid systolic jet were obtained for each participant in the parasternal or apical window using the continuous wave Doppler, and the average value was taken as TRVmax. For the few patients without tricuspid regurgitation, peak pulmonary regurgitation (PR) Doppler velocity was measured and inputted into Bernoulli's equation (4V2) which was added to the estimated right atrial pressure (RAP) to get pulmonary arterial systolic pressure (PASP). Right atrial pressure (RAP) was estimated from the inferior vena cava (IVC) size and its variation with respiration. Pulmonary artery systolic pressure (PASP) was extrapolated from the modified Bernoulli's equation: PASP or Right ventricular systolic pressure (RVSP) = 4 × (tricuspid regurgitant velocity)2 + estimated right atrial

pressure. Mean Pulmonary Arterial Pressure was calculated using the Chemla formula (0.61x PASP + 2 mmHg). The severity of pulmonary hypertension using mean PAP was categorized into mild (25-40 mmHg), moderate (41-55mmHg), and severe (>55 mmHg).13

Statistical analysis: The chi-square test was used to test for a significant difference in the prevalence of PH in different stages of CKD using echocardiography, while ANOVA was used to test for significant differences in the levels of PAP based on severity in patients with CKD, all at 95% C.I with SPSS version 26.0 utilized.

Ethical clearance: Ethical approval for the study was obtained from the JUTH Health Research Ethics Committee with an approval number JUTH/DCS/REC/127/XXXI/2487.

RESULTS

Table 1: Distribution of mean pulmonary arterial pressures among patients with chronic kidney disease.

Reference range (mmHg)	No. Observed	**Mean PAP (mmHg)**	F	p-value
Normal (0-24)	51	10.41±0.76	54.634	0.001
Mild (25-40)	16	29.62±0.84		
Moderate (41-55)	1	46.00±0.01		
Severe (>55)	1	58.00±0.01		
TOTAL	**69**			

Result is significant were p<0.05; values are Mean±SD

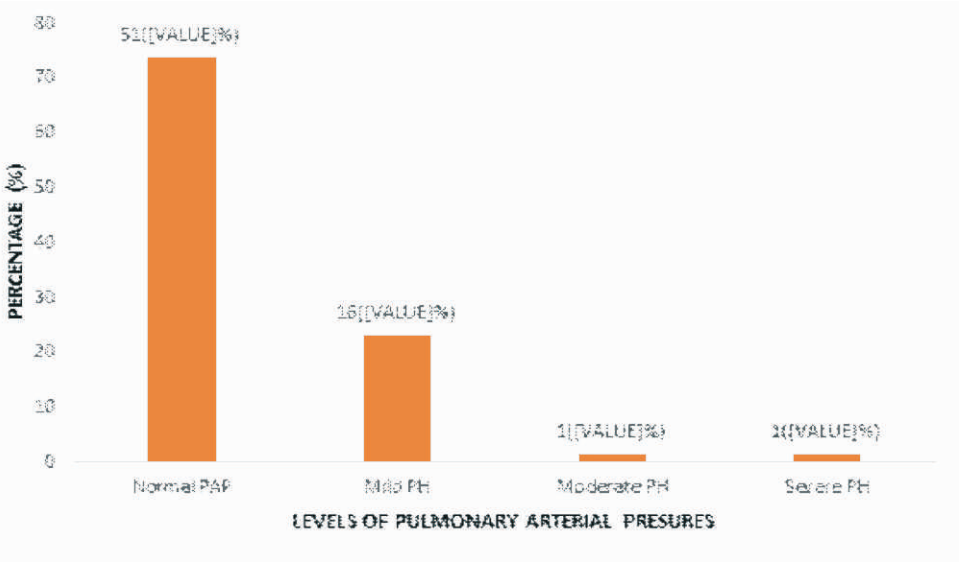
Table 1 above shows the distribution of pulmonary arterial pressures among CKD patients, which shows a significant difference in the levels of severity of PAP at (p<0.05). *Out of the 69 participants in this study, 18(26.1%) had elevated PAP >24mmHg. Out of which*16(23.3%) were mildly elevated with a mean PAP of (29.62mmHg), 1(1.4%) was moderately elevated with a PAP of (46.00mmHg), and 1(1.4%) had severely elevated PAP with a value of (58.00mmHg), (percentages are shown in Fig 1).

Table 2: Prevalence of Pulmonary Hypertension in different stages of chronic kidney disease using echocardiography.

CKD Stages	Freq.	High PP (%)	Normal PP (%)	PAP (mmHg)	X^2	p-value
Stage I	5	**-**	5(100.0)	7.0±0.01	9.217	0.050
Stage II	8	1(12.5)	7(87.5)	11.12±2.74		
Stage III	15	1(6.7)	14(93.3)	14.06±2.29		
Stage IV	9	3(33.3)	6(66.7)	15.42±3.29		
Stage V	32	13(40.6)	19(59.4)	19.93±2.30		
TOTAL	**69**	**18(26.1)**	**51(73.9)**			

The result is significant (p<0.05) at 95% C. I

Table 2 above shows the proportion of PH in different stages of CKD, 18(26.1%) of CKD patients had PH while 51(73.9%) had normal pulmonary pressures. Most CKD patients with PH were in stage 5, while the least was in stage 3 1(6.7), none was observed in stage 1. In all participants, PH was present in 13(40.6%) of patients. A significant difference was observations at ($p<0.05$)



PAP = Pulmonary arterial pressure, PH = Pulmonary hypertension

Figure 1. Percentage distribution of mean pulmonary arterial pressures among patients with chronic kidney disease.

Figure 1 above is a bar chart that shows the distribution of mean pulmonary arterial pressures depicting the degree of pulmonary hypertension severity. The majority of CKD patients had normal pulmonary pressures 73.9%, while 23.2% had mild pulmonary hypertension, and about 1% had moderate and severe PH each.

DISCUSSION

There is a varying prevalence of PH among CKD patients worldwide. In this study, a cut-off value for PH was taken as mPAP greater than or equal to 25mmHg, measured using echocardiography according to the European Society of Cardiology (ESC) and European Respiratory Society (ERS) 2015 guidelines on diagnosis and treatment of PH. However, the Sixth World Symposium on Pulmonary Hypertension (6th WSPH) in 2018 proposed a new haemodynamic threshold of mPAP >20 mmHg as this is widely accepted now following a large cohort study which established increased mortality and risk for hospitalization for mPAP 21 to 24 mmHg.[15]

The overall prevalence of PH among CKD patients found in this study was 26.1%. This prevalence value is comparable to the 25% reported by Issa et. al. and slightly lower than the 32% reported by Abdelwhab et. al. in Stage 5 CKD patients in the United States and Egypt, respectively, even though this study included stage 1 to 5 CKD patients. Moreover, a concordant prevalence of 22% and 27% were reported by Selvaraj and Reque respectively in 2017. Whereas, Jared et al. in the US reported a discordant prevalence of 68% among CKD patients, this high prevalence could be explained by the increased sensitivity of right heart catheterization used to determine pulmonary pressure values when compared to

echocardiography. Furthermore, patients in CKD stage 2 and below were excluded, and probably, patients with other conditions that affect pulmonary pressures could have been included since it was a retrospective study thereby leading to a higher prevalence value. Other reasons for variable prevalence estimates for PH might be explained by different definitions of PH by different researchers. Secondly, different levels of volume excess could also skew the prevalence. Thirdly, some patients with CKD who did not have echocardiographic data were excluded from most studies.

The proportion of patients with PH in stage 5 CKD was 40.6% (table 2) which was higher than 13.5% for stages 1 to 4 combined. This supports the assertion that as renal disease advances there is a corresponding increase in the prevalence of PH. The reasons for this could be due to the multifactorial causes of elevated pulmonary pressures such as vascular stiffening/calcifications, anaemia, fluid overload, LVH et cetera, which are more prominent in advanced stages of CKD. Other studies have shown slightly lower prevalence such as 37.5% reported by Zhilian Li et. al in China, and 13.4% by Yigla[22] in Israel. Similarly, Bozbas et al in Turkey reported a 6% rate of PH in stage 5 CKD patients receiving peritoneal dialysis. This decline in prevalence might be due to their study's use of a higher PASP cut value of 45mmHg and above to define PH as compared to the 2015 ESC guideline that suggested a cut value of 35mmHg which could account for the discrepancy.

The chronic kidney disease patients in stage 5 had a higher mean pulmonary arterial pressure of 19.93mmHg compared to other CKD stages. This is concordant with studies done by Abdelwhab et al. in 2008,[17] Yigla in 2009, and Pabst in 2012. This may be accounted for by the increased fluid overload, severe anaemia, worsening uraemia, and vascular calcifications seen in end-stage renal disease (ESRD) enhancing the development of elevated pulmonary pressures. Severe anaemia, a recognized cardiovascular risk factor in CKD, has been shown to have an impact on the pulmonary circulation. Low haemoglobin levels can exacerbate hypoxia brought on by concurrent diseases, which can lead to PH. High levels of circulating free fatty acids and long-chain acylcarnitines in ESRD, as well as invivo myocardial triglyceride accumulation, could cause considerably elevated pulmonary pressures according to several studies.

The high prevalence of elevated mean pulmonary pressure beyond the threshold of normal in this study increases the pulmonary hypertension burden in CKD patients. Pulmonary hypertension is associated with debilitating symptoms and reduced life expectancy, especially among CKD patients irrespective of the cause. The low index of suspicion, late diagnosis, and ineffective treatment of PH in CKD patients are the main drivers of poor survival and high mortality. The use of a relatively available and affordable tool like echocardiography in the determination of PH during routine evaluation of CKD patients is invaluable in mitigating the negative consequences of PH.

CONCLUSION

Even though, right heart catheterization which is the gold standard for diagnosing PH was not used in this study due to its non-availability, echocardiography used in this study has been shown to still deliver clinically useful or comparable results.[25] Patients with CKD frequently experience pulmonary hypertension (PH), and the prevalence rises as the disease worsens to end-stage renal failure. It is recommended that CKD patients in stage 3 and above should have an assessment of pulmonary pressures using echocardiography and subsequent monitoring of disease progression and response to therapy.

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CHALLENGES IN EARLY DIAGNOSIS OF HEART FAILURE IN SUB SAHARAN AFRICA – A REVIEW

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Abstract

Heart Failure, a rising public health concern has become more prevalent in the Sub Saharan Africa (SSA) in recent times. It is a major cause of high mortality and morbidity with frequent hospitalizations and high economic cost. Majority of heart failure cases in the SSA are due mainly to hypertensive disease, non–Ischemic causes (Cardiomyopathy), and rheumatic disease. However, the reverse is the case in high-income countries where heart disease is linked to ischemic causes. Generally, hypertension has been reported to be a major cause of heart failure across the globe. The most challenging aspect in the diagnosis of heart failure in SSA is the lack of basic tools and the necessary human resources. Also, the unavailability of support facilities and services, high cost of drugs, weak health care systems that are over burdened with infectious diseases and poor access to guideline–directed medical treatment. Overall, prevention of hypertension, community blood pressure screening, physical activities, healthy living and working environment as well as access to effective health care are necessary preventive measures of cardiovascular diseases in SSA. This review is an observational study of 20-yr duration to examine the challenges of early diagnoses of heart failure in SSA and how to overcome them.

Keywords: Heart failure; cardiovascular diseases; sub-Saharan Africa

Introduction

Heart failure is a major health and socio-economic burden in SSA due to its high prevalence, high impact on the young working class and high mortality rates. It affects about 26 million people worldwide (1) especially those in low-income sub-Saharan Africa (SSA). Heart failure is a frequent disease in the adult population in Africa. It is the endpoint of most cardiac disorders and a central theme in cardiology practice in sub-Saharan Africa. In most cases, heart failure is first diagnosed during an episode of hospital care (2). It is one of the most common reasons for emergency admission, with about 20% of cases being new-onset and 80% an acute exacerbation of chronic heart failure (3). The burden and challenges of managing patients and individuals with heart failure are enormous in sub-Saharan Africa. This is because diagnostic and management of this disease require specific heart investigations and treatments that are often inaccessible in the developing countries (4,5). Furthermore, the absence of preventive measures and lack of early diagnosis has drastically increased the rate of morbidity and mortality. The prevalence of ischemic heart disease as the leading cause of heart failure should therefore, drive implementation of relevant preventive strategies. The clinical symptoms of heart failure include dyspnea, fatigue, and clinical signs of congestion due to structural or functional cardiac abnormalities leading to frequent hospitalizations, poor quality of life, and shortened

life expectancy (6). Hypertension, a major cause of heart failure is often asymptomatic. Many hypertension patients are unaware of their condition and therefore remain untreated. Untreated or poorly controlled hypertension and left ventricular hypertrophy (LVH) have been reported to be risk factors for cardiovascular diseases (CVD) (7), a major cause of morbidity and mortality, and sudden death (8). Poverty also contributes a great deal to the rising burden of heart failure in SSA. Most people in the sub-Saharan Africa lack sufficient income to address basic needs such as quality health compared to other parts of the world (9). SSA has been reported as home to 14% of the 7.8 billion world's inhabitants but contributes to more than half of the global poor (9). Previous study revealed that while the rest of the world has observed a significant decline in extreme poverty, SSA has recorded a rise in abject poverty from 278 million in 1990 to 413 million in 2015 (10). Although hypertension and diabetes play a major role as causes of heart failure in women (11), previous reports have revealed that the incidence and prevalence of heart failure is lower in women than men at all ages. However, due to the steep increase in incidence with age, and the larger population of elderly women in the developed world, the total number of men and women living with heart failure is similar (12). According to Mehta and Cowie (13), heart failure with preserved systolic function ("diastolic" dysfunction) is more common in women, perhaps related to gender differences in the myocardial response to injury, and the lower prevalence of coronary artery disease in premenopausal women as compared with men. Furthermore, myocardial cell death, apoptosis, and cellular hypertrophy of the remaining cells are more pronounced in the male than in the female myocardium (14,15). Previous studies have reported incidence and treatment of heart failure; however, this review's aim is to investigate the challenges involved in early diagnosis of heart failure in Sub-Saharan Africa, thereby providing the way forward concerning early intervention to reduce the mortality rates.

Methods

Study Characteristics and Selection Criteria

Studies were identified through a systematic literature search of scholarly articles published from 1992 to 2017. A search was conducted using Google Scholar, Research gate and PubMed with search terms including heart failure, sub–Saharan Africa, mortality, morbidity, risk factors, diagnosis, occurrence and prevention. Research papers on clinical trials were excluded from consideration.

Result

History of Heart Failure in Sub-Saharan Africa

Heart failure has been a health challenge in sub-Saharan Africa for more than 60 years (16). Historically, sub-Saharan Africa has had the greatest prevalence of clinically detected rheumatic heart diseases (RHD), ranging from less than 1 to 14 per 1000 (17; 18; 19; 20). The major causes of heart failure cases in sub-Saharan Africa have been traced to non-ischemic causes. Seventy five percent of these are due to rheumatic heart disease, hypertensive heart disease, and cardiomyopathy (21). However, ischemic heart diseases still remain an uncommon cause of heart failure with no apparent increase in its contribution to the cases of heart failure over the past 60 years. This corroborates the fact that non-ischemic heart disease is a major priority to tackle heart failure cases in sub–Saharan Africa needing immediate clinical intervention (22). According to (23), cor pulmonale and pericarditis contribute about 20% of the incidence of heart failure. Cor pulmonale has been implicated in post-tuberculosis lung damage. In an earlier study, (24) reported that over 70% of cases of rheumatic heart diseases in people younger than 20 years of age is majorly due to pure mitral regurgitation. On the other hand, mitral stenosis and mixed valvular disease is common among the elderly in developing Countries like South Africa.
Previous studies reveal that 20 to 25 million people

in low- and middle-income countries have some form of pulmonary vascular disease, representing >97% of the global burden (25). Amongst these, cardiovascular diseases predominantly affect people of working age (30–64 years). In Africa, rheumatic heart disease RHD has demonstrated a particular prevalence in the younger African population (26). More often, the poorer and disadvantaged people suffer the largest burden of cardiovascular diseases (27). Previous studies confirmed an inverse relation between birth weight and cardio vascular diseases in later life (28). Meanwhile, only a small and insignificant portion of the population in Sub-Saharan Africa can afford the cost of diagnosis, medical treatment and/or surgical correction of congenital heart diseases (29). About 27% of 844 *de novo* cases in South Africa have been linked to right heart failure (30). The history of heart diseases in adults Sub-Saharan Africa has also been traced to environmental factors and particularly poor maternal nutrition during pregnancy (31).

Previous studies reveal that urbanization and economic development have also contributed immensely to the emergence of marked reduction of physical activity and a nutritional transition characterized by a shift to a higher caloric content diet (32). These transitions result in enormous public health challenges, and failure to address the problem may impose significant burden for the health sector and the economy of sub-Saharan African countries (33).

Causes of Heart Failure

Valvular heart disease in SSA is almost always due to sequelae of an infectious disease rather than degenerative changes (24). Recurrent pharyngeal infections with group A beta- hemolytic streptococci and subsequent acute rheumatic carditis predispose to the development of rheumatic heart disease - a chronic progressive condition with no known medical therapy. Valvular thickening eventually impairs function with subsequent valvular regurgitation. With time, valvular stenosis start to predominate with more restriction in leaflet mobility and development of a transvalvular pressure gradient. In a similar study, (34) reported that the causes of hypertensive heart disease in SSA seem to be similar to the rest of the world. Several genes have been linked to the development of cardiomyocyte hypertrophy in patients with essential hypertension which affect intracellular signaling, degradation of normal extracellular collagens and contractile dysfunction among other functions. All these eventually lead to left ventricular hypertrophy and heart failure. The essential causes of heart failure in SSA include hypertensive heart disease, HIV associated cardiomyopathy, peripartum cardiomyopathy, myocarditis, infiltrative disease (i.e., iron overload), alcohol induced and familial/genetic forms (35). Some other causes of heart failure that contribute to morbidity in SSA are hemoglobinopathies, chronic obstructive pulmonary disease, interstitial lung disease, high altitude and chronic thromboembolic disease (36). A major compounding factor of heart failure in Sub-Saharan Africa is the lack of early diagnosis of simple lesions that can result in timely referral before onset of permanent damage. This is as result of limited resources in Sub-Saharan Africa. Quite a number of congenital cardiac lesions are not diagnosed prior to birth, due to severely limited antenatal screening for congenital heart disease. Poverty is also a reason behind the rising burden of heart failure in sub–Saharan Africa (37). Poverty is a major reason for poor access to healthcare services that can prevent and control incidence of heart failure. This ultimately contributes to an unhealthy lifestyle among the poor who are helpless (38). With poverty encompassing low income and consumption, poor education, health, nutrition, and other human development parameters, its effect on cardiovascular diseases is complex (39). Thiamine deficiency has been reported as a less common cause of heart failure in the past. However, it has been linked to a number of cases of heart failure in SSA. In recent times, it has accounted for up to 32% of cases of heart failure in a South African center (40). Thiamine performs a

critical role in the metabolism of carbohydrate (41). It is not produced endogenously and is usually stored in the body in small amounts. Adequate intake or supplementation of thymine is therefore very necessary to avoid deficiency (42). The heart failure as a result of thiamine deficiency (so called wet beri-beri) is a chronic disease characterized by a peripherally vasodilated state that leads to fluid retention through activation of the renin-angiotensin-aldosterone system. The consequent clinical effect is heart failure.

Epidemiology and prevalence

Hypertensive heart disease in SSA consistently ranks in the top three causes of heart failure from the 1950s till date (24). Previous studies have shown that progression to systolic failure and ventricular dilatation is less common than the development of high end-diastolic pressure and diastolic dysfunction in 60-80% of people having heart failure diagnosis (29, 43-45). In SSA, other forms of high-output heart diseases have been reported. They include those that are due to thiamine deficiency and arrhythmogenic right ventricular cardiomyopathy (ARVC). In Uganda, up to 20% of patients referred for echocardiography are found to have the disease. It is equally prevalent amongst boys and girls of ages 10 to 30 in Uganda. However, it is more prevalent in adult women than men (46). The occurrence of EMF is not necessarily a result of ethnicity as reported by (24). This is because it occurs not only amongst immigrants from neighboring countries such as Rwanda and Burundi (47) but also in non-natives who have lived in endemic locations (48). In South Africa, the major type of heart failure has been discovered to be Right heart failure. Also, in countries where schistosomiasis is endemic, such as Zimbabwe and Ethiopia, pulmonary hypertension and right heart failure have been commonly encountered. Previous studies reported that HIV-related pulmonary hypertension was more prevalent amongst women in Soweto. It was found in 8% of *de novo* cases of heart failure. However, the prevalence rates in Burkina Faso and Zimbabwe are 0.6% and 6%, respectively (49, 50). Amongst patients that presented with pulmonary embolism, chronic thromboembolic pulmonary hypertension or symptomatic heart failure developed in 30 (23%) patients out of 128 patients tested in Kenya (51). Amongst the genetic cardiovascular diseases, hypertrophic cardiomyopathy (HCM) has been reported to be the most common (52), and over 150 distinct mutations in at least nine different genes are involved (53). Left ventricular hypertrophy of various morphologies, accompanied with a wide array of clinical manifestations and hemodynamic abnormalities typically characterize hypertrophic cardiomyopathy. However, patients may develop mitral regurgitation or diastolic dysfunction, myocardial ischemia, left ventricular outflow obstruction, based on the degree and specific site of cardiac hypertrophy (54). However, the risk relationship between extent of left ventricular hypertrophy and the risk for sudden cardiac death is linear and more serious for younger age groups (54, 55). In the same vein, dilated cardiomyopathy is very common in SSA and has been linked to HIV cardiomyopathy, peripartum cardiomyopathy, myocarditis, infiltrative disease (i.e., iron overload), alcohol induced and familial/genetic forms (35). In a study of prevalence of hypertension treatment among people with hypertension across Africa, (56) reported that hypertension prevalence was positively correlated with the proportion of participants who were overweight or obese but not with the proportion of participants who had a post-primary or higher level of education. The study reported the increase in the prevalence of hypertension with age while it was broadly comparable between rural and urban areas, or between females and males. Pulmonary hypertension narrows the pulmonary vasculature causing right heart failure which is a common clinical syndrome in SSA and other low- and middle-income countries (LMICs) (57). In South Africa, a study identified pulmonary hypertension as one of the most common causes of death accounting for 31% of total cardiovascular deaths

(58). In the same vein, a Nigerian case-control study showed that among patients with sickle cell disease, there was a prevalence of 22.9% in patients with hemoglobin SS as compared to 2.3% in patients with hemoglobin AA (59). Another echocardiography study detected pulmonary hypertension in 23.9% of adults with sickle cell disease (60), with reported higher mortality in these group of patients (61).

Diagnostic Methods

Sub-Saharan Africa is typically associated with poverty. Till date, it is estimated that sub-Saharan Africa is the poorest continent in the world (27). As a result, effective cardiovascular therapy is difficult to sustain financially (62).

Generally, in SSA, left ventricular hypertrophy is detected using both the electrocardiogram and the echocardiogram (24). The former provides information on voltage and cardiac rhythm while the echocardiogram will also provide determination of wall thickness, atrial size, left and right ventricular function and hemodynamics (24). The sensitivity and specificity of the electrocardiogram for left ventricular hypertrophy are approximately 7-74% and 41-98%, respectively, and no single criteria has the highest sensitivity, specificity, accuracy or correlation with cardiac magnetic resonance estimated left ventricular mass index (63). The most commonly used method to identify, quantify and monitor the progression of left ventricular hypertrophy is the Echocardiography. This is because of its portability, reproducibility and correlation with left ventricular mass at necropsy (64). According to Seedat (27), economics with regard to the cost: benefit ratio and social considerations continue to influence the low rate of detection, treatment and control of hypertension in the black population of Africa. In a study in Cameroon, patients with one or a combination of the following pathological features: past history of recurrent heart diseases, precordial murmurs, clinical indications of suspicious cardiopathy and/or cardiomegaly on chest X-ray examination (cardiothoracic index > 0.55) underwent further screening tests for detection of congenital heart diseases. Subsequently, a comprehensive transthoracic Doppler echocardiogram using an Acuson 4–7 MHz was performed. The patients diagnosed with congenital heart diseases were subjected to sanitary evacuation to a collaborative centre outside Africa where corrections of pathology were performed (45). Interestingly, previous studies reveal that hypertension, which is the largest contributor to global burden of heart failure is largely undiagnosed, untreated, or inadequately treated in SSA, creating high risk for morbidity and mortality from potentially preventable heart diseases (65). This has been generally found to be a major challenge. Therefore, to tackle cardiovascular diseases in the SSA, the most adequate and cost-effective approach will be to curb the rising burden of hypertension in this region. This will require efforts to create hypertension awareness in the various communities, encourage early detection of hypertension and improve access to affordable healthcare facilities (57). In some countries in SSA where resources are limited, a chest X-ray (CXR) may often be the only imaging modality available to the clinician. Echocardiography remains the most sensitive tool for the diagnosis of pericardial effusion by showing an echo-free space around the heart (66). Other diagnostic options in patients with interstitial lung disease include Transbronchial biopsy, bronchoalveolar lavage and open lung biopsy (27). Patients with cryptogenic pulmonary hypertension should undergo testing to detect pulmonary arterial emboli or other causes of obstruction with perfusion radionuclide testing or computed tomography scanning depending on availability.

Solutions

In view of the high prevalence of hypertension, as well as a low prevalence of hypertension awareness, treatment, and control in SSA, there is need for concerted efforts to avert the high health and economic burden that the disease entails. Some

important factors for a successful strategy against cardiovascular diseases in SSA include early detection, the availability of dedicated physicians, well-trained nurses with proper supervision by physicians, simplified protocols and basic echocardiography. These are approaches to integrated, decentralized care (67). A major solution will be to put an end to the current outflow of medical personnels from Africa as suggested in an article by Muula (68). Another perspective is the effective use of medications for controlling of hypertension in the SSA populations and of their appropriateness for these populations. Low-income countries can organize sustainable programs through primary healthcare systems and their integration in various infrastructures to tackle hypertension (46; 69). In addition to early detection of hypertension and necessary control strategies, behavioral risk factors such as reduced salt intake and increased physical activity should be encouraged. According to Zühlke et al. (70), the percutaneous approach is now the standard approach for definitive correction of defects such as patent ductus arteriosus and valvular pulmonary stenosis, the lack of cardiac catheterization laboratories has precluded this being introduced into routine clinical practice in many African countries. Furthermore, multisectoral and multidisciplinary platforms have given rise to new cardiac centers acting as continental centers of excellence, comprehensive integrated service frameworks and landmark research focusing on the African context (70). As the technology of echocardiography advances and devices become more portable, it becomes easier to diagnose and understand heart failure during its earliest manifestations (e.g., myocardial strain imaging) (71).

Treatment

Heart failure disease is both preventable and treatable. Therefore, early diagnosis and treatment of heart failure can lead to dramatic decreases in the morbidity and mortality (72). Diagnostic and curative services are being offered in Kenya in the capital cities of Nairobi and Mombasa, while rural communities are being accessed using different models of outreach (73). (74) reported the specific focus of outreach clinics in an integrated clinic in Nairobi. The most common diagnosis of congenital heart disease is those resulting from early detection and timely referral. Pulse oximetry screening for critical congenital heart disease is now recommended and adopted in many parts of the developed world (75). However, Sub-Saharan Africa needs to key in into this technology to be able to manage and treat congenital heart disease in a timely manner. Currently, several new paediatric cardiac centers are being funded by non-governmental organisations to run on a permanent basis in African countries. An example is the Salam Centre for cardiac surgery in Sudan. This centre is managed by an Italian humanitarian organization and it is the only center in North East of Africa offering a free-of-charge service for comprehensive cardiac services (76). More of such centers are needed to reduce the burden of heart failure in Sub-Saharan Africa. In the same vein, the Walter Sisulu Paediatric Centre for Africa in South Africa provides a continental referral centre to train surgeons who subsequently develop programmes in their own countries (77). Similarly, the establishment of the Ghanian National Cardiothoracic Centre in 1989 which has been accredited by the West African College of Surgeons, as a centre of excellence for the training of cardiothoracic surgeons has been of great impact. The Centre provides the much needed resource for West Africa, which happens to be one of the poorest regions in the world (78). The Pan African Society of Cardiology is a platform which allows for development of these critical partnerships to serve all the children of Africa: thus far, it has helped to establish links between African universities and institutions impacting on training, teaching and outreach (79). To date, penicillin, a low-cost drug, is the cornerstone to the treatment of rheumatic heart disease since it prevents the advent of acute rheumatic fever attacks following exposure to Group A streptococci (GAS) infections

(71). The interesting news is that many major cardiovascular drugs are no longer prohibitively expensive (80). According to Seedat (27), the role of biomarkers in diagnosing hypertensive heart failure is still being defined and does not yet impact treatment decisions.

Table 1: Prevalence of heart disease in some sub-Saharan-African countries from 1983-2020

S/N	Country	Gender Predominance	Risk factors	Forms of heart failure	Symptoms	Reference
1	Nigeria	Male	Hypertension (80.4%) Diabetes (34.8%) Dyslipidaemia (43.5%) Cigarette smoking (21.7%) Obesity (26.1)	Ischemic heart disease	Angina and ischemic cardiomyopathy	(81)
2	Togo	Female	Dyslipidaemia (76.9%) Hypertension (75.3%) left ventricular hypertrophy (72.8%), abdominal obesity (71.1%), hyperuricemia (50.5%), hyperglycemia (41.9%)	Ischemic heart disease	Stable angina, silent ischemia, myocardial infarction and unstable angina	(82)

3	Kenya	Adults	Hypertension, Diabetes Mellitus, obesity, dyslipidemia, smoking. Some anatomic risk factors; abnormal branching pattern, wide bifurcation angles, short arterial stems.	Myocardial Infarction	Atherosclerotic plaques, Occlusive intimal hyperplasia, Severe intimal hyperplasia	(83)
4	South Africa	young males	*βMHC* Ala797Thr mutation (25%) *cTnT* Arg92Trp (15%) *βMHC* Arg403Trp(5%)	Hypertrophic cardiomyopathy (HCM)	Left ventricular outflow obstruction, myocardial ischemia, mitral regurgitation or diastolic dysfunction	(84)
5	Soweto	Younger men	Increased immunosuppression HIV viraemia.	HIV-associated cardiomyopathy	Asymptomatic left ventricular dysfunction Cardiomyopathy (38%), Pericardial disease (13%) and Pulmonary arterial hypertension (8%).	(85)
6	Burkina-Faso	Younger age groups	Hypertension	Acute Heart Failure	Kidney dysfunction. hypertensive heart disease Smoking Rheumatic feve	(86)

7	**Côte d'Ivoire**	No significant differences regarding to gender	High blood pressure, smoking, type 2 diabetes and hypercholesterolemia	Ischemic heart disease, hypertensive heart disease and rheumatic valvulopathy	Sinus rhythm, atrial fibrillation	(87)
8	Zimbabwe		smoking, obesity, diabetes, atherogenic lipid levels, cytokines C reactive protein (CRP) and myeloperoxidase (MPO)	Coronary heart disease	Asymptomatic left ventricular dysfunction	(88)
9	Cameroon	2months -41 years		Congenital heart disease		(45)
10	Uganda	Adult women	Eosinophilia, ethnicity, diet, poverty, young age, female sex and infection.	Endomyocardial fibrosis a	right, left or biventricular failure and atrioventricular valve regurgitation	(89)

Conclusion

This Review was carried out by the critical study of some papers published by Research Gate, Google Scholar, and PubMed. They all have things in common that point to the fact that heart failure is a disease of rising public health concern, that has high morbidity and mortality rates. The fact remains that heart failure syndrome remains a major public health issue in many countries in SSA. Systolic heart failure seems to dominate. Meanwhile, ischemic heart disease is more predominant in high income countries. The main causes in most countries in SSA are hypertension, valvular heart disease and non-ischemic cardiomyopathies being the most commonly reported forms. Over the last few decades, this trend has generally been consistent. In recent studies however, larger contemporary studies highlight the emergence of right-sided heart failure and ischemic heart disease and the waning importance of infectious causes. While atherosclerotic heart disease is still a relatively rare cause of heart failure, specific investigation for atherosclerotic heart disease using contemporary

means has only been performed in few studies studies. Several studies and researches have gone into the process of finding out the prevalence of heart failure in Sub Saharan Africa; however, just little is said about the challenges of diagnosing heart failure in good enough time and then overcoming those challenges. This Paper therefore, highlighted the challenges of early diagnosis of heart failure and ways to overcome those challenges.

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THE EFFECT OF STORAGE ON FULL BLOOD COUNT IN DIFFERENT ANTICOAGULANTS.

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ABSTRACT

Background: The effect of storage on full blood count in different anticoagulant was determined in view of its importance on the reliability and validity of test results as the quality of sample stored would determine the quality of results.

Methodology: A total of twenty-five samples of apparently healthy individual were assessed for their Packed cell volume (PCV), total leucocytes count (TLC), platelets count and blood cell morphology by storing 2mls each of their blood sample in Ethylenediamine tetra acetic acid (EDTA), trisodium citrate, lithium heparin, fluoride oxalate and CPDA anticoagulants for a period of 24hrs, 48hrs 72hrs, and 96hrs at 4^0C to determine any changes that would occur.

Result: The PCV record a higher result (35.18 - 40.02%) with statistically significant different PCV of sample in EDTA, CPDA and those in trisodium citrate, lithium heparin ($P< 0.05$). Fluoride oxalate and trisodium citrate had more degenerative changes on the red blood cell morphology than EDTA and CPDA, Lithium heparin showed significant changes for white blood cell count, mild thrombocytopenia was found in samples stored after 72hrs in all anticoagulant as compared with initial platelet estimate at the time of collection. On the other hand, no significant changes of white blood cell morphology occurred after their storage in all anticoagulant except fluoride oxalate. The result showed more degenerative changes in fluoride oxalate, trisodium citrate and lithium heparin than CPDA and EDTA. Samples stored for 24 hours at 4^0C would not result in significant changes in blood parameters.

Conclusion: Based on these findings EDTA is the recommended anticoagulant of choice for haematological work and storage of specimen for analysis should not be encouraged as it adversely affects full blood count. Also, haematological laboratories are advised not to keep samples beyond 24 hours at 4^0C for reliability of test results.

Keyword: Sample storage, Haematologic changes, Anticoagulants, full blood counts, Packed Cell Volume, Total Leucocytes Counts, Ethylenediamine Tetra Acetic Acid,

INTRODUCTION

Determination of the effects of storage on full blood count in different anticoagulant is an aspect of quality assurance. Quality assurance involves the application of all means possible to guarantee that the results reported by the laboratory are both reliable and valid. Reliability concerns the consistency of work. Validity concerns the degree of the test measuring what it is supposed to measure with accuracy[1] Excessive delay in processing blood samples for haematologic testing could compromise the reliability of the results [2, 3]. One of the elements that contribute to quality assurance is the nature of the specimen. Baker and Silverton in 2001, states that blood deteriorate rapidly if not under ideal conditions. Hence, it could be said that the proper storage of blood specimen is a means of guaranteeing the reliability and validity of results reported in a Haematology Laboratory[4].

Storage of blood at 4^0C for up to five days in different anticoagulants caused changes in full blood count and white cell differential results, these changes observed in most of the full blood count parameter and differential results were statistically significant. The improvements of storage anticoagulant and effective storage method have been used to monitor the viability of these erythrocytes. Amongst the changes that occur in erythrocytes during storage is the loss of its deformability property. This is as a result of membrane lipid depletion, which is an important component of the membrane and finally changes the red blood cell from the biconcave shape to spherostomatocytic cells[5].

Manufacturers of automated analysers and published literatures often states that blood specimens kept at 4^0C (refrigerated) for up to 24 hours generally revealed reliable results for full blood count[5]. However, these may not be satisfactory as the high variety of analysers used are considered. Besides, no consensus was reached about which parameters can still be reliable in delays over 24 hours when analysers were out of order due to different reasons[6].

Moreso, for the detection and investigation of certain disease condition, blood samples are collected from individuals. For these to be fully and properly investigated manually, the blood may not be completely processed immediately after collection, therefore it needs to be kept in a fluid state using an anticoagulant. Blood deteriorates rapidly if not kept under ideal laboratory condition[4] and blood which has haemolysed or been contaminated may interfere with interpretation of the results thereby leading to wrong diagnosis. Degenerative changes occur when blood was allowed to stand in the laboratory before films are made[7]. That is, when blood stay for up to 3 hours changes may be discernible and by 12 - 18 hours changes become strikingly obvious[8].

The anticoagulant recommended by the International Council for Standardization in Haematology is the dipotassium salt at a concentration of 1.50±0.25mg/ml of blood[7]. At this concentration, the tripotassium salt produces some shrinkage of red blood cells which results in a 2-3% decrease in packed cell volume (PCV) and followed by gradual mean cell volume (MCV) increase on standing whereas there are negligible changes when the dipotassium salt is used[7].

METHODS

Study location: The study was carried out among healthy individuals. All subjects were between the age of 17- and 60-years attending River State University of Science and Technology (RSUT).

Study population: Apparent healthy student attending River State University of Science and Technology (RSUT). Exclusion criteria included health challenges within the three previous months, not having TB and body mass index <18.5 or $\geq$25 kg/m2.

Safety Precautions: Blood samples were collected with care and adequate safety precautions to ensure test results are reliable, contamination of the samples was avoided and infection from blood transmissible pathogens were prevented. Protective gloves were worn when collecting and

handling blood samples. Needles, and syringes were sterile, and dry, and blood collecting materials were discarded safely to avoid injury from needles.

Blood Sample Collection: In this study, 10mls of venous blood were obtained from each subject who were apparently healthy student attending River State University of Science and Technology (RSUT) (Males and Females). The samples were collected into 2.5mg/ml of dipotassium {EDTA} anticoagulant and 2ml of the same blood into 0.5 ml of trisodium citrate inside a plastic specimen container, fluoride oxalate, CPDA, and lithium heparin, were immediately analyzed for the parameter that is day 1. The use of an electric mixer ensures proper mixing of the samples. The sample were then stored at 4^0C in the refrigerator and analyzed after 24 hours, 48hours, 72 hours, and 96 hours, the specimen were processed for analysis e.g packed cell volume (PCV), platelet count, total leucocytes count and differential white cell count.

Reagents: In this study, Turk's solution and Ammonium oxalate were used.

Procedure for Blood Sample Analysis: Standard materials and methods were employed for the analysis. Initial analysis for the packed cell volume (PCV), total leucocyte count, differential white cell count and platelet count were carried out on each sample on the day 1 after which an aliquot was prepared. The sample were then stored at 4^0C in the refrigerator and analyzed again for haematological parameters listed above after 24 hours, 48hours, 72 hours, and 96 hours. Results were compared with previous ones.

Haematocrit or Packed Cell Volume (PCV): The method used for haematocrit was that reported by Baker and Silverton (2001) which is the centrifugation method using micro-haematocrit centrifuge.

Total Leucocyte Count (WBC): This was based on the Turk's method in which acetic acid in the Turk's fluid lyses the red blood cells, leaving the leucocytes intact with their nuclei stained with gentian violet component of the fluid. A 1:20 dilution of blood was made by adding 0.02ml of blood to 0.38ml of Turk's solution in a test tube. The content was properly mixed by means of Pasteur pipette, an improved neubauer counting chamber covered with a cover slip was charged with the suspension. The white blood cells present in 4 corners $1mm^2$ area were counted and the number of WBCs per litre of blood is calculated using the first principle formula.

Platelets Counts: This is based on the Cronkite's ammonium oxalate method where the red cells where lysed and the platelets left as highly refractile particles under illumination. Before a count, a 1:20 dilution of blood was made by adding 20ul of blood to 0.38ml of diluents (ammonium oxalate). The suspension was mixed, loaded and allowed to stand for some times before the count. This is done by leaving the loaded chamber in Petri dish containing moist filter paper for 20 minutes. The platelets present in the 4 corner $0.04mm^2$ and central one (5 squares in all) were counted and the total platelet count for the whole blood sample is obtained by the first principle formula.

Differential leucocyte count: (1) the blood was mixed thoroughly before sampling; (2) a thin blood film of the blood was made on clean grease free glass slide. The slide was allowed to air dry and labelled with a lead pencil; (3) the film was flooded with the Leishman stain and allowed to fix for 2 minutes; (4) it was double diluted with equal volume of the buffered distilled water pH 6.8 and allowed to stain for 8 minutes; (5) the stain was washed off with the buffered distilled water of $_P$H 6.8; (6) the back of the slide was cleaned. The slide was drain dried at room temperature; (9) it was examined with x 10 objective for cell distribution. The differential leucocytes count was done with x 100 objective; (11) it was examined for in as many fields with x100 objective until 100 cells were counted; and (12) the counting of the various type of white cell should be performed as indicated by

the battlement method

Statistical analysis: Numerical Data was obtained from the experiment and these data were analyzed using MS--Excel and the data presented as means and standard deviations. The significant difference between means in haemalogical changes were analyzed using ANOVA and Regression analysis

RESULTS:

Table 1: Distribution of all haematological parameter of students attending River State University of Science and Technology across the different anticoagulants after day one of sample

ANTICOAGULANT	PCV (%)	PLT (cell/mm^3)	WBC (cell/mm^3)	L(%)	N(%)	M(%)	E(%)	B(%)
EDTA	37.6±2.42	247.2±48.28	4.98±0.71	40.6±12.08	50.4±14.11	7.2±1.72	1.8±0.4	0±0
SODIUM CITRATE	36.6±4.32	241.8±45.26	4.38±0.81	38±9.45	56.6±8.85	3.6±2.15	2.2±1.17	0±0
LITHIUM HEPARIN	37.6±3.50	234.2±73.58	4.42±0.52	41±9.23	54.8±9.39	2.8±0.75	1.2±0.4	0.2±0.4
FLOURIDE OXALATE	37.8±2.79	225.8±64.12	5.48±1.11	33.2±7.08	59.8±10.11	4.6±2.8	1.8±0.4	0.2±0.4
CPDA	37.2±1.72	252±48.81	5.16±0.87	37.6±9.07	57.4±9.67	2.8±9.67	2±0.63	0.2±0.4

PCV: Packed Cell Volume; WBC: White Blood Cell Count; L: Lymphocytes; PLT: Platelets; N: Neutrophils; M: Monocytes; E: Eosinophils; B: Basophils

Table 1 (above) shows the distribution of all haematological parameter across the different anticoagulants after day one (24 hours) of sample collections.

Table 2: **Distribution of all haematological parameter of students** attending River State University of Science and Technology **across the different anticoagulants after day two of sample**

ANTICOAGULANT	PCV (%)	PLT (cell/mm^3)	WBC (cell/mm^3)	L(%)	N (%)	M(%)	E (%)	B (%)
EDTA	35.2±1.47	227.8±43.44	4.42±0.64	50.4±15.90	42.2±14.86	4.6±1.2	2.6±1.20	0.2±0.4
SODIUM CITRATE	34.4±2.50	217.2±60.49	3.74±0.66	42.6±2.06	55.2±2.64	1±0.89	1.2±0.4	0.2±0
LITHIUM HEPARIN	33.4±2.06	224.6±59.51	3.72±0.47	50.6±5.61	44.6±5.95	2.8±0.74	2±0.63	0.2±0
FLOURIDE OXALATE	35.6±2.42	220.4±50.14	3.94±0.55	48.2±2.93	46.6±4.03	5.4±1.62	2±0.63	0.2±0.4
CPDA	37±2.61	246.2±51.45	4.9±0.76	40±4.20	56±4.94	3±0.63	1.4±1.02	0±0

PCV: Packed Cell Volume ; WBC: White Blood Cell Count ; L: Lymphocytes; PLT: Platelets; N: Neutrophils; M: Monocytes; E: Eosinophils; B: Basophils

Table 2 (above) shows the distribution of all haematological parameter across the different anticoagulants after day two (48 hours) of sample collections.

Table 3: Distribution of all haematological parameter of students attending River State University of Science and Technology across the different anticoagulants after day three of sample

ANTICOAGULANT	PCV (%)	PLT (cell/mm^3)	WBC (cell/mm^3)	L(%)	N(%)	M(%)	E(%)	B(%)
EDTA	36.4±1.86	216.4±47.60	3±1.19	46.8±10.53	48.2±11.36	4.8±2.04	2.2±0.4	0.2±0.4
SODIUM CITRATE	33±3.17	219.8±50.75	3.46±0.84	44.8±6.34	49±6.54	4.2±1.94	1.8±0.4	0.2±0
LITHIUM HEPARIN	34±2.61	219±32.79	3.42±0.29	59.2±10.53	38.8±15.12	3.4±0.8	2.4±0.49	0.2±0.4
FLOURIDE OXALATE	36.4±3.26	231.2±39.63	3.3±0.41	53.8±7.22	38.6±6.47	5±1.41	2.4±0.49	0.2±0.4
CPDA	36.6±2.15	243.2±49.45	4.68±0.59	40.4±5.08	56±5.40	2.8±0.75	1.20.75	0±0

PCV: Packed Cell Volume; WBC: White Blood Cell Count; L: Lymphocytes; PLT: Platelets; N: Neutrophils; M: Monocytes; E: Eosinophils; B: Basophils

Table 3 (above) shows the distribution of all haematological parameter across the different anticoagulants after day three (72 hour) of sample collections.

Table 4: Distribution of all haematological parameter of students attending River State University of Science and Technology across the different anticoagulants after day four of sample collections

ANTICOAGULANT	PCV (%)	PLT (cell/mm^3)	WBC (cell/mm^3)	L(%)	N(%)	M(%)	E(%)	B(%)
EDTA	34.4±1.62	211±49.71	1.88±0.46	43.2±14.22	50±12.63	3.8±3.25	2.2±1.17	0.2±0.4
SODIUM CITRATE	30.8±1.17	184.8±23.85	2.76±0.42	53.4±6.41	43.4±8.54	1.4±1.74	1.8±1.17	0±0
LITHIUM HEPARIN	33.8±3.19	199.2±7.78	2.96±0.37	51.2±1.83	42.4±2.25	4.4±2.00	2±0.63	0±0
FLOURIDE OXALATE	39.6±5.31	203.8±59.54	2.4±0.30	59.6±8.84	35.6±8.75	3±1.26	1.4±0.49	0.4±0.49
CPDA	36.2±2.14	240.6±48.81	4.66±0.59	44.6±2.65	51±3.69	2.8±2.48	1.4±1.02	0.2±0.4

PCV: Packed Cell Volume; WBC: White Blood Cell Count; L: Lymphocytes; PLT: Platelets; N: Neutrophils; M: Monocytes; E: Eosinophils; B: Basophils

Table 4 (above) shows the distribution of all haematological parameter across the different anticoagulants after day four (96 hours) of sample collections.

Table 5: Distribution of all haematological parameter of students attending River State University of Science and Technology across the different anticoagulants after day five of sample collections

ANTICOAGULANT	PCV (%)	PLT (cell/mm^3)	WBC (cell/mm^3)	L(%)	N(%)	M(%)	E(%)	B(%)
EDTA	33±1.41	189.4±37.89	1.74±0.32	53.2±20.39	41±19.02	3.8±2.86	2±0.63	0.2±0.4
SODIUM CITRATE	31±0.89	171.4±16.78	2.38±0.35	56.8±10.98	40.2±7.28	2.6±0.49	2±0.63	0.4±0
LITHIUM HEPARIN	36±5.06	168.4±30.30	2.42±0.39	60.2±5.78	36.4±5.32	3.8±2.0	1.4±1.02	0.4±0.49
FLOURIDE OXALATE	40±6.36	193.8±53.02	2.04±0.52	56.8±5.27	37.2±5.84	3.4±1.62	2.4±0.49	0.2±0.4
CPDA	35±2.45	228±42.76	4.4±0.53	47±1.79	50.4±2.87	1.6±1.4	1±0.6	0±0

PCV: Packed Cell Volume; WBC: White Blood Cell Count; L: Lymphocytes; PLT: Platelets; N: Neutrophils; M: Monocytes; E: Eosinophils; B: Basophils

Table 5 (above) shows the distribution of all haematological parameter across the different anticoagulants after day four (120 hours) of sample collections.

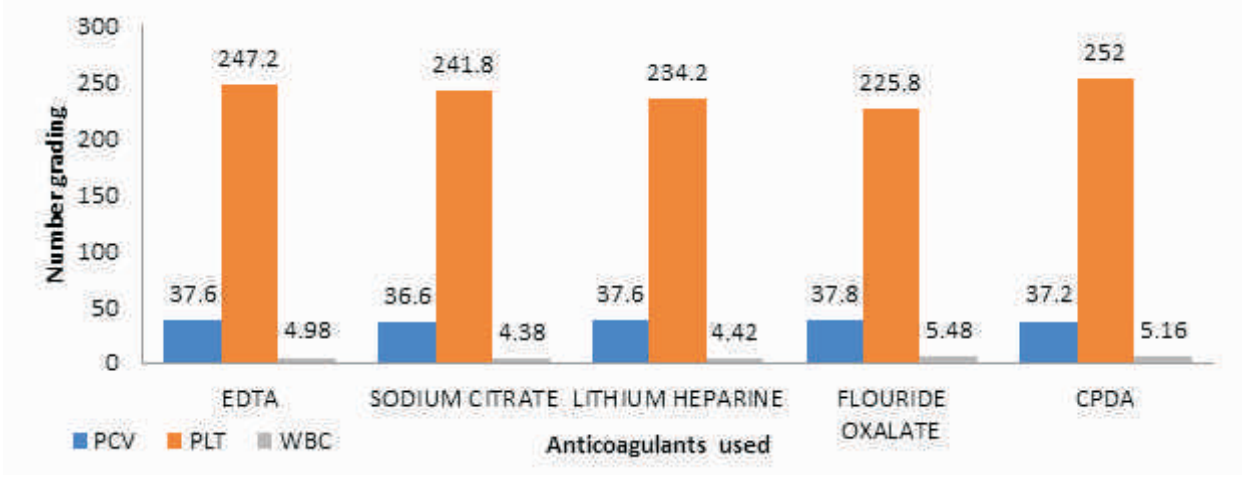

Figure 1: Bar Chart showing the comparison of the PCV (%), Platelet count (cell/mm^3) and white blood cell count (cell/mm^3) of blood sample stored in the different anticoagulant for day one

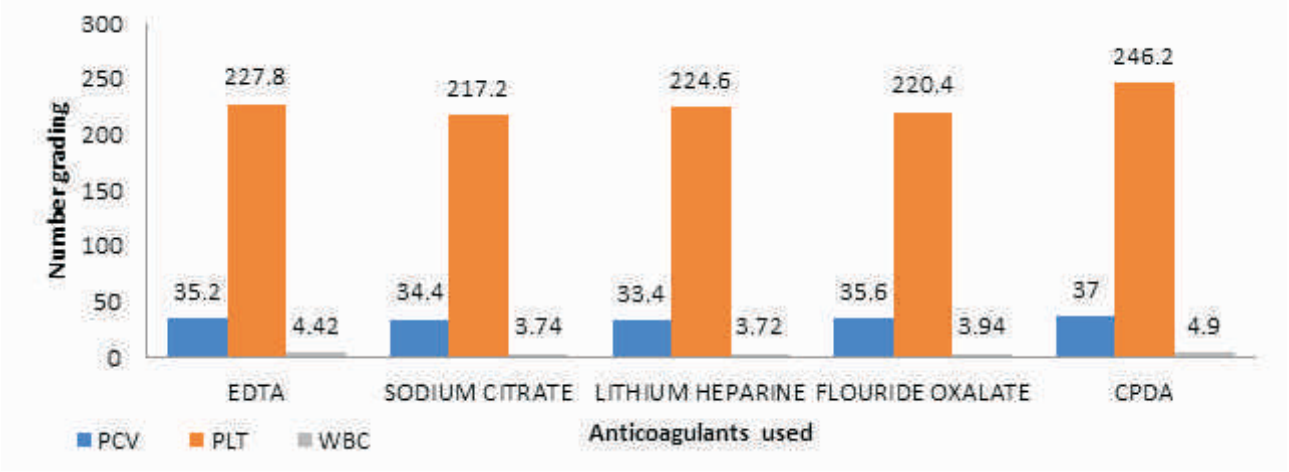

Figure 2: Bar Chart showing the comparison of the PCV (%), Platelet count (cell/mm^3) and white blood cell count (cell/mm^3) of blood sample stored in the different anticoagulant for day two

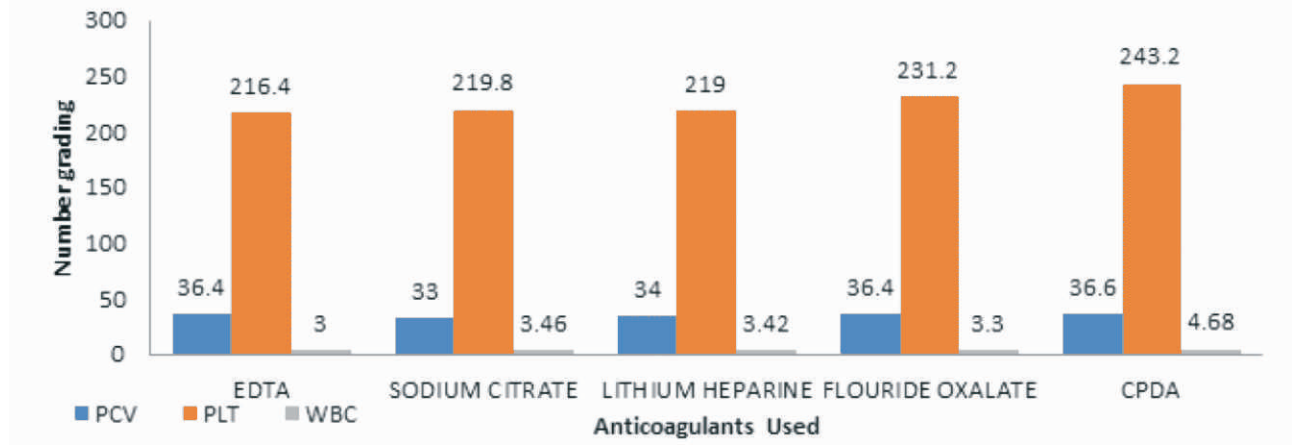

Figure 3: Bar Chart showing the comparison of the PCV (%), Platelet count (cell/mm^3) and white blood cell count (cell/mm^3) of blood sample stored in the different anticoagulant for day three

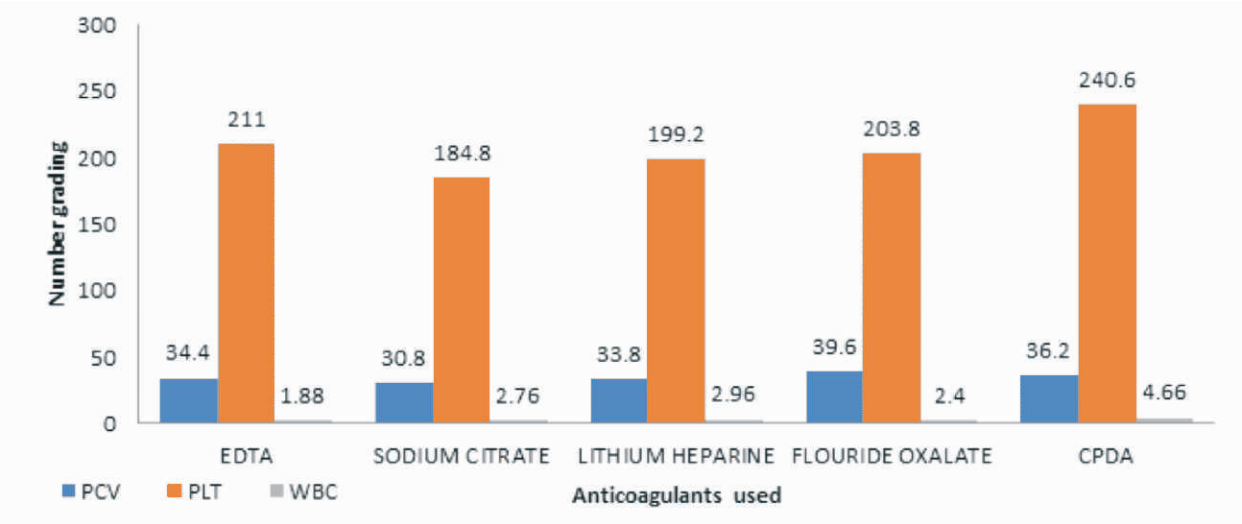

Figure 4: Bar Chart showing the comparison of the PCV (%), Platelet count (cell/mm^3) and white blood cell count (cell/mm^3) of blood sample stored in the different anticoagulant for day four.

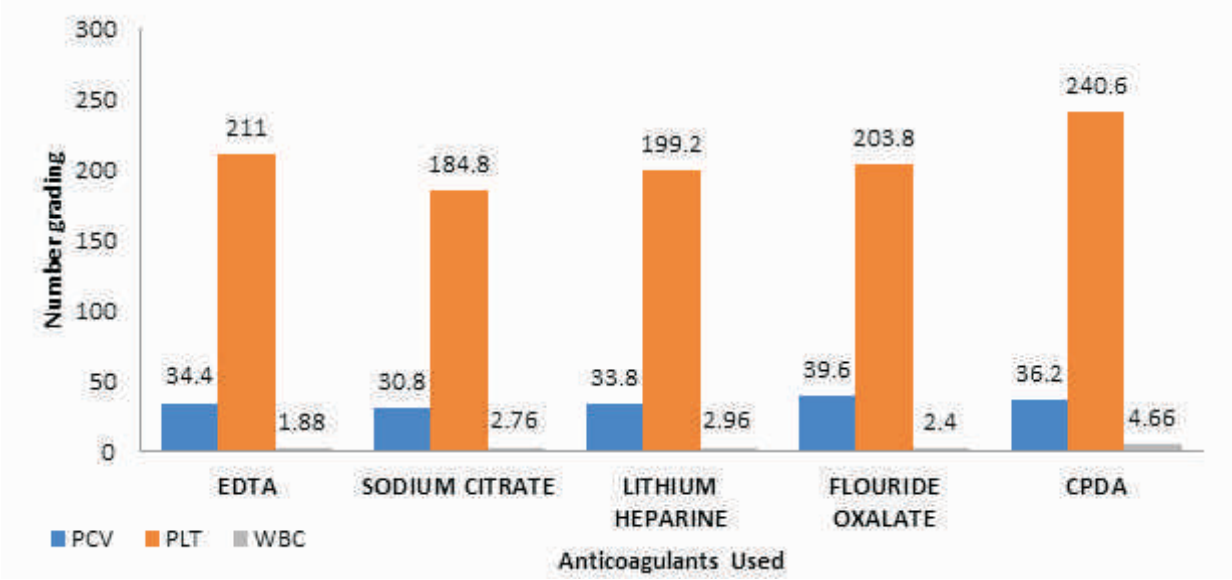

Figure 5: Bar Chart showing the comparison of the PCV (%), Platelet count (cell/mm^3) and white blood cell count (cell/mm^3) of blood sample stored in the different anticoagulant for day five.

Table 6: comparison of haematologic changes of blood samples across the differing anticoagulants.

PARAMETER	Btw day 1 and day 2	Btw day 1 and day 3	Btw day 1 and day 4	Btw day 1 and day 5
Packed Cell Volume	$P < 0.05^{bd}$	$P < 0.05^{bcd}$	$P < 0.05^{bcda}$	$P < 0.05^{abcd}$
Platelets	$P > 0.05$	$P < 0.05^{abc}$	$P < 0.05^{abcd}$	$P < 0.05^{abc}$
White Blood Cell Counts	$P < 0.05^{cd}$	$P < 0.05^{abcd}$	$P < 0.05^{abcd}$	$P < 0.05^{abcde}$
Lymphocyte	$P < 0.05^{d}$	$P < 0.05^{d}$	$P < 0.05^{d}$	$P < 0.05^{ad}$
Neutrophil	$P < 0.05^{bd}$	$P < 0.05^{bcd}$	$P < 0.05^{bcde}$	$P < 0.05^{abcde}$
Monocytes	$P > 0.05$	$P < 0.05^{ac}$	$P < 0.05^{abcde}$	$P < 0.05^{abcde}$
Eosinophil	$P < 0.05^{ab}$	$P < 0.05^{ab}$	$P < 0.05^{abd}$	$P < 0.05^{abcde}$
Basophil	$P > 0.05$	$P > 0.05$	$P > 0.05$	$P > 0.05$

*Comparative findings of Haematological changes in EDTA, Sodium Citrate, Lithium Heparine, Floride Oxalate and CPDA between day 1 to day 5. [a] Statistically significant for EDTA at $P < 0.05$; [b] Statistically significant for Sodium Citrate at $P < 0.05$; [c] Statistically significant for Lithium Heparine at $P < 0.05$; [d] Statistically significant for Floride Oxalate at $P < 0.05$; [e] Statistically significant for CPDA at $P < 0.05$

DISCUSSION

Storage of blood at 4^0C for up to five days in different anticoagulants caused changes in full blood count and white cell differential results, these changes was observed in most of the full blood count parameter and differential results which were found to be statistically significant.

Gulati in their work of 2002 stated that amongst the changes that occur in erythrocytes during storage is the loss of its deformability property. This is as a result of membrane lipid depletion, which is an important component of the membrane and finally changes the red blood cell from the biconcave shape to spherostomatocytic cells.

From table 4.6 samples in trisodium citrate, lithium heparin and fluoride oxalate record a significant value for the red blood cell when compared to EDTA anticoagulant for day 3 and day 5. This could be as a result of dilution effect since trisodium citrate is in liquid form and up to 0.5mls of it was used as anticoagulant for the blood sample.

When blood is stored at 4^0C, the total white blood cell count showed a significant reduction (downward trend) after 48 hours. This is also consistent with previous findings[9]. Lithium heparin show significant changes for white blood cell count in table 4.6 and is therefore not good for blood film morphology and in line with previous findings[10].

Fluoride oxalate and trisodium citrate had more degenerative changes on the red blood cell morphology than EDTA and CPDA. These changes include hypochromia and crenation of the cell. The CPDA and EDTA shows no significant value for packed cell volume, white blood cell count and platelet count and is in line with Wintrobe and Dacie findings[11,7].

More so, table 4.6 show significant value for platelets count, white blood cell count and packed cell volume with storage showing that duration of storage affects the cell morphology. These changes in packed cell volume, white blood cell count, platelets count and differential are most likely the sum effect of the loss on individual cell

characteristics and cellular degeneration that is known to occur as the cell ages[12]. Not much changes were observed in the white cell and red cell morphology when stored in EDTA and CPDA compared to that when stored in trisodium citrate, lithium heparin and fluoride oxalate, which agrees with the findings of Dacie[7]. Based on the finding of this study and the cited published report, it can be stated that even only after 24hrs, a specimen may yield unreliable result.

CONCLUSION

There are more degenerative changes observed in sample stored in trisodium citrate, lithium heparin and fluoride oxalate than those in EDTA and CPDA anticoagulant. Blood analysis (full blood count and differential) should be done immediately after collection, my study suggests that clinically reliable results may not be obtained for most full blood count and differential parameters from specimen older than one day.

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BURNOUT AND PERCEIVED FAMILY AND SOCIAL SUPPORT OF A CROSS-SECTION OF FEMALE SENIOR REGISTRARS IN THE NIGERIAN RESIDENCY PROGRAMME.

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ABSTRACT

Background- Burnout has been noted to be increasing in prevalence among doctors undergoing residency training, and the female gender is especially vulnerable to burnout. Not many studies have isolated female doctors in residency as subjects for a study on burnout rates and related factors. This study was designed to measure the burnout rate and perceived family and social support among female doctors across residency training programmes in Nigeria.

Methodology- This was a cross-sectional study which used the Oldenburg Burnout Inventory (OLBI) Instrument to assess the burnout rate and the multidimensional scale of perceived social support to assess the perceived support received by the study respondents. Data for a total of 55 respondents was analysed using the 6.2.14, Microsoft Excel 2021 (v16.0)

Results- The study respondents were distributed across 11 residency specialty areas located across Nigeria with an age range of 29- 50 years, an average age of 35.1±3.55 years. Most (89.2%) of the study respondents were married and had been in the residency programme for an average of 3.9±1.41 years. The majority (63.6%) of the study respondents were found to have high burnout, with 32.7% having moderate burnout and 3.7% had low burnout. The exhaustion component was overwhelming (96.35% had high exhaustion) while 100% had low disengagement) in the burnout spectrum. The study respondents perceived that they received the most support from their spouses (94.6%), parents (93.9%), siblings (88.9%) and friends (86.5%) and at the time of the survey, they noted that their most significant source of stress was from coworkers (72%).

Conclusion- There is a need to explore the workplace of Female Doctors in residency to address the factors that increase their vulnerability to stress and subsequently burnout.

Key Words; Burn out, Female Senior Residents, Nigeria, Family and Social Support.

Introduction

Burnout is a psychological process resulting from chronic work stress which is expressed as physical, emotional, and attitudinal symptoms.[1] Burnout is a state of physical, emotional and mental exhaustion caused by prolonged involvement in

emotionally challenging situations.[2] Burnout typically results from working `on the front lines' which is very prominent in-service oriented occupations like Medicine.[2] The burnout syndrome is characterized by low energy, chronic fatigue, weakness, feelings of helplessness, hopelessness, entrapment, and negative attitudes towards one's self, work and life itself.[1]

Residency training has been noted as the peak time for burnout when compared with the other stages of a physician's career.[3] The high expectations of the Trainers of the Resident Doctors, long working hours, prolonged sleep deprivation, uncontrolled schedules, high job demands and inadequate personal time often experienced by Doctors in residency have been noted to be responsible for the high risk of burnout experienced at this stage of a Physician's career.[3]

Many authors have attempted to examine and categorize stressors experienced by residents, both within residency and in their lives.[3] Others have tried to predict levels of stress and one such study that was carried out in a Nigerian residency training programme showed that being a female Resident Doctor was a predictor of burnout among the study respondents.[4,5] The varying responses to stress by Doctors in residency include depression, burnout, anger/irritability, anxiety and substance abuse.[6] Other responses to stress experienced by Doctors in residency include reported changes in mood patterns from enthusiasm and depression to anger and fatigue.[7] Sleep deprivation alone which is a common occurrence among doctors in residency training, has been shown to predispose resident Doctors towards more medical errors, injuries, increased alcohol and drug use, as well as increased conflict with other healthcare staff.[8] In very severe cases, suicides have occurred among burnt-out Doctors and these have created a need for researchers to more closely examine residency training stresses and burnout among Doctors in residency training.[9,10]

Burnout among Doctors in residency training, as in other health professionals, is a process that begins with job stress. As Doctors in residency training expend increasing resources in their efforts to deal with these stressors, the process of burnout is initiated.[2]

there is no such person). Data for a total of 55 respondents was analyzed using the Microsoft Excel 2021 (v16.0). and the analysis included a simple description, using measures that were specific to quantitative variables such as the mean and standard deviation, as well as in terms of frequency and percentages.

Ethical Considerations

Confidentiality and anonymity of respondents were prioritized; identifying labels were not included in the questionnaire. Each participant signed an informed consent form that contained a participant information sheet detailing what the survey was about, the information required and what it will be used for, as well as the measures in place to ensure that the information provided was confidential. Ethical approval was obtained from Bingham University Teaching Hospital Health Research Ethics Committee (NHREC/21/05/2005/01145).

Results

Table 1 (below) shows that most (59.3) of the Study respondents belonged to the 31-36 years age group, with the next majority (29.6%) belonging to the 37-42 age group. The study respondents were distributed across 11 residency with most (32.7%) from the Paediatrics faculty followed by 11.6% from the faculty of Obstetrics &Gynecology. Most (89.2%) of the study respondents were married and most (40%) had been in the residency programme for a period of 4 years closely followed by 36.3% who had been in the residency training programme for approximately 3 years. The number of call days reported by most of the study respondents was 6 hours in 20.4% of the study respondents and 7 hours in another 20.4%. Majority (89.2%) of the study respondents were from Government owned residency training institutions.

Table 1: Socio-demographic characteristics of the study Respondents

	Description	Frequency	Percentage (%)
Age group(years)	25-30	5	9.3
	31-36	32	59.3
	37-42	16	29.6
	49-54	1	1.8
Specialty	Pathology	2	3.8
	Ortorhinolaryngology	2	3.8
	Surgery	1	1.9
	Community Medicine	5	9.7
	Psychiatry	2	3.8
	Paediatrics	17	32.7
	Dentistry	1	1.9
	Ophthalmology	5	9.6
	Obstetric &Gynecology	6	11.6
	Internal medicine	3	5.8
	Family Medicine	8	15.4
Duration of residency in years	2	1	1.8
	3	20	36.3
	4	22	40.0
	5	7	12.7
	6	3	5.5
	7	2	3.7
Number of call days monthly	3	5	11.7
	4	8	18.1
	5	6	13.6
	6	9	20.4
	7	9	20.4
	8	4	9.0
	9	1	2.3
	10	4	9.0
	>10	3	6.8
Type of training Institution	Government	49	89.2
	Private	4	7.2
	Mission	2	3.6
Marital Status	Single	6	10.8
	Married	49	89.2

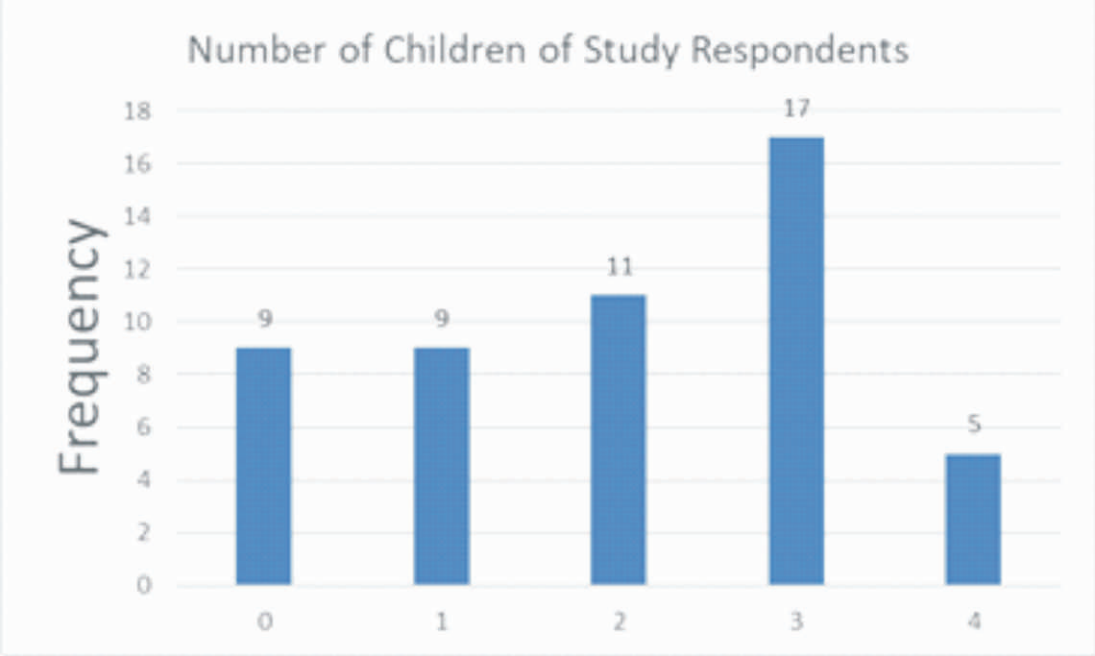

Figure 1: Number of Children of Study Respondents

The Figure 1 (above) shows that most 17(38.6%) of the study respondents had 3 Children, and 11(25%) had 2 Children, 9 (20%) had one Child, another 9 (20%) had no Children while 5 (11.4%) had 4 Children.

Table 2 (below) shows that most 35(63.6%) of the study respondents recorded high burnout levels corresponding to a burn out score of more than 59, 32.7% reported moderate burnout corresponding to burn out scores between 44-59 while 2(3.7%) reported low burn out with burn out scores that are less than 44.

Table 2 : The Burnout Levels of Study Respondents

Level	Range scores	Frequency	Percentage
Low	<44	2	3.7
Moderate	44-59	18	32.7

Burnout component	Level	Range scores	Frequency	Percentage
High		>**59**	35	63.6

Table 3 (below) represents a breakdown of the burnout status of study respondents which show that the effect of burn out was more in terms of exhaustion rated as heigh by 96.3% of the study respondents and moderate by 3.7%.

All (100%) of the study respondents had low engagement levels as a consequence of their burn out.

Table 3 The Burnout levels on components of Study Respondents

Burnout component	Level	Range scores	Frequency	Percentage
Exhaustion	Low	<21	0	0%
	Moderate	21-29	2	3.7%
	High	>29	53	96.3%
Disengagement	Low	<24	55	100%
	Moderate	24-31	0	0%
	High	>31	0	0%

Table 4 (below) presents the sources and level of perceived support available to study respondents. The study respondents perceived that they received the most support captured as some support and a lot of support in the table from their spouses (94.6%), parents (93.9%), siblings (88.9%) and friends (86.5

Table 4: Sources and level of perceived support available to study respondents

Source of Support	Level of support N(%)				Total respondents
	None	Some	A lot	There is no such person	
Spouse or significant other	1(1.8)	12(22.7)	38(71.9)	2(3.6)	53(100)
Child(ren) or Grandchild(ren)	6(12.5)	17(35.5)	18(37.5)	7(14.5)	48(100)
Parent(s) or Grandparent(s)	1(1.85)	16(29.5)	35(64.8)	2(3.7)	54(100)
Brother(s) or Sister(s)	4(7.4)	21(38.9)	27(50.0)	2(3.7)	54(100)
Other relatives by blood	10(22.2)	19(42.2)	12(26.6)	4(9)	45(100)
In-laws i.e. relative(s) by marriage	14(28)	20(40)	13(26)	3(6)	50(100)
Neighbor(s)	19(37.3)	25(49)	1(1.9)	6(11.8)	51(100)
Co-worker(s)	3(5.8)	39(75)	10(19.2)	0(0)	52(100)
Members of spiritual/religious group	12(23.1)	32(61.5)	4(7.7)	4(7.7)	52(100)
Friend(s)	4(7.7)	34(65.4)	11(21.1)	3(5.8)	52(100)

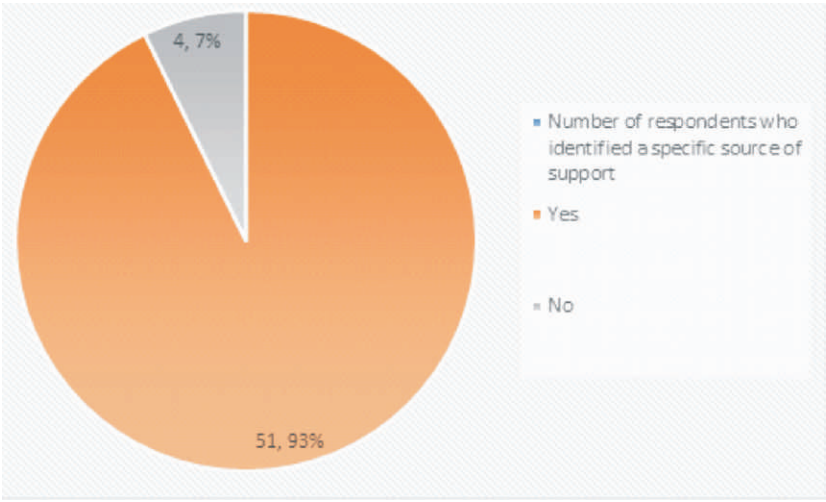

Figure 2: Specific Source of Perceived Support by Study Respondents

Figure 2 (above) shows that the majority (93%) of study respondents had a particular person that they trusted and could go to with personal difficulties

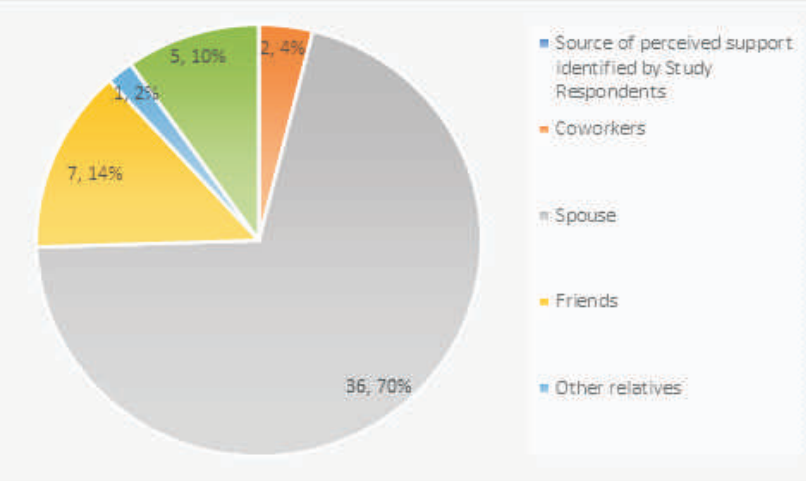

Figure 3: Categories of Persons identified by study respondents as specific source of support

Figure 3 (above) presents the categories of person's that study respondents identified as people that they trust and can go to when they require support. Most 36 (70%) study respondents mentioned their spouses, 7(14%) their friends, 5(10 %) mentioned their siblings, 2(4%) coworkers and 1(2%) to their other relatives.

Table 5 (below) represents the perceived sources of stress experienced by study respondents who reported that their coworkers contributed to the stress in 63.4% of cases, followed by their spouses 40.4%, in-laws in 25%, neighbours in 17.9 %, spiritual groups in 17.1% , other relatives in 15.3 % , friends in 10.5 % and 10% from their siblings.

Table 5: Sources and level of stress experienced by study respondents.

Source of Stress	Level of Stress N (%)				Total respondents
	None	Some	A lot	There is no such person	
Spouse or significant other	24(57.1)	14(33.3)	1(2.5)	3(7.1)	42(100)
Child(ren) or Grandchild(ren)	38(100)	0(0)	-	-	38(100)
Parent(s) or Grandparent(s)	32(82.1)	5(12.8)	0(0)	2(5.1)	39(100)
Brother(s) or sister(s)	34(85.0)	4(10.0)	0(0)	2(5.0)	40(100)
Other relatives by blood	31(79.5)	6(15.3)	0(0)	2(5.2)	39(100)
In-laws i.e. relative(s) by marriage	27(67.5)	10(25)	1(2.5)	2(5)	40(100)
Neighbor(s)	29(74.4)	7(17.9)	0(0)	3(7.7)	39(100)
Co-worker(s)	14(34.1)	19(46.3)	7(17.1)	1(2.5)	41(100)
Members of your spiritual/religious group	31(75.6)	7(17.1)	0(0)	3(7.3)	41(100)
Friend(s)	32(84.2)	4(10.5)	0(0)	2(5.3)	38(100)

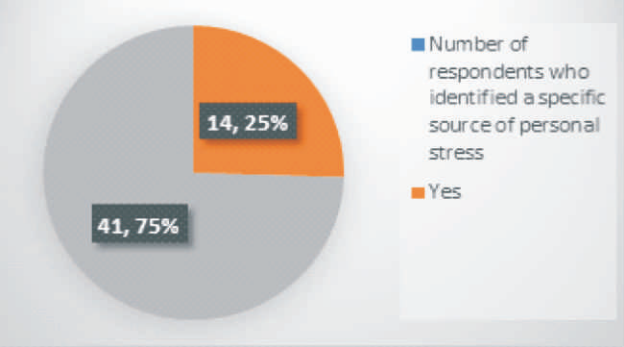

Fig 4: Specific Source of Perceived Stress by Respondents

Figure 4 (above) shows that the majority (75%) of the respondents did not identify any specific person causing them personal stress at the time of the survey.

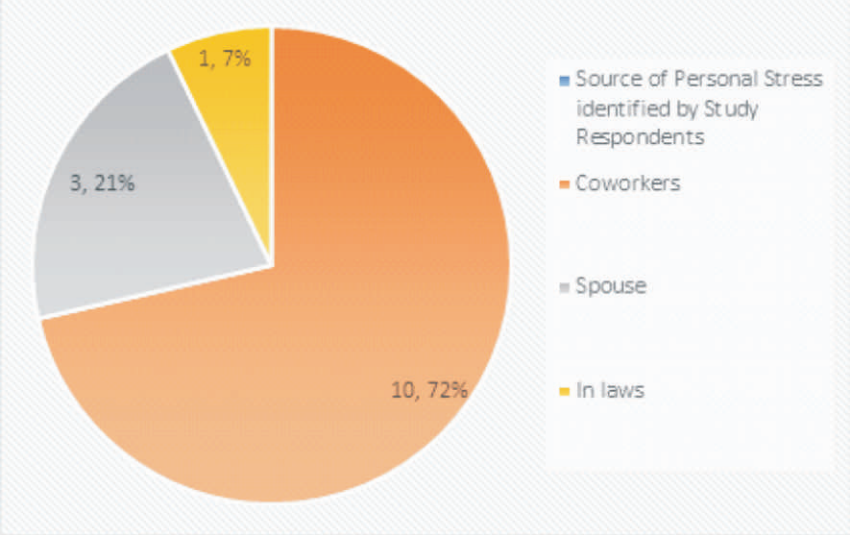

Fig 5: Categories of Persons identified by study respondents as causing personal stress

Figure 5 (above) shows that among the 25 % of study respondents who admitted that there were persons who caused them personal stress, they mentioned their coworkers in 72% of instances, their spouses in 21% of instances and their in-laws in 7% of instances.

DISCUSSION

This study was designed to measure the burnout rate and perceived family and social support among female Doctors across residency training programmes in Nigeria. While it is established that burnout rates are significantly higher among female Resident Doctors, perceived social support has been noted to play a moderating role between job burnout and subjective wellbeing.[13]

This study found that the majority (63.6%) of the study respondents were found to have high burnout, 32.7% had moderate burnout and 3.7% had low burnout with the exhaustion component overwhelming (96.35% with high exhaustion). Regarding the disengagement component,100% had low disengagement in the burnout spectrum. This finding is similar to those of a study conducted in the United States where 84% of

female emergency medicine physicians suffered from moderate to high levels of emotional exhaustion, 48.1% had moderate to high levels of depersonalisation and 80.5% had moderate to high levels of burnout in the low personal achievement subscale.[14] Another study indicates that a high percentage of female neurologists experience symptoms of burnout, and in a study among primary care physicians, women were almost twice as likely as men to report burnout.[14,16]

Female Doctors have been noted to show more empathy towards Patients and spend more time counselling patients, in addition to providing care for their immediate and extended families.[16,17] These are the possible explanations why burnout rates, especially of the emotional exhaustion type are more common among female Physicians and especially senior registrars in our context who typically combine the dual role of residency and family caregiving.

Social support has been found to reduce emotional burnout.[18] This study also considered the source of support available for the female Senior registrars as well as their source of stress. The study respondents perceived that they received the most support from their spouses, parents, siblings and friends at the time of the survey.

The workplace and home are commonly implied as separate domains, but research has shown that the roles at the workplace and home are complementary.[19] Working full time in an organization as is the custom for female medical doctors in residency training and keeping the household at the same time requires a lot of coordination, support and attention. The challenges faced in trying to balance the overlapping borders of work and family domain require a very good understanding of both spheres.[1] Attempts at finding the required work-life balance often, lead to a clash in the two domains of life with burnout resulting as a consequence.

The family is considered the source of human emotion, hence the support from family and significant other is especially important. The family can influence one's health, psychologically and physically, and family support is a positive predictor of well-being.[18]

Work-related burnout negatively impacts an individual's family, work, as well as their physical and mental health.[11] This is especially true for doctors, who not only experience a negative impact on their job performance and increased susceptibility to physical, emotional and psychological illnesses but inability to concentrate on patient care. This makes burnt-out doctors prone to medical errors which negatively impact patient care and, in some instances, have serious consequences on the health of the patients that such doctors are responsible for. The majority of the respondents in this study noted that a significant cause of their stress at the time of the survey was related to their workplace, it is therefore important for residency training institutions to explore ways of introducing interventions that will improve the work conditions especially of female doctors in residency. This will hopefully increase work efficiency, reduce medical errors, and improve patient compliance and patient satisfaction with health care services.

This study is limited in terms of the generalization of its findings by the sample size, but it offers an opportunity for more research, especially of the mixed method type to explore the coping mechanism of female doctors in residency. It will also be interesting to further explore why emotionally exhausted doctors surveyed in this study had low disengagement scores.

Conclusion

The generalization of the findings of this study are limited by the small sample size however this should serve as a basis for further research which should target a larger sample size and include a qualitative component that will further explore the factors responsible for burn out among this at risk group of resident Doctors with a view to proposing interventions that will reduce burn out among this group as well as improve their social support system and general wellbeing.

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Conflict of interest

The Authors of this Manuscript declare that we have no financial or personal relationship(s) which may have inappropriately influenced us in writing this paper.

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KNOWLEDGE, ATTITUDE AND PRACTICE OF HEPATITIS B AND ITS TRANSMISSION FROM MOTHER TO CHILD AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINICS IN JOS UNIVERSITY TEACHING HOSPITAL

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ABSTRACT

Background: Hepatitis B virus(HBV) infection remains a serious public health problem worldwide. Mother-to-child transmission (MTCT) of HBV is the major mode of transmission in HBV-endemic areas, including Nigeria, where little is known about pregnant women's knowledge of and attitudes towards HBV infection and MTCT.

Methodology: A cross-sectional study conducted over a 3-month period among 361 consenting pregnant women attending antenatal clinic at the Jos University Teaching Hospital, Plateau State, Nigeria. A structured self-administered questionnaire was used to extract information from the respondents. Data was analyzed with IBM SPSS statistics version 23.0

Result: Socio-demographic characteristics of participants revealed that most of the participants(47.1%) were aged between 27-38 years. The Majority were married (93.6%), Christains (62.6%), resided in Urban areas (68.1%), had tertiary education (57.3%) and were unemployed (41.6%). Overall 51.0% of the participants had adequate knowledge about the Hepatitis B virus while most of the pregnant women (59.3%) had negative attitude toward Hepatitis B. Practice of safety measures for Hepatitis showed that about half (51.2%) of the participants had done screening for Hepatitis. The level of vaccination against Hepatitis B was however low (36.0%) among the study participants.

Conclusion: The results highlighted the need to prioritize educating pregnant women and mothers in future public health campaigns to increase knowledge, reduce misperception and improve hepatitis B vaccination. The overall knowledge of participants was found to be inadequate, and their attitude and practice were also limited. In this study, poor knowledge about the transmission of HBV from mother to child was evident.

Keywords: knowledge, attitude, practice, Hepatitis B, antenatal clinic, Jos, Nigeria

Introduction

Hepatitis B virus (HBV) is a deoxyribonucleic acid (DNA) virus belonging to the family Hepadnaviridae that causes acute or chronic infection.[1]Hepatitis B infection remains a serious global public health problem.[1]Globally, there are over 250 million people chronically infected with HBV, with 4.5 million new HBV infections, and 880,000 HBV related deaths annually due to complications of hepatitis B, including cirrhosis and hepatocellular carcinoma.[1] The highest prevalence of HBV over 8% is reported in Central Asia, Southeast Asia, sub-Saharan Africa, and the Amazon Basin; followed by an intermediate prevalence of 2%-8% reported in the Middle-East, South Asia, some Eastern European countries, and the Mediterranean basin; and the lowest prevalence of <1% is reported in the United States, Western Europe, Australia, and parts of South America.[1,2] In HBV endemic regions, the lifetime risk of HBV exposure is universal and 5%-10% of the adults have chronic HBV infection.[1,2]

The difference in the HBV burden across regions is reflected in the modes of transmission and burden of paediatric HBV infection.[2] In high prevalence regions, HBV is predominantly transmitted in the perinatal period or early childhood, accounting for over 50% of chronic HBV infection in the adult population.[2] The risk for chronic HBV infection is about 90% if infected at birth or infancy, 30%-50% in children aged 1-6 years, and 5%-10% in children above the age of 6 years to adulthood.[1,2] Chronic HBV infection acquired in childhood carries a 25% risk of death resulting from complications of chronic liver disease, cirrhosis, or hepatocellular carcinoma.[2]

HBV transmission can occur via contaminated blood transfusion, unprotected sex, and prick with contaminated sharp objects; Mother-to-child transmission (MTCT), by which HBV is transmitted from infected mothers to their infants is the main route of infection in infants and can occur through prenatal transmission (in utero), natal transmission (during delivery), or post natal transmission (during childcare or through breast milk).[3] Following HBV infection, many people with HBV may not show any symptoms and the clinical manifestations vary in acute and chronic cases from nonspecific symptoms to organ failure.[3,4]

Prevalence of Hepatitis B surface antigenemia (HBsAg) positivity varies widely among pregnant women. In Nigeria, the prevalence ranges between 2%-15.2%. HBV prevalence in pregnancy was reported to be 5.7% and 8.2% in studies done in Ilorin and Zaria respectively, both in North-central Nigeria.[3,4] A prevalence of less than 2% in Ethiopia and Ghana; 3.3% in Zimbabwe; 4.6% in South Africa; 9.5% in Senegal; 16.1% in Zambia; and 24% in Southern Tanzania have been reported.[5,6,7,8]

A study conducted in Nigeria showed that 75.2% of antenatal care attendee women do not know that hepatitis is a viral infection affecting the liver, while a study in eastern Ghana in 2016 showed that 59.8% of pregnant women had poor knowledge, 64.7% of them had negative attitude, and 73.7% of them had poor practice towards HBV in the study.[6,7] This revealed a poor level of knowledge, attitude and practice among the average 66.1% of pregnant women in the study.[9]

Mother–to-child-transmission (MTCT) is the major mode of HBV transmission worldwide, which is problematic, since around 90% of infected infants progress to chronic Hepatitis B.[1,2,8] This risk is much higher than from horizontal transmission where the rate of chronicity is 30-50% when infected before 6 years of age and less than 5% when infected in adulthood.[1,2,6] Despite improved childhood HBV vaccination worldwide, MTCT still accounts for about 50% of new HBV infections in high-endemic countries and one-third in low-endemic countries.[7,8,9,10] In the presence of high magnitude, rapid rate transmission, and severe complications including death in pregnant women and infants, the infection is still prevalent.[2]Among pregnant women, these illnesses can lead to coagulation disorders, postpartum haemorrhage, organ failure and high maternal death and poor outcomes of their new born such as still birth,

neonatal deaths, acute and chronic liver disease, and hepatocellular carcinoma.[2,6,8] Therefore, preventing MTCT is crucial for decreasing HBV prevalence.[11]Prevention requires HBV-infected mothers to be aware of their disease status and to understand the consequences of HBV transmission to their children.[11] There are only few studies that have assessed the knowledge, attitude and practice of hepatitis B and MTCT among pregnant women.[11] Assessing the KAP among pregnant women is the best way of HBV infection prevention, which ultimately will reduce vertical transmission by giving health education.[11] Their attitudes could affect their willingness for prenatal screening and to follow the current WHO immunoprophylaxis guidelines, which include birth dose vaccine, hepatitis B immunoglobulin for their infants, and completing HBV vaccine series before 1 year of age.[1,8] In addition, results obtained from this study are important to program managers and health planners, to plan vaccination and other preventive strategies. Thus this study is aimed at assessing the knowledge, attitude, and practice towards hepatitis B among pregnant women attending antenatal care at Jos University Teaching Hospital (JUTH), Jos, North-central Nigeria.

The objective of this study is to assess the knowledge of, attitude, and practice towards hepatitis B and its transmission from mother to child among pregnant women attending antenatal care in Jos University Teaching Hospital, aimed at prevention of hepatitis B.

Methodology

Study setting and population: As at 2016, Plateau state population was put at 4,390337. The capital, Jos is famous for its cold climate that has been attributed to its high altitude which is 1238 meters or 4062 feet above sea level.

The study site was the antenatal clinic of the Jos University Teaching Hospital, Jos, 600-bed tertiary health institution located in Jos, the capital of Plateau state in north central Nigeria. Plateau state is one of the 36 states in Nigeria. It has over 30 ethnic groups.

The teaching hospital was established in 1981; it is located in the eastern part of Jos metropolis and has

Table 1: Demographic characteristics of subjects (n=361)

Variables	F	%
Age		
15-26	135	37.4
27-38	170	47.1
39-49	56	15.5
Residence		
Urban	246	68.1
Rural	115	31.9
Marital Status		
Single	15	4.2
Married	338	93.6
Widowed	5	1.4
Divorced	3	.8
Religion		
Traditional	5	1.4
Muslim	130	36.0
Christianity	226	62.6
Education		
No Formal Education	24	6.6
Arabic Education	31	8.6
Primary Education	27	7.5
Secondary Education	72	19.9
Tertiary Education	207	57.3
Occupation		
Self Employed	121	33.5
Employed	90	24.9
Not Employed	150	41.6

Table 2 (below)on awareness revealed that 49.6% of the women had never heard about a disease called hepatitis B; nor do about half (51.8%) of them know that vaccination is available for Hepatitis B.

Table 2: Knowledge toward Hepatitis B among pregnant women attending ANC in JUTH (n=361)

Knowledge	f	%
Have You Heard Of A Disea se Caused By Hepatitis B Virus?		
Yes	179	49.6
No	167	46.2
I don't know	15	4.2
Can Hepatitis B affect Liver?		
Yes	200	55.4
No	154	42.7
I don't know	7	1.9
Can Hepatitis B Cause Liver Cancer?		
Yes	135	37.4
No	217	60.1
I don't know	9	2.5
Can Hepatitis B Affect All Age Group?		
Yes	263	72.9
No	95	26.3
I don't know	3	0.8
Are Nausea, Vomiting And Loss of Appetite Symptoms of Hepatitis B?		
Yes	174	48.2
No	180	49.9
I don't know	7	1.9
There Is No Symptom of Hepatitis B In Some Patients?		
Yes	179	49.6
No	180	49.8
I don't know	2	0.6
Can Hepatitis B Be Transmitted Through Contaminated Blood?		
Yes	190	52.6
No	162	44.9
I don't know	9	2.5
Can Hepatitis B Be Transmitted By Blood Of Ear Or Nose Pierces?		
Yes	179	49.6
No	161	44.6
I don't know	21	5.8
Can Hepatitis B Be Transmitted By Unsafe Sex?		
Yes	180	49.9
No	179	49.6
I don't know	2	0.5
Can Hepatitis B Be Transmitted From Mother To Child?		
Yes	160	44.3
No	171	47.4
I don't know	30	8.3

Is Hepatitis B Curable/Treatable?		
Yes	198	54.8
No	160	44.4
I don't know	3	0.8
Is Vaccination Available For Hepatitis B?		
Yes	174	48.2
No	180	49.9
I don't know	7	1.9

Figure 1 (below) shows that almost half of the participants representing 49.0% had inadequate knowledge about Hepatitis B.

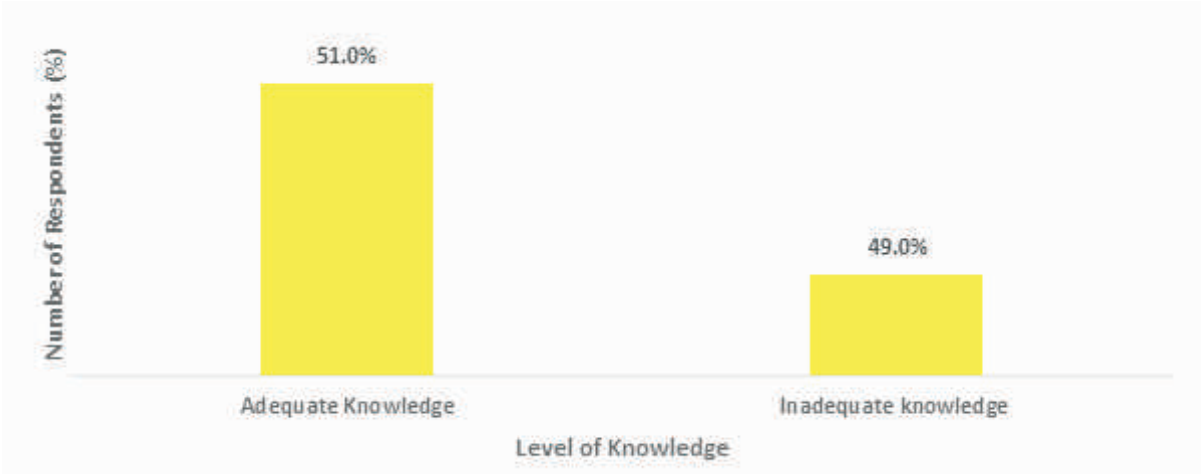

Figure 1: Overall Knowledge toward Hepatitis B among pregnant women attending ANC in JUTH

Table 3 (below) shows that almost half have good risk perception towards hepatitis B infection; with just above a quarter willing to disclose to a family member if found to be infected; with the cost of treatment being the biggest worry among almost a third of respondents.

Table 3: Attitude towards Hepatitis B Virus among pregnant women attending ANC in JUTH (n=361)

Attitude	F	%
Do You Th ink You Can Get Hepatitis B?		
Yes	176	48.8
No/ I don't know	185	51.2
What Will Be Your Reaction If You Are Found To Have Hepatitis B?		
Fear	88	24.4
Sadness	150	41.6
Go To Health Facility	123	34.1
Do You Have Hepatitis B?		
Yes	25	6.9
No/ I don't know	336	93.1
Whom Would You Communicate To About Your Illness?		
Doctor	200	55.4
Family Member	100	27.7
No One	61	16.9
What Will You Do If You Think You Have Symptoms Of Hepatitis B?		
Go To Hospital	225	62.3
Go To Traditional Healers	85	23.5
Will Not Go Anywhere	51	14.1
If You Had Symptoms Of Hepatitis B, At What Stage Will You Go To The Hospital?		
As Soon As I Realized The Symptoms	232	64.3
After 24 Hours Of Symptoms	75	20.8
When Home Treatment Fails	30	8.3
Will Not Go To Hospita l	24	6.6
How Expensive Do You Think Is Diagnosis And Treatment Of Hepatitis B?		
Free	11	3.0
Moderately Expensive	29	8.0
Expensive	48	13.3
I Do Not Know	273	75.6
What would worry You If You Are Diagnosed With Hepatitis B?		
Cost Of Treatment	105	29.1
Fear Of Transmitting The Disease	93	25.8
Discrimination By The Society	82	22.7
Nothing To Worry About	81	22.4

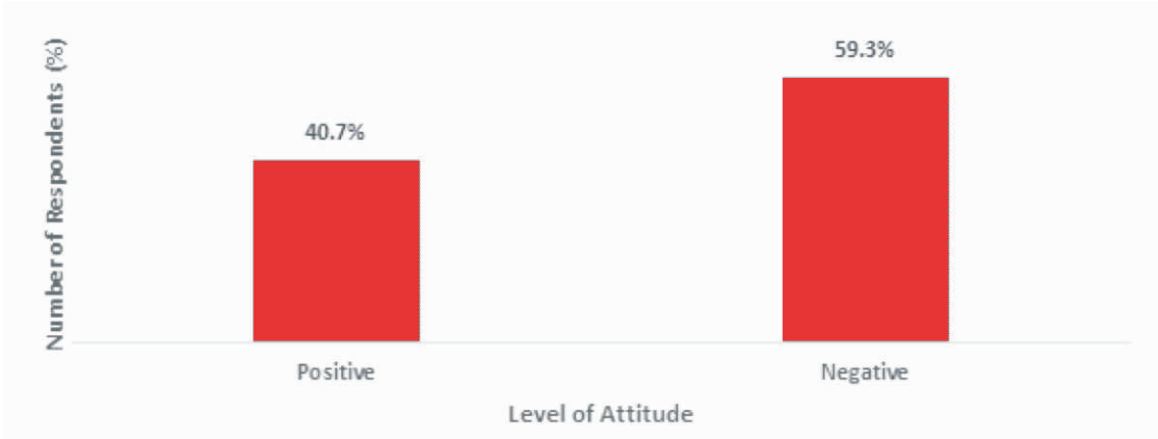

Figure 2: Attitude towards Hepatitis B Virus among pregnant women attending ANC in JUTH

Figure 2 (above) shows that overall attitude toward Hepatitis B by the pregnant women revealed that most of the women, (59.3%) had negative attitude toward Hepatitis B while 40.7% had positive attitude. **Table 4** (below) on Practice of safety measures to Hepatitis B showed that around half of the study participants have been screened for Hepatitis; with only about a third being vaccinated against Hepatitis B infection.

Table 4: Practice of safety measures to Hepatitis B (n=361)

Practice	F	%
Have You been screened for Hepatitis?		
Yes	185	51.2
No	167	46.3
I don't know	9	2.5
Do You Change The Blade For Safe Equipment For Ear And Nose Piercing?		
Yes	166	46.0
No	195	54.0
Have You Been Vaccinated Against Hepatitis B?		
Yes	130	36.0
No	230	63.7
I don't know	1	0.3
When diagnosed With Hepatitis B Would You Go For Further Investigation And Treatment?		
Yes	201	55.7
No	158	43.7
I don't know	2	0.6
Do You Avoid Meeting Hepatitis B Patients?		
Yes	170	47.1
No	191	52.9

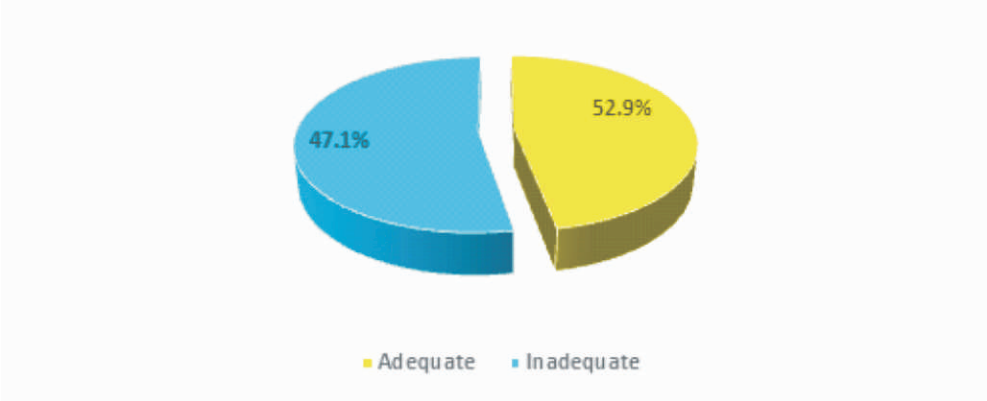

Figure 3: Overall Practice of Safety measures (n=361)

Overall practice of safety measures as seen in Figure 3 (above) revealed that more than half of the participants (52.9%) had adequate practice of safety measures against Hepatitis B.

DISCUSSION

The study revealed inadequate knowledge and negative attitude and practice towards HBV among pregnant women attending antenatal clinics in Jos University Teaching Hospital. This lack of knowledge may influence the attitudes of the mothers towards intervention that could reduce the risk of transmission to their infants.

The findings in this study showed that 49% of participants had poor knowledge, whereas in a study conducted by Gebrecherkos T et al in Ethiopia, 73.4% of the participants had poor knowledge.[11] A study conducted by Dun-Dery F et al in Ghana showed that less than half of the participants (46.2%) knew about HBV infection and its disease.[12] A cross-sectional study conducted by Hanz Z et al in China, only 21% of the participants were able to answer all the general knowledge-related questions correctly.[13] A study conducted by Frambo A et al in the Buca Health District, Cameroon; showed that less than 20% of the participants had correct knowledge.[14] However, in a study conducted by Fikremariam et al in Addis Ababa, Ethiopia, 39.2% of them had adequate knowledge about HBV.[15]

According to the result, almost half of the respondents did not know HBV is transmissible through blood and blood products, through unsafe sex, and from mother to child during pregnancy, respectively. This is similar to a study reported by Fikremariam from Addis Ababa, Ethiopia.[15]This low level of knowledge of route of HBV transmission calls for targeted health education in order to prevent and control the spread of the virus. In contrast, a study conducted by Gboeze A et al in Nigeria in 2015 revealed that 72.9% of respondents demonstrated good knowledge regarding the transmission of HBV from mother-to-child, which was similar to findings in a study by Pham et al in Vietnam that reported 75.3% of the participants were aware that HBV is transmitted through unprotected sex.[17] Good knowledge of pregnant women regarding the different modes of transmission of HBV can be explained by the fact that these women have received regular antenatal care education on subject of HBV infection.

Only about a third of our study participants believed that hepatitis B can cause liver cancer. Similarly, low level of knowledge in Ethiopia, Japan and Addis Ababa Ethopia.[11,15,18] However it differed from the findings of Wah et al from China who found that 87% of the study participants believed that HBV can cause liver cancer.[19]

In this study, 59.3%of the respondents had negative attitudes towards HBV. This is similar to a study conducted by Kamal R in Honiara, Solomon

Islands.[20] A study conducted by Rahman M in Bangladesh showed that 50% of the participants had negative attitude.[21]As part of the negative attitude of respondents in this study, 23.5% of the participants said they will go to traditional healers as a choice of treatment if infected with HBV. A study conducted by Gebrecherkos T et al in Ethiopia showed that 47.7% of the respondents had gone to traditional healers if they had HBV.[11] This negative attitude by some respondent may be due to inadequate knowledge about HBV and its management.

In this study, 47.1% of the participants had negative practice. This differed from a study conducted by Fikremariam B in Addis Ababa Ethiopia, which showed 57.5% of the participants had negative practice.[15] In this study, 48.8% had not screened for HBV and 64% have not been vaccinated against HBV, while a study conducted by Gebercherkos T et al in Ethiopia showed that 85.9% had not been screened.[11] This is due to lack of awareness about the importance of screening for HBV, vaccination and the implication on maternal and fetal wellbeing.

Conclusion

The study highlighted the need to prioritize educating pregnant women and mothers in future public health campaigns in order to increase knowledge, reduce misperception and improve hepatitis B vaccination. The overall knowledge of participants was found to be inadequate, and their attitude and practice were also limited. In this study, poor knowledge about the transmission of HBV from mother to child was evident.

Extensive health education campaign should be provided to the general population and pregnant women in particular. Public health intervention to improve HBV antenatal screening practices are needed to eliminate MTCT. All pregnant women should be screened for HBV as part of antenatal follow up.

Conflict of Interest: There is no conflict of interest.

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ASSESSMENT OF KNOWLEDGE OF RISK FACTORS FOR ECTOPIC PREGNANCY AND ASSOCIATED FACTORS AMONG FEMALE UNDERGRADUATES OF UNIVERSITY OF JOS.

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ABSTRACT

Background: Ectopic pregnancy a major gynaecological problem and leading cause of maternal mortality. It is assuming greater importance from increasing incidence and impact on women's fertility; as late presentation makes its burden larger among women in developing countries.

Objective: To assess the level of knowledge and prevalence of risk factors for ectopic pregnancy among female undergraduates of the University of Jos.

Method: A cross-sectional survey carried out among 347 students who lived in the hostels of the University of Jos using a multistage sampling technique. Data was analyzed using SPSS. Descriptive statistics was presented as frequencies and percentages. Other statistical tests used include Chi-square and Fisher's exact at $p<0.05$ level of significance.

Results: Almost a quarter (24.8%) of the participants had good knowledge, about half (49.0%) had moderate knowledge while slightly above a quarter (26.2%) had poor knowledge of ectopic pregnancy. A statistically significant relationship was observed when multiple sexual partners (X^2=63.42; p=0.000); prior PID (X^2=117.22; p=0.000); OCP use (X^2=93.50; p=0.000); induced abortion (X^2=140.62; p=0.000); tubal surgery(X^2=88.09; p=0.000); smoking (X^2=7.76; p=0.021); and the number of sexual partners was compared with knowledge of ectopic pregnancy (X^2=36.20; p=0.003), but none when marital status was compared with knowledge ($X^2$12.302; p=0.138). The most prevalent risk factors included the use of oral contraceptives, prior PID 37(10.7%), alcohol intake 34 (9.8%), induced abortion 33(9.5%) and multiple sexual partners 43(16.3%) of 264 sexually active respondents.

Conclusion: Women of reproductive age group should be educated on the knowledge of symptoms and risk factors of ectopic pregnancy to reduce the morbidity and mortality associated with it.

Key words: Ectopic pregnancy, Risk factors, Knowledge level, Fallopian tubes.

Introduction

Ectopic pregnancy (EP) is defined as pregnancy, in which the implantation of the embryo occurs outside the uterine cavity, most frequently in one of the two fallopian tubes, or more rarely, in the abdominal cavity;[1,2] a life-threatening emergency with a rising incidence of maternal mortality especially in resource-poor settings.[3] It is a major gynaecological problem of public health importance all over the world. EP is the leading cause of maternal mortality in industrialized countries in the first trimester, and possibly the second most frequent cause in developing countries after complications of induced abortion.[4, 5, 6.] Between 93 and 97% of ectopic pregnancies are located in a fallopian tube and 75% are located in the ampulla,13% in the isthmus and 12% in the fimbriae.[4, 7] It is a major health problem for women of childbearing age not only because it causes maternal mortality but of greater clinical importance is the indirect morbidity of poor fertility prognosis and adverse outcome in subsequent pregnancies with a 7-15% chance of recurrence and only 40-60% chance of conceiving after surgery.[8,9.] The common risk factors associated with ectopic pregnancy include pelvic inflammatory disease (PID), complications associated with the use of Intrauterine Contraceptive Device (IUCD), increased maternal age, previous pelvic surgery, history of infertility, early age of intercourse, multiple sexual partners, cigarette smoking, post-abortal sepsis , puerperal sepsis and peritonitis arising from other causes like appendicitis.[10,11,12,13,14] Affectation of the ciliary functions of the fallopian tube is the mechanism upon which these risk factors cause EP with pelvic inflammatory disease as the most common.[15]

Symptoms usually depend on the evolution of the pathology; from an asymptomatic state of the unruptured early ectopic gestation through chronic pelvic pain in the slow leaking variety to sudden collapse in acute ruptured EP. Other symptoms include a missed period and vaginal bleeding.[16,17]

Diagnosis of ectopic pregnancies is by serial detection of serum human chorionic gonadotropin (hCG) to confirm pregnancy and ultrasound to identify the exact location of the pregnancy, but when in doubt, the gold standard for the diagnosis is laparoscopy.[16]

Ectopic pregnancy is assuming greater importance because of its increasing incidence and its impact on women's fertility.[5,18] It is a leading cause of maternal death during the first trimester of pregnancy, accounting for approximately one in ten pregnancy-related deaths.[6] It contributes to poor reproductive performance amongst women of child bearing age.[19] The risk of death among those in the developed world is between 0.1 and 0.3 per cent while in the developing world it is between 1 and 3%.[20]

A significant percentage of women of reproductive age (15–44 years) are ignorant of the risk factors of EP.[1] Absence of recognizable risk factors is responsible for the late presentation identified recently in most women with severe morbidity from EP. Most undergraduates are young and nulliparous, hence the need to assess their knowledge of risk factors for ectopic pregnancy aimed at increasing their understanding of the subject matter and encouraging preventive measures which will in-turn reduced the menace cause by ectopic pregnancy in them as they advance in age and their reproductive life.

This study hopes to increase literature availability that discusses risk factors on ectopic pregnancy which is currently scarce in our region; and by so doing reduce the incidence of EP and the morbidities associated with late presentation.

The study aimed to assess the level of knowledge and prevalence of risk factors for ectopic pregnancy among female undergraduates of the University of Jos.

Methodology

Study Area/Population: The study was carried out at University of Jos, Plateau State, Nigeria. Currently the University has three major hostels, Abuja, Village and Naraguta hostels providing accommodation for most of the students. Abuja hostel has five blocks, A to E with blocks C, D allotted to females, each block has ground, first and second floor with 37 rooms on each floor and each

room has 5 students. In Naraguta hostel there are blocks A, B, C, D and Zion (A and B blocks); Blocks D and Zion (A and B) are allotted to females each block has four floors with 16 to 20 rooms per floor containing a student each while Village hostel is organized in to compounds with 10 compounds allotted to females each compound has 27 to 30 rooms containing 4 students per room.

Study Design

A cross-sectional survey was carried out among the undergraduate female students who lived in the hostels.

Sampling Technique

Respondents were selected by multi-staged sampling from the three major hostels of the institution.

Stage one: All three major hostels and all floors/compounds of each hostel were purposively selected to provide a good spread of the respondents across Levels and age groups.

Stage two: Ten rooms per floor, 4 rooms per floor, and 3 rooms per compound were selected by simple random sampling by balloting in Naraguata, Abuja, and Village hostels respectively.

Stage three: All occupants of all the selected rooms were interviewed for the research giving a total of 384 participants.

Instrument of Data Collection

Data was collected through a pre-tested, semi-structured self-administered questionnaire on the sociodemographic characteristics of respondents, knowledge of EP, and prevalence of risk factors for EP obtained from the literature review.

Study Process: A brief introduction to the purpose of the study was given to participants, after which informed consent was sought and obtained. A total of 374 self-administered questionnaires were distributed to the respondents and 347 were filled and returned giving a response rate of approximately 93%. Respondents were assured of confidentiality and anonymity and informed that their participation was voluntary and that they had the right to opt-out without any consequences.

Results

Table 1: Awareness of Risk Factors of Ectopic Pregnancy Among Female Undergraduates of the University of Jos

Variable	Frequency (n= 374)	Percent (100%)
Prior PID		
Yes	240	69.2
No	107	30.8
Abortion		
Yes	221	63.7
No	126	36.3
Contraceptive use		
Yes	214	61.7
No	133	38.3
Tubal surgeries		
Agree	190	54.8
Disagree	157	45.2
Early age at First Pregnancy		
Yes	171	49.3
No	176	50.7
Family History		
Yes	162	46.7
No	185	53.3
Cigarette smoking		
Yes	125	36.0
No	222	64.0
Early age at sexual debut		
Yes	123	35.4
No	224	64.6
Infertility		
Yes	113	32.6
No	234	67.4
Multiple sexual partners		
Yes	107	30.8
No	240	69.2

From Table 1(above), only a tenth of respondents were able to correctly identify all 10 questions asked to assess knowledge while about a third could not identify any question correctly. A good number (>60%) were able to identify PID and previous history of abortion as a risk factors for ectopic pregnancy.

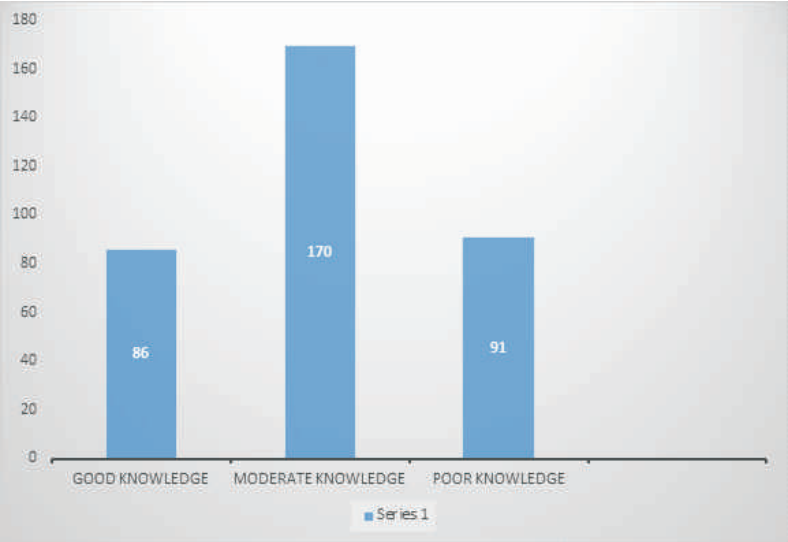

Figure 1: Level of knowledge of Risk Factors of Ectopic Pregnancy Among Female Undergraduates of University of Jos

From Figure 1(above), slightly less than a quarter (24.8%) of the respondents had good knowledge of the risk factors for ectopic pregnancy, almost half (49%) had moderate knowledge while slightly above a quarter (26.2%) had poor knowledge of the risk factors of ectopic pregnancy.

Table 2: Pattern of Risk factors for Ectopic Pregnancy among Female Undergraduates of the University of Jos.

Variables	**Frequency (n=374)**	**Percent (100%)**
Use of Oral Contraceptives		
Yes	54	15.6
No	293	84.4
Age at First Use of Oral Contraceptives		
	12	22.2
19 – 21	26	48.1
22 – 24	13	24.1
>24	3	5.6
Prior PID		
Yes	37	10.7
No	310	89.3
Frequent Alcohol intake		
Yes	34	9.8
No	313	90.2

Induced Abortion		
Yes	33	9.5
No	314	90.5
Smoking		
Yes	26	7.5
No	321	92.5
Previous Ectopic Pregnancy		
Yes	8	2.3
No	339	97.7
Previous Tubal Surgery		
Yes	8	2.3
No	339	97.7
Number of Sexual Partners in the Past 3 Months		
None	165	62.5
One	56	21.2
Two and above	43	16.3

From Table 2(above), the most prevalent risk factor for ectopic pregnancy among the respondents is the use of oral contraceptives identified in above a tenth of the respondents, Prior PID was identified in a tenth while frequent alcohol consumption and induced abortion were identified in about a tenth of the respondents. The least prevalent risk factor for ectopic pregnancy among the respondents was a previous ectopic pregnancy and previous tubal surgery, 2.3% each.

Table 3: Association between Pattern of Risk factors for Ectopic Pregnancy and Knowledge of Ectopic pregnancy among Female Undergraduates of the University of Jos.

Variable	Knowledge, Frequency (%)			X^2	P
	Good	**Moderate**	**Poor**		
Having MSP					
Yes	54(50.5)	45(42.1)	8(7.4)	63.42	***0.000****
No	32(13.3)	125(52.1)	83(34.6)		
Prior PID					
Yes	84(35)	131(54.6)	25(10.4)	117.22	***0.000****
No	2(1.9)	39(36.5)	66(61.6)		
OCP USE					
Yes	75(35)	120(56.1)	19(8.9)	93.50	***0.000****
No	11(8.3)	50(37.6)	72(54.1)		
INDUCED ABORTION					
Yes	78(35.3)	131(59.3)	12(5.4)		
No	8(6.3)	39(40)	79(62.7)	140.62	***0.000****
TUBAL SURGERY					
Agree	80(42.1)	89(46.8)	21(11.1)	88.09	***0.000****
Disagree	6(3.8)	81(51.6)	70(44.6)		
SMOKING					
Yes	7(26.9)	18(69.3)	1(3.8)	7.76	***0.021****
No	79(24.6)	152(47.4)	90(28.0)		
DRINKS ALCOHOL					
Yes	10(29.4)	17(50)	7(20.6)	0.79	*0.67*
No	76(24.3)	153(48.9)	84(26.8)		
NUMBER OF SEXUAL PARTNERS					
None	28(17)	100(60.6)	37(22.4)	36.20	***0.003****
One	17(30.4)	18(32.1)	21(37.5)		
More than One	41(32.5)	52(41.3)	33(26.2)		

***Significant at <0.05:**
MSP-Multiple Sexual Partners, PID- Pelvic Inflammatory Disease, OCP-Oral Contraceptive Pill, P Significant at <0.05

From Table 3(above), there was statistically significant relationship between having MSP, prior PID, OCP use, induced abortion, tubal surgery, and the number of sexual partners, except drinking alcohol and knowledge of ectopic pregnancy at p values indicated in the table 3.

Table 4: Association between Marital Status and Knowledge of Risk Factors of Ectopic Pregnancy among Female Undergraduates of the University of Jos.

		Knowledge Group F (%)			Total
		Good knowledge	Moderate knowledge	Poor knowledge	
Marital Status	Divorced	1(100%)	0 (0.0%)	0 (0.0%)	1 (100.0%)
	Married	4 (57.1%)	0 (0.0%)	3 (42.9%)	7 (100.0%)
	Separated	0 (0.0%)	2 (66.7%)	1 (33.3%)	3 (100.0%)
	Single	81 (24.2%)	167 (49.9%)	87 (26.0%)	335 (100.0%)
	widow	0 (0.0%)	1 (100.0%)	0 (0.0%	1 (100.0%)
Total		86 (24.8%)	170 (49.0%)	91 (26.2%)	347 (100.0%)

$X^2 = 12.302$, df = 8 p= 0.138

Table 4: Association between Marital Status and Knowledge of Risk Factors of Ectopic Pregnancy among Female Undergraduates of the University of Jos.

DISCUSSION

The study revealed that only about a quarter of the respondents had good knowledge of ectopic pregnancy (EP), slightly below half of them had moderate knowledge while slightly above a quarter had poor knowledge of ectopic pregnancy. These findings were the similar to what was found in a similar study conducted in Southeastern Nigeria;[1] that recorded that, slightly over a third of the respondents had good knowledge, half had moderate knowledge, and almost half had poor knowledge of the risk factors for EP. This similarity was most likely because both studies were carried out among undergraduates who shared similar age ranges and most likely similar social behaviours. This means that a significant number of the undergraduate female population might have been practicing some social habits and sexual behaviours that can put them at risk of ectopic pregnancy without knowing it. Such individuals may only be recognised when they present with long-term complications of EP like chronic pelvic pain or infertility. Therefore, deliberate effort through health education should be done to enlighten them about the risk factors of ectopic pregnancy and how to avoid or treat them.

Concerning awareness of risk factors for ectopic pregnancy, most of the respondents identified prior PID, induced abortion, contraceptive use, and previous tubal surgery as risk factors for ectopic pregnancy. They, however, failed to identify having multiple sexual partners, infertility, early age at sexual debut, and cigarette smoking as risk factors for EP; these findings are similar to what was found in a similar study conducted among female undergraduates in Calabar, Nigeria.[1] This invariably means that, they will continue to ignorantly practice some harmful lifestyles which will put them at risk of having ectopic pregnancy with its attendant complications.

The use of oral contraceptives was the commonest risk factor for EP identified among the respondents of this study, which is not surprising as there is an increase in the number of private and government organizations advocating for an increased uptake of modern family planning methods among all young women of reproductive ages. This will mean an increased incidence of EP as the pills only protect against pregnancy and not sexually transmitted diseases, might well lead to PID; and if not promptly and properly treated lead to tubal damage and EP; hence the need to educate young women on this risk and to advocate for the use of other forms of contraception especially barrier

contraception like condoms to give them dual protection again STDs and pregnancy. This finding is similar to what was found in a study conducted in a tertiary institution in Kano,[22] a lower prevalence was reported in a similar study conducted in Calabar[1] while a higher prevalence was reported in studies conducted in Southwestern and Northeastern Nigeria.[23,24,25] Factors responsible for this variation may be due to cultural and religious beliefs about contraception in regions where these studies were conducted.

Prior PID was the second highest risk factor for ectopic pregnancy identified in this study this is lower than what was reported in a study conducted in India.[5] Induced abortion had a prevalence of less than a tenth, which is lower than the prevalence of more than a quarter reported in a study in India;[5] factors responsible for this variation may be related to the difference in the mean age of the respondents of these studies (21.96+/-3.12 versus 29.1+/- 5.42 respectively). This means the respondents should be educated on the fact that almost 100% of people who had an induced abortion will have a very high risk of developing ectopic pregnancy in the nearest features as some studies have reported that about 63 to 95% of ectopic pregnancies had induced abortion as a risk factor.[19,26,]

One in every four of the respondents reported having multiple sexual partners (MSPs), this is similar to what was recorded in other studies among undergraduates in Southeast Nigeria.[1,27,28] This risky behaviour among them simply means an increased incidence of unwanted pregnancies/induced abortion and PID if barrier contraception is not consistently and correctly used. Therefore, there is need for young women to be given adequate knowledge of this relationship to reduce the incidence of EP with its attendant complications. Possible reasons for this increased number of young women with MSPs include financial and social problems occasioned by increasing poverty and economic instability in Nigeria.

There was a statistically significant relationship observed when smoking and the number of sexual partners were compared with the knowledge of ectopic pregnancy. This is likely linked to the fact that in the pathogenesis of ectopic pregnancy smoking usually causes tubal damage by destroying ciliary motion of fertilize zygote preventing movement of the zygote to the endometrial cavity resulting in EP.[29] Multiple sexual partners on the other hand will lead to STDs, then PID and tubal damage by different mechanisms.

There was no statistically significant relationship seen when the marital status of the respondents was compared with the knowledge of risk factors of EP. Same was the case when age groups were compared with the knowledge of risk factors for EP. A possible explanation for this is that behaviours and activities that put women at risk of EP can be practised by all women regardless of age or marital status.

CONCLUSION

It can be concluded from the study therefore, that awareness of the risk factors for ectopic pregnancy does not translate to knowledge, hence there is a the need to empower women within the reproductive age group with sound knowledge of risk factors for EP; teach them preventive measures and encourage early presentation when they have features suggestive of EP. This will help in reducing the maternal morbidity and mortality that can arise from EP including complications like chronic pelvic pain and infertility.

The study was limited by the fact that there was no means of verifying or confirming the responses given by the respondents and also by the cross-sectional nature of this research, the self-reported nature of the information instrument of data collection, and social desirability bias from the respondents.

It was recommended that public health education on risk factors of ectopic pregnancy and ways of preventing them be carried out by public health officials and health care professionals to women of reproductive age at any level of care or contact and encouragement of safe sexual practices and barrier contraception use among all women of reproductive age regardless of her age or marital

status if they are at risk of contracting STIs.

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POSTDATE UNRUPTURED OVARIAN ECTOPIC PREGNANCY: A CASE REPORT.

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ABSTRACT

Advance ovarian ectopic pregnancy (OEP) is a very rare condition and is typically difficult to diagnose and associated with high maternal and neonatal morbidity and mortality. We present a case report of a primigravida diagnosed with a postdate ovarian ectopic pregnancy at laparotomy.

Keywords: advanced ovarian pregnancy, postdate, laparotomy

INTRODUCTION

Ectopic pregnancy occurs when the embryo implants anywhere other than the uterine cavity.[1] Ectopic pregnancy constitutes 1-2% of all pregnancies and is among the leading causes of maternal morbidity and mortality.[5,6] Ovarian ectopic pregnancy is one of the rarest subtypes with an estimated incidence of 0.5 – 3.5%.[5,7]

The first case of ovarian pregnancy was reported in 1689 by St Maurice and only eleven cases have been previously reported base on literature search carried out on PUB MED[2]

Because of the rarity of this condition, it is often not considered as a diagnostic possibility and could easily be missed.

Furthermore, an accurate diagnosis is not easily arrived at and may require series of procedures including a surgical intervention in majority of cases. Consequently a high but unfortunately unknown number of cases have remain undiagnosed with fatal consequences.[4] Therefore, early and accurate diagnosis is vital to prevent serious outcomes and to overcome severe complications.[4] Here, we report a case of a post date ovarian ectopic pregnancy occurring after spontaneous conception.

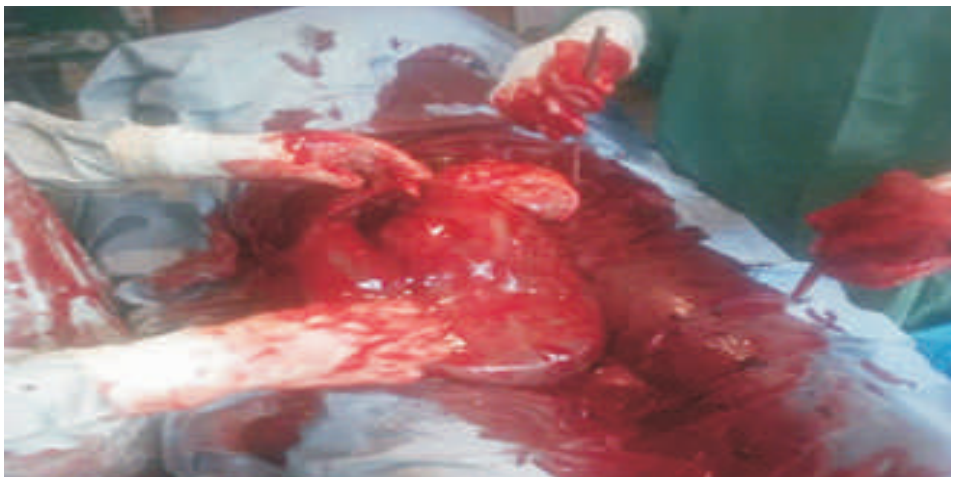
CASE REPORT

The patient was a 21 year old primigravida who was unsure of her last menstrual period but ultrasound done at presentation estimated her to be 41 weeks pregnant. She was of low socioeconomic status and did not book her pregnancy for antenatal care, she presented to the hospital with complaints of generalized mild abdominal pains and decrease perception of foetal movement of one week duration. There was history of Pelvic inflammatory disease in the past, however, no history of ovulation induction or IUCD use.

On examination, her general condition was stable with pulse rate of 84 beats per minute and blood pressure of 100/70 mmHg. On abdominal examination, the fundal height was 36cm with a singleton foetus in longitudinal lie and cephalic presentation. No contractions were felt on palpation. Foetal heart tones were not felt. Vaginal examination revealed a firm, posterior cervix that was closed. Her parked cell volume was 34% and obstetric ultrasound showed a post date nonviable pregnancy in cephalic presentation she was

counseled on the findings and she consented to cervical ripening and induction of labour. She had four doses of 25µg misoprostol (cytotec) inserted 6 hourly in the posterior vaginal fornix but no changes were observed in the cervix. The dose was stepped up to 50µg for which she had another 3 doses yet no changes were observed in the cervix. A suspicion of cervical dystocia was made and she was planned for a caesarean delivery with the following intra-operative findings;

- A non gravid bulky uterus that was intact measuring about 8cm x 6cm
- Normal left ovary and fallopian tube
- Normal right fallopian tube
- A fresh male still born in an intact amniotic cavity within the right ovary measuring about 25cm x 15cm. The baby weighed 2.5kg
- Placenta attached internally to the ovarian sac and omentum attached to the wall of the ovarian sac externally.
- The ovarian sac was connected to the uterus by ovarian ligament.
- Healthy ovarian tissues noted on the inferior portion of the ovarian sac.



DISCUSSION

Ovarian ectopic pregnancy is one of the rarest forms of ectopic pregnancy.[2] These pregnancies usually do not extend to 37 weeks and usually end up with foetal loss with associated maternal morbidity and mortality.[4] For correct diagnosis, the traditional criteria proposed by Spigelberg in 1878 must be fulfilled.[2] These criteria include: Intact fallopian tube on the affected side, foetal sac occupying the position of the ovary on the affected side, ovary connected to the uterus by ovarian ligament, and ovarian tissue must be located in the sac.

The findings in this patient met the criteria put forward by Spigelberg, however, the ovarian tissue was noted on the ovarian sac but was not sent for histological confirmation.

Ovarian pregnancy could be primary or secondary from tubal abortion.[2] There is paucity of information on the causes of ovarian pregnancy.[2] Possible explanations for primary ovarian pregnancy suggested includes interference in the release of the ovum from the ruptured follicle, malfunction of the tubes and inflammatory thickening of the tunica albugenia.[2]

This inflammation could result from pelvic inflammatory disease which our patient was treated for in the past. Other risk factors are use of IUCD and control ovarian hyperstimulation in ART cycles.[2] Majority of cases are diagnosed in the first trimester as rupture commonly occurs at the 7th week of gestation.[5] Patients will present with

symptoms of abdominal pains, syncopal attacks and varying degrees of vaginal bleeding.[5] Our patient was unique being that the pregnancy was carried to 41 weeks.

The diagnosis of advanced ovarian pregnancy is very challenging, history and physical examinations are inconclusive.[4] It is easier to reach a diagnosis during the first trimester using high resolution transvaginal ultrasonography, making quantitative measures of β human choronic gonadotrophin (β HCG) levels and performing laparoscopy.[4,8,9] Our patient did not register for antenatal clinic, hence the opportunity for early ultrasound evaluation and possible diagnosis of extrauterine gestation was missed. Observing the entire uterine wall encapsulating the pregnancy and placenta confirms intrauterine pregnancy. If ultrasonography shows no uterine wall surrounding the foetus and if foetal parts are very close to the abdominal wall, then the suspected diagnosis will be extrauterine.[4]

Extrauterine pregnancies should also be suspected in cases of vaginal bleeding with non-labour abdominal pains in the 3rd trimester and post date pregnancy with a failed Induction of labour as it was in our case.[4]

Treatment for ovarian ectopic pregnancy could be expectant, pharmacological or surgical (open or laparoscopy) depending on the gestational age, haemodynamic status of the patient, serum β HCG level and presence or absence of cardiac activity.[1,10]

Expectant and medical treatment may be suitable for patients that are asymptomatic with no evidence of rupture, absent cardiac activity small gestational age and declining serum β HCG level in patients who are likely to comply to follow up.[1,10]

Success rate with methotrexate is >80% with the beta HCG level between 10000 and 14999 mIU/mL but according to the American society of reproductive medicine guidelines, a β HCG level more than 5000 mIU is a relative contraindication to medical therapy.[2,7,8]

In our case, though the patient was haemodynamically stable with no evidence of rupture and absent cardiac activity, the pregnancy was carried to post date and the diagnosis of ovarian ectopic pregnancy was made intra-operatively. She had laparotomy with right ovariectomy and was transfused 2 unit of blood. She responded well to treatment and was discharged post op day 5.

CONCLUSION

Ovarian ectopic pregnancy is by no means an easy diagnosis to make preoperatively, when carried to term as was in our case, the diagnosis becomes even more difficult. This case report supports the consideration for possible ovarian ectopic pregnancy as a differential diagnosis when cervical changes fail to occur despite several attempts to ripen the cervix and be prepared to manage the patient as such.

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CONTENT

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CONTENT

TIME TO TREAT THE CLIMATE AND NATURE CRISIS AS ONE INDIVISIBLE GLOBAL HEALTH EMERGENCY

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Over 200 health journals call on the United Nations, political leaders, and health professionals to recognize that climate change and biodiversity loss are one indivisible crisis and must be tackled together to preserve health and avoid catastrophe. This overall environmental crisis is now so severe as to be a global health emergency.

The world is currently responding to the climate crisis and the nature crisis as if they were separate challenges. This is a dangerous mistake. The 28th Conference of the Parties (COP) on climate change is about to be held in Dubai while the 16th COP on biodiversity is due to be held in Turkey in 2024. The research communities that provide the evidence for the two COPs are unfortunately largely separate, but they were brought together for a workshop in 2020 when they concluded that: "Only by considering climate and biodiversity as parts of the same complex problem…can solutions be developed that avoid maladaptation and maximize the beneficial outcomes."[1]

As the health world has recognized with the development of the concept of planetary health, the natural world is made up of one overall interdependent system. Damage to one subsystem can create feedback that damages another—for example, drought, wildfires, floods and the other effects of rising global temperatures destroy plant life, and lead to soil erosion and so inhibit carbon storage, which means more global warming.[2] Climate change is set to overtake deforestation and other land-use change as the primary driver of nature loss.[3]

Nature has a remarkable power to restore. For example, deforested land can revert to forest through natural regeneration, and marine phytoplankton, which act as natural carbon stores, turn over one billion tons of photosynthesizing biomass every eight days.[4] Indigenous land and sea management has a particularly important role to play in regeneration and continuing care.[5]

Restoring one subsystem can help another—for example, replenishing soil could help remove greenhouse gases from the atmosphere on a vast scale.[6] But actions that may benefit one subsystem can harm another—for example, planting forests with one type of tree can remove carbon dioxide from the air but can damage the biodiversity that is fundamental to healthy ecosystems.[7]

The impacts on health

Human health is damaged directly by both the climate crisis, as the journals have described in previous editorials,[8,9] and by the nature crisis.[10] This indivisible planetary crisis will have major effects on health as a result of the disruption of social and economic systems—shortages of land, shelter, food, and water, exacerbating poverty, which in turn will lead to mass migration and conflict. Rising temperatures, extreme weather events, air pollution,

and the spread of infectious diseases are some of the major health threats exacerbated by climate change.[11] "Without nature, we have nothing," was UN Secretary-General António Guterres's blunt summary at the biodiversity COP in Montreal last year.[12] Even if we could keep global warming below an increase of 1.5°C over pre-industrial levels, we could still cause catastrophic harm to health by destroying nature.

Access to clean water is fundamental to human health, and yet pollution has damaged water quality, causing a rise in water-borne diseases.[13] Contamination of water on land can also have far-reaching effects on distant ecosystems when that water runs off into the ocean.[14] Good nutrition is underpinned by diversity in the variety of foods, but there has been a striking loss of genetic diversity in the food system. Globally, about a fifth of people rely on wild species for food and their livelihoods.[15] Declines in wildlife are a major challenge for these populations, particularly in low- and middle-income countries. Fish provide more than half of dietary protein in many African, South Asian and small island nations, but ocean acidification has reduced the quality and quantity of seafood.[16]

Changes in land use have forced tens of thousands of species into closer contact, increasing the exchange of pathogens and the emergence of new diseases and pandemics.[17] People losing contact with the natural environment and the declining loss in biodiversity have both been linked to increases in noncommunicable, autoimmune, and inflammatory diseases and metabolic, allergic and neuropsychiatric disorders.[10,18] For Indigenous people, caring for and connecting with nature is especially important for their health.[19] Nature has also been an important source of medicines, and thus reduced diversity also constrains the discovery of new medicines.

Communities are healthier if they have access to high-quality green spaces that help filter air pollution, reduce air and ground temperatures, and provide opportunities for physical activity.[20] Connection with nature reduces stress, loneliness and depression while promoting social interaction.[21] These benefits are threatened by the continuing rise in urbanisation.[22]

Finally, the health impacts of climate change and biodiversity loss will be experienced unequally between and within countries, with the most vulnerable communities often bearing the highest burden.[10] Linked to this, inequality is also arguably fueling these environmental crises. Environmental challenges and social/health inequities are challenges that share drivers and there are potential co-benefits of addressing them.[10]

A global health emergency

In December 2022 the biodiversity COP agreed on the effective conservation and management of at least 30% percent of the world's land, coastal areas, and oceans by 2030.[23] Industrialised countries agreed to mobilise $30 billion per year to support developing nations to do so.[23] These agreements echo promises made at climate COPs. Yet many commitments made at COPs have not been met. This has allowed ecosystems to be pushed further to the brink, greatly increasing the risk of arriving at 'tipping points', abrupt breakdowns in the functioning of nature.[2,24] If these events were to occur, the impacts on health would be globally catastrophic.

This risk, combined with the severe impacts on health already occurring, means that the World Health Organization should declare the indivisible climate and nature crisis as a global health emergency. The three pre-conditions for WHO to declare a situation to be a Public Health Emergency of International Concern are that it:[25] 1) is serious, sudden, unusual or unexpected; 2) carries implications for public health beyond the affected State's national border; and 3) may require immediate international action. Climate change would appear to fulfil all of those conditions. While the accelerating climate change and loss of biodiversity are not sudden or unexpected, they are certainly serious and unusual. Hence, we call for WHO to make this declaration before or at the Seventy-seventh World Health Assembly in May 2024.

Tackling this emergency requires the COP processes to be harmonised. As a first step, the respective conventions must push for better integration of national climate plans with biodiversity equivalents.[3] As the 2020 workshop that brought

climate and nature scientists together concluded, "Critical leverage points include exploring alternative visions of good quality of life, rethinking consumption and waste, shifting values related to the human-nature relationship, reducing inequalities, and promoting education and learning."[1] All of these would benefit health.

Health professionals must be powerful advocates for both restoring biodiversity and tackling climate change for the good of health. Political leaders must recognise both the severe threats to health from the planetary crisis as well as the benefits that can flow to health from tackling the crisis.[26] But first, we must recognise this crisis for what it is: a global health emergency.

This Comment is being published simultaneously in multiple journals. For the full list of journals see: https://www.bmj.com/content/full-list-authors-and-signatories-climate-nature-emergency-editorial-october-2023

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FACTORS ASSOCIATED WITH CHILDHOOD MALNUTRITION IN MELELE COMMUNITY OF PLATEAU STATE, NIGERIA.

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ABSTRACT

Background: Optimal nutrition during childhood, particularly in the first five years of life, is essential for a healthy and productive adult life. Under-five malnutrition is a serious public health issue because it impairs children's cognitive and physical development and raises their risk of morbidity and death. This study is to determine the prevalence of malnutrition and factors influencing it among under five children in a rural area of Plateau state.

Methods: This cross-sectional community-based survey was conducted in Melele community of Mangu ward II, Mangu Local Government of Plateau State. Data from a total of 167 under-five children was obtained and analyzed using SPSS version 23 to determine the association between the nutritional status and independent variables (age group, sex, immunization status, deworming status within last six months, being given ITN, sleeping under ITN and attainment of developmental mild stone).

Results: There were 56.3% males out of the 167 under-five respondents; about three-quarters of the children were 12months or older with a median age of 24 (5 – 45) months. about half (53.9%) of the participants were exclusively breastfed with most of them starting complimentary feed at a median age 6 (5 – 7) months of age. This study revealed a disproportionately high degree of malnutrition of under-fives in Melele community with 58.1% stunted, 46.7% wasted, and 31.1% underweight. There was a statistically significant relationship between deworming children within the last 6 months (p=0.012) and ownership of ITN (p=0.047) with nutritional status

Conclusion: We recommend that there should be an increase of nutritional interventions in rural communities in Plateau State as presently, most intervention and awareness programmes target urban areas. In addition, further research needs to be done to explore other factors, such as maternal and household characteristics, in relation to under-five malnutrition.

Key words: childhood, malnutrition, deworming, insecticide treated nets, rural, Nigeria

Introduction

Optimal nutrition during childhood, particularly in the first five years of life, is essential for a healthy and productive adult life. Under-five malnutrition is a serious public health issue because it impairs children's cognitive and physical development and increases their risk of morbidity and death.[1] Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients and can be categorized as undernutrition or over nutrition respectively.[2,3] By the age of 50, the risk of diabetes and major cardiovascular illness, such as cardiac arrest and cardiovascular accidents (CVAs), is doubled for children born with low birth weights (LBW).[4]

Globally, in 2022, 45 million children under the age of five were projected to be wasted (too thin for

height) and 149 million were stunted (too short for age), and about half of the total mortality among under-fives was associated to undernutrition.[3] Africa and Asia currently houses more than 90% of the worlds stunted children, contributing to 56% of all deaths in under-fives in developing countries,[5] and a stunting prevalence of 36% in Africa.[6]

According to the Nigeria's National Demographic Health Survey(NDHS) 2018, 37% of the nation's children under five were stunted, with 7% being wasted and a 22% underweight (too thin for age).[7] The burden of malnutrition varied across the geopolitical zones and even within areas in states. And there was a north – south variation in under-nutrition, with Sokoto state having the worst indices (68.1% prevalence of malnutrition among under-fives) and Anambra state the least, with a 17% prevalence.[8] In Plateau state, the prevalence of underweight among under-fives was found to be 22.7% (slightly above the national average of 22%) while stunting was 42.8%, significantly higher than the national average.[9]

Different determinants have been explored to affect the nutritional status of children, including environmental factors, household incomes, family factors (mother's educational qualification, health behaviours concerning the child's immunization and deworming) and child's socio-demographics (age and sex).[1,10-12] Another study in Plateau State showed other associated factors such as hygiene, socioeconomic factors of parents, and diet-related non-communicable diseases to be associated with under-five malnutrition.[13]

The variability in the prevalence of under-five malnutrition and its determinants calls for qualitative research into understanding the community determinants and uniqueness in different communities which will shape interventions that fit best into each community. This information can also serve as a baseline in measuring effect of nutritional interventions.

Methods

Study area

Melele is a community in Mangu ward II, Mangu district of Mangu Local government area. The population is predominantly Mwaghavul and Fulfulde speaking, majority of whom are peasant farmers with maize, beans and millet being the major crops. Major religions are Christianity and Islam. There is a primary health care center which meets the people's health needs and provide services such as health education, immunization, growth monitoring and treatment of common ailments.

Study design

The study was part of a cross-sectional community-based survey of Melele community.

Study setting and data collection

Melele community was purposively selected as a site for medical student's community diagnosis, based on its ease of access as well as security during the time of data collection. A total population sampling was used where all under-fives who were permanent residents with their primary caregivers as at the time of the study were included in the survey after obtaining verbal informed consent from the primary caregivers. The verbal permission of household heads was also sought while household numbering and community mapping were ongoing with the help of community guides, and medical students.

Data collection was done using a pre-tested interviewer administered, semi-structured questionnaire by trained research assistants (medical students). Data was collected from caregivers, mostly mothers, in Hausa language which is the primary language of communication and commerce in the community. Information on immunization history was gotten from immunization hand cards. The questionnaire collected data on the children's characteristics which covered the age, sex, immunization status and health seeking behaviours which may affect nutritional status. Weight of children was measured using the bathroom weighing scale while the basinet was used for children who could not stand. The height/length measurement was done using a measuring tape. All anthropometric measurements were taken after zero-correction and with the subjects minimally dressed and recorded to the nearest 0.1kg or cm.

Data management and analysis

Data was entered into Microsoft excel, cleaned and subsequently exported for analysis using SPSS version 23. Socio-demographic variables (sex and

age) and other characteristics were expressed as frequencies and proportions. Furthermore, age and duration of breast feeding were explored for normality where the distribution was found to be skewed, therefore, median and interquartile range were used for descriptive statistics.

Estimation of nutritional status (weight for height/length, weight for age and height for age) was done using the WHO Anthro v3.2.2 software. The z-scores were used in classifying children into normal and the various forms of malnutrition (stunting and wasting; Table 1).[14] However, the assessment of

Table 1. Z-score classification of malnutrition used

Variable	Z-score
Weight for height	
Wasted	≤ 2
Normal	? -2 to ? 2
Overweigh	≥
Weight for age	
Underweight	≤ 2
Normal	? -2 to ? 2
Overweight	≥
Height for age	
Normal	? -2
Stunted	≤ 2

Results

The sociodemographic and health behaviour characteristics of the study participants is shown in ***Table 2*** below. There were 94 (56.3%) males out of the 167 under-five respondents; 126 (75.4%) of the children were 12months or older with a median age of 24(5 – 45) months. Ninety (53.9%) of the participants were exclusively breastfed with most of them starting complimentary feed at a median age 6 (5 – 7) months of age. There were 74 (55.7%) respondents who were fully immunized for age. Though 97 (58.1%) of them received insecticide treated net, more of them 118 (70.7%) slept under it the night before data was collected. One hundred and forty-six (85.6%) of the under-fives received care from a health facility when sick.

Table 2. Characteristics of under-fives in Melele community

Variable	Frequency (n=167)	Percentage
Sex		
Female	73	43.7
Male	94	53.6
Age		
Infants	41	24.6
Older	126	75.4
Median age of children in months (IQR) - 24 (5 – 45)		
Nutritional status		
normal	78	46.7
malnourished	89	53.3
Immunization status		
Appropriate for age	74	44.3
Inappropriate for age	93	55.7
Child being exclusively breastfed		
Yes	90	53.9
No	77	46.1
Median duration of breastfeeding in months (IQR) 18 (12 – 21)		
Median age at commencing complementary feeding in months (IQR) 6 (5 – 7)		
Developmental milestone		
Appropriate for age	97	64.7
Delayed for age	53	35.3
Dewormed in last 6 months		
Yes	35	21
No	132	79
Point of care when sick		
Health facility	143	85.6
Traditional medicine	17	10.2
Prayer house	7	4.2
Child given ITN		
Yes	97	58.1
No	70	41.9
Child sleep under ITN last night		
Yes	118	70.7
No	49	29.3

IQR – interquartile range; ITN-insecticide treated net

Table 3 below shows the nutritional and developmental characteristics of the study participants. It is observed that 46.7% of them were wasted, 31.1% underweight while 58.1% were stunted.

Table 3: Nutritional status of under-fives in Melele community of Plateau State (n = 167)

Variable	F	%
Weight for height		
Wasted	78	46.7
Normal	27	16.2
Overweigh	52	37.1
Weight for age		
Underweight	53	31.1
Normal	103	61.7
Overweight	12	7.2
Height for age		
Normal	70	41.9
Stunted	97	58.1

F – frequency; % - percentage

There was a statistically significant relationship between deworming children within the last 6 months (p=0.012) and ownership of ITN (p=0.04) with nutritional status. Those who were dewormed within the last 6 months of the survey were 2.9 times more likely to have normal nutritional status as compared to those that have been dewormed. Similarly, those who owned ITN (59.8%) had more malnourished children ***(Table 4)***.

Table 4. Factors associated with nutritional status of under -fives in Melele community of Plateau State

Variable	Nutritional status (F [%])		χ^2	P-value	OR	95% CI
	Normal	Malnutrition				
Sex						
Female	39(53.4)	34(46.6)	2.352	0.125	1.618	0.873 – 2.996
Male	39(41.5)	55(58.5)				
Age in months						
0 – 12	22(53.7)	19(46.3)	1.055	0.304	1.447	0.714 – 2.936
13 – 59	56(44.4)	70(59.6)				
Immunization status						
Completed for age	31(41.9)	43(58.1)	1.238	0.266	0.706	0.381 – 1.305
Incomplete for age	47(50.5)	45(49.5)				
Child dewormed in the last 6 months						
No	55(53.4)	48(46.6)	6.255	***0.012****	2.928	1.236 – 6.936
Yes	9(28.1)	23(71.9)				
Child given ITN						
No	39(55.7)	31(44.3)	3.928	***0.047****	1.871	1.004 – 3.486
Yes	39(40.2)	58(59.8)				
Child slept under ITN last night						
No	27(55.1)	22(44.9)	1.964	0.161	1.612	0.825 – 3.152
Yes	51(43.2)	67(56.8)				
Attainment of developmental milestone						
Attained	43(44.3)	54(55.7)	0.112	0.738	0.892	0.456 – 1.746
Delayed	25(47.2)	28(52.8)				

F – Frequency, % -percentage, χ^2 – chi square, ITN – insecticide treated net, OR – odd ratio, CI – confidence interval.

Discussion

This study reveals a disproportionately high degree of malnutrition of under-fives in Melele community when compared to previous studies in Kwara State (stunting of 23.6%, wasting of 14.2% and underweight of 22%), the average national, and Plateau State figures of 2018 NDHS.[2,7,9.] The findings may also be a revelation of the worsening nutritional status of under-fives in rural communities in Nigeria. Seasonal variations however exist in availability of food; particularly in rural agrarian populations. This high level of malnutrition may also not be unconnected to the time of the year within which the study was done

The study also found a significant relationship between deworming 6 months prior to data collection and nutritional status; the largest proportion of malnutrition was found among dewormed children. In contrast, similar studies conducted in Jos and Abuja reported lower proportion among those who were dewormed.[15,16] This variation may be due to fact that parents in this community mostly get their children dewormed on presentation to the health facility for treatment of illnesses; suggesting that these children have been sick within the last 6 months and therefore received anti-helminths alongside other treatments for their ill-health. However, their being dewormed has a positive impact on their health and purports a good outlook for their nutritional status in the nearest future.

Owing to the relatively high degree of malnutrition

found in this study, there is a high risk of under-five morbidity and mortality in this community. This is to be expected as under-5 mortality rate is generally higher in rural than urban communities in Nigeria. The public health implication of this finding is that, it can be postulated that in the future, except this high prevalence of malnutrition is controlled, there will be a high prevalence of chronic illnesses in this population and community; as this level of undernutrition might result in increased risk of DM and cardiovascular illnesses in later life.[17]

In spite of this addition to knowledge, the absence of qualitative component to explore cultural nutritional factors that could affect the nutritional status of under-fives is a limitation to this study. Also, cause-effect relationship cannot be established because of the cross-sectional nature of the study.

Conclusion

There is a high prevalence of all forms of undernutrition among under-fives children in Melele Community, Mangu LGA. There should be upscaling of nutritional interventions in rural communities as most interventions and awareness programmes largely target urban areas. Parents (and especially Mothers) of under-fives need to be given nutritional education on ways to improve the nutrition of their children as well as the dire implication of undernutrition on their children. Further qualitative studies need to be done to explore other factors such as maternal and household characteristics, in relation to under-five malnutrition.

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SATISFACTION OF STAKEHOLDERS WITH THE IMPLEMENTATION OF THE TERTIARY INSTITUTIONS SOCIAL HEALTH INSURANCE PROGRAMME IN JOS: A QUALITATIVE STUDY

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ABSTRACT

Background:The tertiary Institutions Social Health Insurance programme was developed to provide access to quality health care services to students in institutions of higher learning in Nigeria but several authors have reported underutilization by students. The purpose of the study was to determine how the programme is implemented in tertiary institutions in Jos.

Methodology: A two-stage sampling technique was used to select respondents for the study. Data was collected using key informant interviews and focus group discussions with important stakeholders of the programme. The recorded interviews were transcribed and analysed using NVivo 12.

Results :Enrolment fees is compulsorily collected from students but most of them are not aware of the other steps they need to take to access services under the scheme. An initial medical examination is performed as part of the enrolment process in some schools but not in others. The school management collect premium on behalf of the health maintenance organizations but often delay remittance, in some cases, up to two consecutive sessions. There is also the strong belief among school clinic heads that the proportion of premium meant for provision of primary care services in often misappropriated. The Tertiary institution social health insurance programme management committees are non-functional in all the schools studied. Quality of primary care services provided by the school clinic is sub-optimal because of frequent drug stock out and lack of equipment and supplies. Most respondents were not satisfied with the implementation of the programme in their school.

Conclusion:Key stakeholders are dissatisfied with the implementation of TISHIP. The NHIA needs to supervise the implementation of the programme to ensure that the good intentions of the programme are not jeopardized.

***Key words**:* Satisfaction, Implementation, Stakeholders, TISHIP, Nigeria

Background

Tertiary Institution Social Health Insurance Programme (TISHIP) is one of the formal sector programs of the National Health Insurance Authority (NHIA) that is designed to cater for the health needs of students of higher institutions, who lose coverage in their parents' insurance when they turn 18 years.1 Enrolment is compulsory for all students and each student is required to pay a minimum premium of two thousand naira per session although the actual premium paid is determined actuarially. Payment is made at the time of school fees payment before school registration for the academic session. Enrolled students are registered with a Health Maintenance Organisation (HMO) at the beginning of the session. The HMO is

responsible for providing secondary and tertiary care for enrolled students and receives about thirty percent (30%) of the total premium while the school, responsible for primary care of enrollees through the school clinic, receives about 70 %.1,2

Like in every health insurance programme, successful implementation of the TISHIP requires the participation of several organisations and groups including the NHIA, tertiary institutions, HMOS, Health care leaders and workers, the students' union executives and students. These stakeholders need to be satisfied with the operations of the programme to be committed to the attainment of its goals and objectives.

The TISHIP programme has been in operation for several years and authors in different parts of the country have reported low level of awareness of its existence, its operational guidelines and utilization by students in several institutions among other challenges.3-6 The purpose of this study is to explore how TISHIP is implemented by tertiary institutions in Jos and the satisfaction of key stakeholders with the implementation.

Methodology

Study setting

The study was conducted in Jos Metropolis, Plateau State. Jos Metropolis is made up of Jos North and Jos South local government areas (LGAs). Plateau State is located in the North-Central Nigeria with a 2023 projected population of 4,830,515. Jos North has a population of about 429,300, and is headquartered in Jos; while Jos south has a population of about 407,900 with headquarters in Bukuru. Both LGAs are predominantly urban.7

Sampling technique

Respondents were selected using a two-stage sampling technique. The first stage involved the selection of institutions from a sampling frame of six largest tertiary institutions in Jos metropolis; and three tertiary institutions in the metropolis were selected using simple random sampling technique by balloting. In the second stage, participants for the key informant interview and the focus group discussion were purposively selected from each of the schools.

Data collection

Data was collected using focus group discussions and key informant interviews. The interview guides were informed by previous research and the designated roles of the stakeholders in the TISHIP

Table 1: description of study participants

INTERVIEW TYPE	RESPONDENT	No PER INSTITUTION	TOTAL
Key Informant Interviews	School clinic Head	1	3
Key Informant Interviews	Male SUG member	1	3
Key Informant Interviews	Female SUG member	1	3
Key informant interview	HMO Representative	1	2
Focused Group Discussions	Students	1	3
TOTAL		**5**	**14**

Enrolment:
All the respondents maintained that enrolment was nonvoluntary for all full-time students and the enrolment fee was collected as part of the school fees. The actual enrolment fees charged varied per school and ranged between two thousand naira and three thousand naira. Students are required to go to the school's health facility with their receipt of payment for enrolment, after which they are given an enrolment identification card.

> "Students are enrolled into the program when they register as incoming students when they complete their school fees payment and have an Identity card with the HMO. Without which, they would not be able to access the health services of the University." - (58-year-old Health Director)

Although students are required to go to the school health service for enrolment many students don't do this because of lack of awareness as stated by one FGD participant:

> "We do not know about it because we have not been informed" (22-year FGD participant)

In two of the schools, students undergo a medical examination before or at enrolment but this was not the case in the third school.

Health services covered:
Nearly all the respondents said that TISHIP covers primary care services which are provided by the school's health clinic, while secondary and tertiary services are provided through referrals and include admission (in-patient services) for a maximum of twelve days. Unlike in other programmes of the NHIA, special investigations like MRI are also covered fully and enrollees are not required to make any co-payment.
Pharmaceuticals and laboratory services are also covered but common drugs which are on the NHIA list are often out of stock in the school clinics responsible for providing primary care services to the students' enrollees. A focus group discussion participant has this to say.

> "There is no drug only paracetamol." (25-year-old focus group discussion participant).

Funding/Premium management:
Students pay their premium to the school at the time of school fees payment. The schools are meant to remit the funds to the HMO after collection but this happens irregularly and sometimes does not happen for two consecutive sessions. The HMO responsible for services in one of the schools has this to say:

> "When the students pay to the institution, in some cases, the institution remits to the HMO 100% then the HMO remits back to the school Clinic 65% as part of the capitation which is what cater for the Primary care…."
> "I can say that the last time they remitted was in 2017 I cannot say precisely but I think the last time they remitted was in 2017/2018. But from 2019 till date, they have not remitted a Kobo."

The HMO share the collected premium with the school for the primary care services which are provided by the school clinic.

> "We pay 65% back to the school, that 5% is for administrative fee and improvement fee while 60% is for capitation for primary care to furnish their facility with drugs…". (38-year-old HMO personnel).

Satisfaction with the Programme:
The Implementation:
Most of the respondents were not satisfied with the implementation of the programme. Dis-satisfaction was nearly universal with the allocation and utilization of funds (premium) paid by the students, the functioning/performance of the T-SHIP management committees at the school level, as well as collaboration with the HMOs.

"The management of funds is not satisfactory as the funds acquired are used in other projects depriving the progress of projects in the Health Center". (54-year-old School clinic Director)

> "In the management of the TISHIP, there is supposed to be a TISHIP management committee to be chaired by the Director and all the departments are supposed to be represented. The Students' Union Government is supposed to be represented, the Provost, the VC and the Registrar are all supposed to be managers of this. In principle that committee exists but in practice, it does not" (54-year-old school clinic Director)

There was also dis-satisfaction with the enrolment process, particularly the lack of information about the process. Un-informed students do not follow the enrolment procedures and are unable to access services at the time of need, resorting to self-medication.

> "Some students do not even collect their receipts from the bursary, talk less of coming here to register with the forms before they get their NHIS Cards. And until in the scenario of a medical emergency when it is discovered that the student has not registered." - (58-year-old Health Director)

Discussion
Analysis of the data revealed that the schools compulsorily collect enrolment fees from students but do not make adequate efforts to enlighten them about the insurance programme and the other steps

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DIAGNOSTIC YIELD OF PLAIN ABDOMINAL RADIOGRAPH IN PATIENTS PRESENTING WITH ACUTE ABDOMINAL PAIN IN JOS, NORTH-CENTRAL NIGERIA

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ABSTRACT

***Background**:* Abdominal pain is one of the most commonly encountered complaints seen in the emergency room and constitutes a significant proportion of emergency department visits. An abdominal radiograph is a noninvasive imaging tool commonly utilized in the evaluation of acute abdominal pain. It is cheap, readily available, reproducible, and a quick and reliable technique for evaluating abdominal pain. The aim of this study was to review the diagnostic yield of plain abdominal radiographs in patients presenting with acute abdominal pain in a peripheral facility in Jos, Plateau State Nigeria.

Methods: A seven-year retrospective review of the archive of abdominal radiographs of 638 consecutive patients presenting with acute abdominal pain between January 2015 and December 2022 was conducted. Only 503 patients with complete documentation who met the inclusion criteria were enrolled. Patients with incomplete documentation were excluded from the study.

Results: The study included 271 (53.9%) males and 232 (46.1%) females, giving a male-to-female ratio of 1.2:1 and a mean age of 31.91± 18.76 years. Abdominal x-ray findings were normal in 57.1% and abnormal in 42.9% of patients. The abnormal abdominal findings were intestinal obstruction (23.7%), bowel perforation (7.8%), degenerative spine disease (3.8%), abdominal mass (2.0%), and renal calculus (1.4%).

Conclusion: Abdominal radiograph is an effective, cheap, and complementary imaging tool in a resource-constrained setting like ours. Its diagnostic yield in acute abdominal pain can be improved by following the American College of Radiologists' guidelines.

Keywords: Abdominal radiography, acute abdominal pain, diagnostic yield, American College of Radiologist guideline

Introduction

The abdominal cavity houses the numerous abdominal viscera and pathologic abnormalities from these organs may present with abdominal pains with a variety of symptoms ranging from mild self-limiting to life threatening diseases requiring emergency surgery. Insufficient work up results in unnecessary interventions or delayed treatment. Therefore, early and accurate diagnosis is essential in decision-making.

Abdominal pain is one of the most encountered presenting complaints seen in the emergency room and constitutes approximately 4%? 10% of emergency department visits.[1] Diagnosis based solely on clinical history, physical examination and laboratory investigations is not reliable enough, despite the fact that these aspects are essential parts of the workup of a patient presenting with acute abdominal pain.[1,2] Imaging workup is therefore mandatory in patients acute abdominal conditions. Imaging workup traditionally starts with abdominal radiography especially in a resource constraint setting.[3] Computed Tomography is the most commonly used imaging modality for evaluating acute abdomen. It provides detailed cross-sectional images of abdominal organs. X-ray has found usefulness in the evaluation fractures, foreign body and some abdominal diseases causing acute abdominal pain

Abdominal radiograph is often the initial imaging investigation performed in acute abdominal pain especially in low- and medium-income countries.[4] However, in the era of cross-sectional imaging, the role of an abdominal radiograph in the evaluation of acute abdominal pain is being questioned due to its low sensitivity and diagnostic yield.[4] Abdominal x-ray performed in suspected cases of bowel obstruction or perforation, urinary calculi, or bowel ischaemia is often helpful.

The percentage of diagnostic accuracy of acute abdominal pain has improved over the years due to establishment of emergency medicine, increased laboratory testing and widespread availability of various diagnostic modalities, such as computed tomography (CT), ultrasound, and nuclear imaging.[5] Despite this feat, making a definitive diagnosis of the underlying cause of acute abdominal pain still remains a challenge. The ideal diagnostic imaging modality should provide a balance between the highest diagnostic value, lowest radiation exposure and duration of stay at the emergency department while ultimately resulting in the lowest cost to the health care system.[6]

The value of plain abdominal radiography to therapeutic decision-making remains questionable particularly in the case of a negative result. It is for this reason that several studies suggest plain abdominal radiographs for specific indications such as suspicion of perforated viscus, urinary tract stones, bowel obstruction, and ingested foreign body in order to reduce the number of unnecessary requests.[7,8,9,10]

In spite of the advent of other newer imaging techniques, plain abdominal radiographs still retain their position as one of the most useful initial investigations.[11] Imaging techniques such as CT scan and ultrasound have been shown to increase diagnostic accuracy substantially,[7] and consequently have significantly decreased the added diagnostic value of plain abdominal radiography in a clinical setting.[11]

Despite recent abundant evidence of its limited value, many physicians still rely on plain abdominal radiography as a simple, cheap, and widely available first diagnostic modality with lower radiation exposure than CT scan.[12] Proponents of plain abdominal radiography advocate its use to prevent high radiation exposure in patients due to unnecessary CT imaging. The average plain abdominal radiograph exposes the patient to 0.7 mSv and an abdominal CT exposes the patient to 10.0 mSv.[13,14]

Materials and Methods

A seven (7) year retrospective review of the archive of abdominal radiographs from a private peripheral diagnostic facility of 709 consecutive patients presenting with abdominal pain or an acute abdomen between January, 2015 and December 2022 was conducted. Patients with incomplete documentation were excluded from the study.

Most of the radiographs were requested to evaluate abdominal pain and to exclude pneumoperitoneum, bowel obstruction, or calculus disease. Each

radiograph was reviewed, interpreted and placed in diagnostic categories, including obstruction, pneumoperitoneum, mass lesion, foreign body, pathologic and nonspecific abnormal gas collections, organomegaly, and no specific abnormality (normal).

The abdominal x-ray examination was performed using a multix swing floor mount 500MAs X- ray machine (Siemens, 2007 Germany) fitted with a stationary grid. Demographic data obtained included age, sex, clinical indications and abdominal x-ray findings. The data was collated, entered into a computer and processed by the use of Statistical Package for Social Sciences (SPSS) version 23 to determine frequencies; means ± standard deviations. Results are presented using frequency tables and percentages as appropriate. A p-value of <0.05 was considered statistically significant with a confidence interval of 95%.

The hospital's ethical committee and review board concurred that the retrospective study was a continuous quality improvement initiative for patient care and did not require ethical approval.

Results

Findings were considered significant if they were

Table 1: Age and Sex distribution

	Age group (years)									
Sex	**0-9**	**10-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**≥70**	**Total**	**Percent**
Female	21	33	59	66	20	11	11	11	232	46.1
Male	37	41	48	47	44	20	18	16	271	53.9

Mean (±SD): 31.91 ± 18.76 years

Abdominal findings: Abdominal x-ray findings were normal in 57.1% of the subjects while 216 (42.9%) patients show various abnormal findings. The common abnormal abdominal findings were intestinal obstruction (23.7%) and followed distantly by bowel perforation constituting 7.8%. Other findings include degenerative spine disease (3.8%), abdominal mass (2.0%),ascites(1.6%) and renal calculus (1.4%).The least findings were ureteric stent, soft tissue calcifications and hepatomegaly constituting 0.4% each ***(Table 2)***.

Table 2: Relationship between plain abdominal x-ray findings and sex

Findings	Sex		Total	Percent (%)
	Male	Female		
Normal	138	149	287	57.1
Intestinal obstruction	61	58	119	23.7
Intestinal Perforation	32	7	39	7.8
Foreign Body	4	1	5	1.0
Renal Calculus	5	2	7	1.4
Bladder calculus	3	0	3	0.6
Ascites	5	3	8	1.6
Degenerative spine disease	14	5	19	3.8
Soft tissue calcifications	0	2	2	0.4
Hepatomegaly	0	2	2	0.4
Abdominal mass	7	3	10	2.0
Ureteric stent	2	0	2	0.4

The age groups 20-29 years and 30-39 years had the majority of the abnormal abdominal findings constituting 19.0% and 16.7% respectively. Also, age groups 20-29 years and 30-39 years had normal findings constituting 23.0% and 26.8% respectively. The least abnormal and normal abdominal findings were seen in age groups 60-69years and ≥70 years constituting 7.4% and 8.8% respectively. This was statistically significant ($p<0.005$) ***(Table 3)***.

Table 3: Relationship between abdominal findings and age groups

	Age group								
Findings	**0-9**	**10-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**≥70**	**Total**
Normal abdominal	33	39	66	77	38	13	13	8	287
findings (%)	(11.5)	(13.6)	(23.0)	(26.8)	(13.2)	(4.5)	(4.5)	(2.8)	(100.0)
Abnormal findings (%)	25	35	41	36	26	18	16	19	216
	(11.6)	(16.2)	(19.0)	(16.7)	(12.0)	(8.3)	(7.4)	(8.8)	(100.0)
Total	58	74	107	113	64	31	29	27	503

$X^2 = 20.267$; df = 7; P = 0.005

Discussion

The American College of Radiology (ACR) states that an abdominal radiograph should be taken for adult patients who have constipation, pneumoperitoneum, suspected ileus or intestinal obstruction, foreign body assessment, or urinary tract stone evaluation.[8] A basic abdominal radiography typically consists of an upright abdominal view, a supine abdominal view, and an erect chest film.[15]

A total of 503 radiographs of the abdomen were examined. Table 1 displays the male-to-female ratio of 1.17:1 and the mean age of 31.91 ± 18.76 years, with 271 (53.9%) men and 232 (46.1%) females among them. The sex distribution of the patients in this study is comparable to that of Anyanwu *et al.,* who found that there were more men (53.2%) than women (46.8%) in their study.[10] A comparable sex distribution trend of 63.89% men and 36.11% females was also found by Morris-Stiff *et al.*[18]

In the present study, 42.9% of patients had varied abnormal findings on plain abdominal x-rays, while

57.1% of individuals had normal results. These findings are consistent with several earlier publications, which show a significant percentage of plain abdominal radiographs without abnormality or particular features.[16,17,21] According to two separate studies, 77% and 78% of all requested plain abdominal radiographs showed no abnormal findings.[16] In another study, it was found that among individuals experiencing acute abdominal discomfort, only 10% of specific diagnostic abnormalities were detectable on a plain abdominal radiograph.[17] Additionally, only 10% of the 1780 plain abdominal radiography examinations had positive findings, according to Eisenberg *et al.*[21]

Intestinal obstruction (23.7%), bowel perforation (7.8%), and ascites (3.8%) accounted for the majority of the abnormalities seen on plain radiograph in the present study. Renal calculus, soft tissue calcification, and hepatomegaly were the least positive findings of the current study. According to various other studies, a significant portion of the positive findings on a plain abdominal radiograph include intestinal obstruction and bowel perforation. The percentage of patients in this study with intestinal obstruction and perforation does seem to be larger than in many other previous studies, though. For instance, only 3% of the plain abdominal radiographs in Abdel-Rauf *et al*'s investigation showed appropriately identified intestinal perforations and obstructions.[17] Furthermore, bowel obstruction was detected in roughly 7% of individuals with acute abdominal pain, according to Gans *et al*? s study.[12] They also discovered that in 50%? 60% of patients with bowel obstruction, plain abdominal radiography findings are diagnostic; in 20%? 30% of cases, they are indifferent; and in 10%? 20% of cases, findings are misleading.[12] The small number of positive diagnoses of bowel obstruction reported by the preceding studies may be explained by a decline in the use of plain abdominal radiography as a first-line imaging modality in patients suspected of having intestinal obstruction throughout the industrialized nations of the world. According to Gans *et al*, there is a general decline in the use of plain abdominal radiography. They discovered that, whereas plain abdomen radiographs were used less frequently, CT and ultrasound scans were used more frequently.[18] The significant positive detection rate of intestinal obstruction in this present study could be attributed to the fact that alternative imaging modalities other than plain abdominal radiography are still uncommon in our context. Plain abdominal radiography is almost always performed on individuals presenting with acute abdominal pain in our setting.

In conclusion, several investigations have demonstrated that the sensitivity and accuracy of plain abdominal radiography are low when assessing specific conditions such intestinal obstruction, ureteral stones, perforated viscus, swallowed foreign objects, and acute abdominal pain.[12] However, plain abdomen films still remain one of the useful preliminary examinations, despite the recent proliferation of various imaging techniques.[11]

Limitations

The most important limitation of this study is that the abdominal radiographs were reviewed without adequate history or insufficient clinical information which may impact negatively on the accuracy of the final diagnosis. The retrospective review of the records without inputs from further laboratory workup, clinical reviews, definitive diagnosis and intra-operative findings may also affect this study.
A prospective study in multiple centers for the evaluation of abdominal radiograph findings is required.

Conclusion

Abdominal radiography is an effective, cheap and complementary imaging tool in evaluating the abdomen. However, the low sensitivity and accuracy of plain abdominal radiography in the evaluation of acute abdominal pain underscores the need to uphold the American College of Radiologist practice guideline for the performance abdominal radiography to improve the diagnostic yield especially in resource constraint settings like ours.

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Nil

Conflicts of Interest
There are no conflicts of interest.

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THREE-YEAR REVIEW OF CHILDHOOD AND ADOLESCENT PRESENTATION IN THE GYNAECOLOGICAL EMERGENCY UNIT OF THE JOS UNIVERSITY TEACHING HOSPITAL.

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ABSTRACT

Background:Gynaecological problems in children and adolescents are often both medically and psychologically unique and require a highly skilled approach differing from those utilized from an adult female population. Gynaecological problems in childhood and adolescence constitute great levels of anxiety in parents. Most presentations are related to unprotected sexual intercourse and its complications. The aim of this study is to determine the prevalence and pattern of gynaecological problems in childhood and adolescence population in gynaecological emergency of JUTH.

Methods:This was a 3-year retrospective study of the records of childhood and adolescent presentation at gynaecological emergency of JUTH between 1st January 2018 and 31st December 2020. A proforma was used to extract information from the file records of all patients aged 1 month to 19 years seen at the gynaecological emergency of JUTH. Information on age and gynaecological condition diagnosis was extracted. Data was analysed using IBM SPSS statistics version 23.0.

Result:The hospital attended to 5025 emergency gynaecological cases over the 3-year period. Children and adolescents made up 133(2.6%) cases, of which (9.8%) were children and (90.2%) were adolescents. The commonest presentations were abortion (24.8%), of which induced abortion is the commonest (64%) form of abortion, and menstrual disorders (21.8%).

Conclusion:Childhood and adolescent gynaecological disorders constitute a significant number of emergency gynaecological presentations. There is a need for gynaecologists to acquaint themselves with the pattern of presentation of these disorders and promote the health of teenagers as this group is often misinformed. Additional attention is needed to safeguard their reproductive health.

Keywords*:* childhood, adolescent, gynaecological emergency, Jos.

Introduction

Childhood is the age span ranging from birth to puberty.[1] Adolescence is described as that transitional period of life when a carefree child becomes a responsible adult.[2]The adolescent period represents a time of considerable change in a woman's lifetime as reproductive capacity and sexual activity commence.[3] There is no statutory legal age limit at which adolescence begins and ends; however, WHO defines adolescents as young people between the ages of 10 to 19 years.[4]

In the emergency department, gynaecologic complaints are common presentations for adolescent girls, who may present with abdominal pain, pelvic pain, vaginal discharges and vaginal bleeding.[5] The different presentations in this period are broad and further complicated by psychosocial factors, confidentiality concerns and the need to recognize abuse and sexual assault.[5]

During adolescence, young people go through many changes as they move from childhood into physical maturity.[6] It is the time during which secondary sexual characteristics develop, menstruation begins and the psychological outlook of the girl changes as she develops a more adult aspect of herself.[6] The following changes may commence during puberty and mature to their full potential during the adolescent period: breast development, pubic hair growth, axillary hair growth, growth spurt and menarche.[6] The relative hypothalamo-pituitary-ovarian axis immaturity in the immediate post-menarcheal period results in defective regulations which causes irregular changes and sequences in menstrual characteristics.[3]

Generally, social factors such as poverty, ignorance, malnutrition, neglect and lack of social support, bizarre cultural and religious beliefs, and loss of moral values have increased the incidence of some gynaecological disorders.[3] Also, during this period, a lot of sexual debuts occur coupled with difficulty or safer sex negotiation with older males.[3] As a result, the adolescent female is faced with high a risk of sexually transmitted diseases, Human Immunodeficiency Virus (HIV), unwanted pregnancies and their complications. [3]Other gynaecological disorders of childhood include vulvovaginitis, labial adhesions, precocious puberty, urethral prolapse, ambiguous genitalia, ovarian tumour, and sexual assault.[6-8] The gynaecological disorders seen among adolescents include menstrual disorders (amenorrhoea, irregular menstruation, dysmenorrhoea, oligomenorrhoea premenstrual syndrome etc), pelvic inflammatory disease, ovarian tumours, hyperprolactinemia, hirsutism, imperforate hymen, Gartner's duct cyst , urethral prolapse, vesicovaginal fistula, Bartholin's cyst/abscess, sexual assault and sometimes infertility.[2,3,6,8]

Gynaecological problems in children and adolescents constitute a significant number of gynaecological presentations.[6,8] The purpose of this study is to acquaint clinicians with the pattern of gynaecological disorders in this patient population. There is a need for increased awareness of the pattern of presentation of childhood and adolescent gynaecological disorders as they have an enormous impact on their future reproductive health and general wellbeing. There is therefore, a need to evaluate the pattern of presentation of childhood and adolescent gynaecological disorders in our centre. Also, to see if the nature of gynaecological presentations in JUTH differ from that elsewhere considering the socio-cultural and economic differences.

This study, therefore, assessed the prevalence and pattern of gynaecological problems in childhood and adolescent populations in gynaecological emergency of Jos University Teaching Hospital (JUTH).

Methodology

Study design*:* This was a retrospective study of cases of emergency gynaecological care offered to children and adolescents at the gynaecological emergency of JUTH, Jos, Plateau State, North Central, Nigeria, over a three-year period (January 2018-December 2020).

Study area/study setting*:* The study was conducted in the Jos University Teaching Hospital (JUTH) 600-bed tertiary health institution located in Jos, the capital of Plateau State in North central Nigeria. Plateau State is one of the 36 states in Nigeria. It has over 30 ethnic groups.

As at 2016, Plateau State population was 4,390,337. The capital, Jos is famous for its cold climate that has been attributed to its high altitude which is 1238 meters or 4062 feet above sea level.

The teaching hospital was established in 1981; it is located in the eastern part of Jos metropolis and has a well-established department of Obstetrics and Gynaecology, with eighteen consultants spread across the subspecialties. The department boasts of a very functional maternity unit, among other specialist service points, which offers obstetrics and gynaecological services to patients from Plateau state and its neighbouring states of Bauchi, Taraba, Nasarawa, parts of Kaduna and Gombe among others. It serves both as a secondary and a tertiary centre because of its peculiar location and costs being affordable to both the rich and poor.

The study includes all patients aged 1 month and 19 years seen at the gynaecological emergency of JUTH from 1st January 2018 to 31st December 2020.

Data collection and analysis: A proforma was used to extract information from the file records of all patients aged 1 month to 19 years seen at the gynaecological emergency of JUTH between 1st January 2018 and 31st December 2020. Information on age and gynaecological conditions diagnosis was extracted. Data was analyzed with IBM SPSS statistics version 23.0. Descriptive statistics were presented in frequency, proportions and charts.

Ethical approval: Ethical approval for this study was obtained from the ethical committee of JUTH with approval reference number: JUTH/DCS/IREC/127/XXXI/2433.

Result

Prevalence of Gynaecological Disorders

Out of a total of five thousand and twenty -five (5,025) gynaecological emergency cases managed in JUTH over the study period, hundred and thirty-three (133) were children and adolescents, contributing 2.6% of all gynaecological emergency cases.

Table 1 (below) shows that more than half of presentations at emergencies were among adolescents between 18- and 19-year-olds. Followed by those between 16- and 17-year-olds accounting for about a fifth of total presentations.

Table 1: Age distribution of patients with Gynaecological Disorder (n=133)

Age group in years	Frequency	Percentage
1-5	11	8.3
6-9	2	1.5
10-11	1	0.8
12-13	6	4.5
14-15	9	6.8
16-17	27	20.3
18-19	77	57.9

Figure 1 below shows that of the 133 childhood and adolescent cases, 13(9.8%) were childhood emergencies and 120(90.2%) were adolescent emergencies.

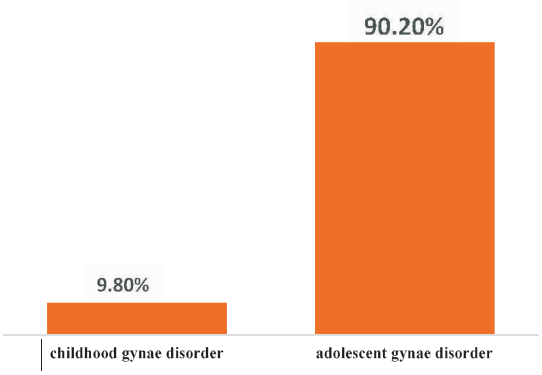

Figure 1: Distribution of adolescent and childhood gynae presentation at emergency

Table 2: Pattern of Gynaecological disorder among childhood

Childhood Gynaecological Disorders	Frequency	Percentage
Rape	5	38.5
Vaginal Atresia	2	15.4
Vulval Trauma	4	30.8
Vulvovaginitis	2	15.4
Total	13	100

Table 2 (above) shows that of a total of 13 childhood presentations, rape (38.3%) and vulva trauma (30.8%) were the commonest presentations at the gynaecology emergency room at Jos University Teaching Hospital.

Table 3: Pattern of Gynaecology disorder among adolescent

Adolescent Gynaecological Disorders	Frequency	Percentage
Abortion	33	27.5
Bartholin cyst	3	2.5
Ectopic pregnancy	1	0.8
Endometriosis	1	0.8
Menstrual disorder	29	24.2
Ovarian tumour	15	12.5
PCOS	4	3.3
PID	7	5.8
Rape	12	10
Uterine fibroid	4	3.3
VVF	11	9.3
Total	120	100.0

Table 3 above shows that of the 120 adolescent presentations, abortion (27.5%) and menstrual disorders (24.2%) were the commonest presentations at the gynae emergency. Induced abortion constituted the major (64%) type of abortion seen in adolescent in this study (***Figure 2***)

Table 4: Pattern of Gynaecological disorder in childhood and adolescent

Gynaecological Disorders	Frequency	Percentage
Rape	5	3.8
Vaginal Atresia	2	1.5
Vulval Trauma	4	3.0
Vulvovaginitis	2	1.5
Abortion	33	24.8
Bartholin cyst	3	2.3
Ectopic pregnancy	1	0.8
Endometriosis	1	0.8
Menstrual disorder	29	21.8
Ovarian tumour	15	11.3
PCOS	4	3.0
PID	7	5.3
Rape	12	9.0
Uterine fibroid	4	3.0
VVF	11	8.3
Total	133	100.0

Table 4 above shows that commonest childhood and adolescent gynaecological disorders presentations at gynaecological emergency were abortion (24.8%), menstrual disorder (21.8%) and ovarian tumour (11.3%).

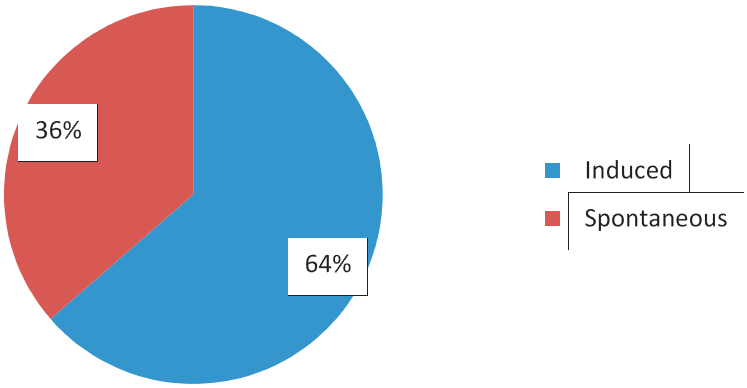

Figure 2: the distribution of the types of abortion of childhood and adolescent gynaecological presentations

Discussion

In the period under review, children and adolescents constituted 0.3% and 2.4% of all gynaecological emergencies seen respectively. The adolescent presentation is lower than the findings of Anikwe et al in Federal Teaching Hospital Abakaliki who reported that adolescent constituted 5.1% of the gynaecological presentation.[9] These is due to the difference in time and duration of the studies.

Most of the adolescents presenting at gynae emereency were in the age range of 18-19 years. This was similar to the findings of a previous study.[9,10] Abortion (24.8%) was observed as the commonest adolescent presentation in gynaecological emergency of JUTH. This was similar to the study of Ekwempu et al at Jos,[11] but was unlike the findings of Anikwe et al at Federal Teaching Hospital, Abakaliki who reported the commonest presentation as menstrual disorders.[9] This is likely due to early marriages practised in this

region and religious belief. The abortions were mostly induced (63.6%).[12] The reason for high rates of abortions could be because adolescents often experiment with sex, although they are usually inexperienced in bargaining with their partners regarding the use of contraception, this could lead to unwanted pregnancies leading to unsafe abortions.[10] WHO estimates that 2.5 million adolescents have unsafe abortion annually.[12]Abortion is a neglected problem in health care in developing countries, and yet decreasing safe abortion practices dominate those settings.[13,14] Adolescents who have unintended pregnancies may resort to unsafe abortion practices due to socioeconomic factors, cultural implications of being pregnant before marriage and restrictive abortion laws[3,15]Adolescents clandestinely use self-prescribed drugs or beverages, insert sharps in the genitals, and most often consult traditional service providers or quacks in an attempt to abort a pregnancy.[13,16] Abortion could result in morbidities such as sepsis, severe anaemia, and, in some instances, infertility and death.[13,17,18]

Menstrual disorder was next in frequency (21.8%), this is because of the irregularities that follow menarche. This was lower than the findings of Irem et al(36.8%) at Ebonyi State University Teaching Hospital.[3] Menstrual disorders are very common in adolescence, and can be the cause of a significant amount of stress to both the patients and their parents.[6,19] Amenorrhea(either primary or secondary), abnormal uterine bleeding and dysmenorrhea are conditions that require careful evaluation through a stepwise and logical manner.[19] The occurrence of irregular, prolonged or heavy uterine bleeding is one of the most urgent gynaecological problems in adolescence.[6,19] Dysmenorrhea refers to painful menstruation and is the most common reason for which a young girl may refer to a gynaecologist.[19] It is characterized as primary in the absence of an underlying organic disease and as secondary when there is evidence of pelvic pathology.[19] Appropriate and early management of the patients is necessary to minimize the possibility of future complications such as infertility regarding women's reproductive ability.[19,20,21]

Just above 10% of adolescent presentations were due to Ovarian tumours. This was similar to the findings of Anikwe et al (11.5%) at Federal Teaching Hospital, Abakaliki.[9] This similarity may be due to the pattern of occurrence of ovarian tumours. Prompt and precise detection of either benign or malignant tumours in childhood and adolescence may lead to cure and preservation of fertility.[14]

Rape constituted 9% of adolescent presentations and 3.8% in children, and this was the commonest childhood presentation. Rape constituted 12% of childhood gynaecological presentation in Zaria.[16] The perpetrators of these rapes are usually from the victim's neighbourhood or boyfriends. This is similar to the study done in Zaria.[16] This may be due to vulnerability of children and adolescent to these group of people. Some consequences of rape could be physical injuries, unwanted pregnancy, depression, lower self-esteem, sexually transmitted infections and criminal abortion amongst adolescents.[17,18]

Vesicovaginal fistula (VVF) constituted 8.3% of the adolescent presentation. VVF is widespread in sub-Saharan Africa and South Asian countries, where cultural factors increase the incidence of child marriage, Marriage at a young age, shortly after the girls first menstrual period between the ages of 9 to 15.[22,23] In many of these cases the first pregnancy is followed soon after marriage.[23]these women who marry early are often from lower socio-economic class and are more likely to be malnourished which further worsens their pelvic dimensions with resultant risk of CPD and VVF.[2] Women affected by fistula are often abandoned by their relatives, stigmatized by the community, physically debilitated and even blamed for their condition.[23] Social isolation and abandonment often lead to low self-esteem, depression and prolonged emotional trauma.[22,23]

Pelvic inflammatory disease (PID) constituted 5.3% of adolescence presentation. This is different from the finding at Abakaliki which constituted 10.3% of adolescent gynaecological presentation.[20] This may be due to the high patient population in Abakakiliki. PID occurs mostly in the reproductive age group when sexual activities are highest.[8,20] Most sexually-active adolescents engage in unprotected sex leading to sexually transmitted disease and PID.[20] Poorly treated or untreated PID may lead to infertility,

ectopic pregnancy and chronic pelvic pain, thus having a negative impact on their future reproductive health.[8,20]

Uterine fibroid constituted 3% of the presentation in adolescence. Uterine fibroid is the most common gynaecological tumour in the reproductive years in Africa.[6,24] However it is extremely rare in adolescence (1%), with few reports found in a systematic review performed at PubMed/MEDLINE and EMBASE.[24] Optimal treatment in this age group is not defined, but myomectomy has advantages and disadvantage.[24]

Conclusion

Many health and social challenges confront young people all over the world. From this study, induced abortion in adolescent and rape cases in children were prominent. Teenage problems need to be dealt with sensitivity. Counselling should be an integral component of treatment strategies, awareness and utilization of youth-friendly services must be provided. Gynaecologist must create awareness about the negative health consequences of unsafe abortion and prevent unwanted pregnancies in teenagers by advocating for safe sex practices, STIs and emergency contraception should be included in sex education.

Preventive measures such as medical, traditional and religious advocacy to curtail indiscriminate and risky sexual behaviour, health education on adolescent reproductive health, use of contraception, use of potent antibiotics, and other post abortal care services will go a long way in reducing the reproductive and general health problems of children and adolescents.

Government must make legislations that will curtail perpetrators of rape and ensure that no culprit goes unpunished to serve as a deterrent to others. Victims must be encouraged to report all cases of rape, and social media campaigns that will encourage victims to speak up should be advocated. Legislation must also be made against teenage marriage as this leads to many reproductive health challenges.

Conflict of Interest:

There is no conflict of interest.

Funding:

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EVALUATION OF BACKGROUND IONIZING RADIATION LEVELS IN JOS UNIVERSITY TEACHING HOSPITAL, NORTH CENTRAL NIGERIA

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ABSTRACT

Background: Exposure of patients to radiographic examination (computerized tomography, fluoroscopic procedures, dental diagnosis, and routine exposure to x-rays), radioisotope procedures and radiation therapy have contributed to increase in background radiation and radiation levels of patients and many occupational workers. The aim of this study was to measure and establish the background ionizing radiation level in different parts of Jos University Teaching Hospital.

Methods: Measurement of background ionizing radiation level was performed using a well calibrated Radiation Alert (Inspector^{+} and Inspector EXP^{+}) monitor manufactured by S.E. International, INC. USA; 2013. The total count was taken for a period of 10 minutes which was carried out three times for each location, the average was calculated and recorded. This was carried out in all 71 locations within the hospital, the values were then converted to Sievert (Sv) using the relation: 1CPM=0.01μSv/hr (Radiation Alert User's manual 2007).

Results*:* The results obtained range from 0.218±0.0608 μSv/hr to 0.308±0.01 μSv/hr with a mean of 0.243±0.02 μSv/hr within Radiology Department, 0.279±0.017 μSv/hr for the wards, 0.254±0.026 μSv/hr for the clinics, and 0.27±0.0382 μSv/hr for the laboratories and other location in the Hospital.

Conclusion: The mean measurement from the wards is slightly above the standard of 0.274 μSv/hr recommended as worldwide average natural dose of background ionizing radiation while the average measurement for Radiology Department and the clinics were within permissible allowed values. The results from this study indicates that some locations such as the Radiology Department and the clinics as safe while the wards are relatively unsafe.

Keywords*:* Background ionizing radiation, hospital, measurement, Jos, Plateau state.

Introduction

Radiation is part of our daily lives. It is all around us and has been present since the birth of this Planet. It is energy that travels in the form of waves and makes up the electromagnetic spectrum. The electromagnetic spectrum is divided into two major categories: ionizing radiation and non-ionizing radiation.

Non-ionizing radiation includes both low frequency radiation and moderately high frequency radiation, including radio waves, microwaves and infrared radiation, visible light and lower frequency ultraviolet radiation while ionizing radiation includes higher frequency ultraviolet radiation, x-rays and gamma rays .[1]

Ionizing radiation has enough energy to break chemical bonds in molecules or remove tightly bound electrons from atoms, creating charged molecules or atoms (ions) .[1]
Background radiation consists of three primary types: Primordial, cosmogenic and anthropogenic. Primordial radionuclides are present in the earth's crust and found throughout the environment. Cosmogenic radionuclides are produced when cosmic radiation interacts with elements present in the atmosphere and are deposited through both wet and dry deposition. Anthropogenic sources of radiation result from human activities, but are considered background because their presence is ubiquitous .[2]

Radiation from hospitals and medical research institutes has been of great concern because of the known effects of high dosages. Radiations in hospitals come from three main sources namely: medical exposures, cosmic-terrestrial radiation and radioactivity from the background.[3,4] Some of the materials used in the construction of buildings are also known to be radioactive.[5]

Exposure of patients to radiographic examination (computerized tomography, fluoroscopic procedures, dental diagnosis, and routine exposure to x-rays), radioisotope procedures and radiation therapy have contributed to increase in background radiation and radiation levels of patients and many occupational workers .[6,7,8]

Background radiation levels in Nigeria and other developing countries are lower than those of industrialized countries even though the level is on the increase due to rise in illegal mining and poor environmental management.

It is reported that the global average natural dose of background ionizing radiation to humans is about 0.274 μSv/hr. Eighty percent (80%) of which comes from nature, while the remaining 20% results from exposure to man-made radiation sources, primarily from medical imaging. Average background ionizing radiation exposure is much higher in developed countries, mostly due to numerous industrial and medical activities .[9] Literature search has shown that there is no data about the background ionizing radiation at the Jos University Teaching Hospital (JUTH) and couple to the fact that there is limited knowledge to the level of background radiation staff and patients are exposed to daily. It is against this background that this study was carried out to determine the background ionizing radiation level at different locations within the Jos University teaching hospital.

Materials And Methods

Study design.

It was a hospital-based cross-sectional study.

Study Area.

This study was conducted in January, 2016 in 71 locations within the Jos University Teaching Hospital, Plateau State, Nigeria. These locations were randomly selected where there was high staff, patients and patient's relatives' traffic as well as suspected high radiation activities. The hospital is a 600-bed tertiary hospital that sub-serves neighboring states such as Bauchi, Nassarawa, Benue, part of Kaduna, Gombe and Taraba states. It has a functional radiology department that has machines that produce ionizing radiation such as Computed Tomography, Conventional X-ray machines, Mammography machine, Fluoroscopy machine and other non-ionizing radiation producing machines.

Data sources and measurements.

A Radiation Alert (Inspector^{+} and Inspector EXP^{+}) Inspector Survey Meter was used for the measurement; manufactured by S.E. International,

INC. USA; 2013. The Radiation Alert monitor is a device with Geiger-Muller (GM) tube which detects or monitor radioactivity in an area. The monitor was set in total count mode and the total count was taken for a particular period time.

The monitor was placed on a stool that was constructed for the purpose of this study. The stool is one meter (1m) tall above the ground with an open top to suite the detector window of the Radiation Alert monitor which was placed face down. The total count was taken for a period of 10 minutes for every location since the number of counts detected by the monitor varies from minute to minute due to random nature of radioactivity. The reading was taken at three different spots within each location, then the average of the three readings was calculated and recorded. This was carried out in all the 71 locations within the hospital. The values were then converted to Sievert (Sv) using the relation:
1CPM=0.01μSv/hr (Radiation Alert User's manual 2007).

Statistical analysis.
The exposure rates were entered into excel sheet and the mean exposure rates were calculated along with their standard deviations. The results were presented in tables and bar charts in microsievert (μSv/hr).

Results
Table 1 below shows background ionizing radiation for Radiology Department of the hospital. The values range from 0.218±0.0608μSv/hr to 0.298±0.032μSv/hr with a mean of 0.262±0.02μSv/hr. The mean value from CT suite (0.22±0.06 μSv/hr)
and Fluoroscopy room had the lowest while the Lounge had the highest equivalent dose rate (0.30±0.03 μSv/hr). **Figure 1** (below) illustrates the mean values within radiology department and the standard natural background ionizing radiation (0.274 μSv/hr).

Table1: Dose rate for radiology department of the hospital

S/N	LOCATION	Mean Dose equivalent (μSv/h)
1	Reception	0.27±0.01
2	X-ray room	0.26±0.02
3	Dark room	0.28±0.02
4	Fluoroscopy room	0.22±0.06
5	CT suite	0.22±0.06
6	Mammography room	0.25±0.03
7	MRI suite	0.24±0.05
8	Ultrasound room 1	0.27±0.02
9	Ultrasound room 2	0.27±0.02
10	Lounge	0.30±0.03
11	Entrance	0.26±0.02
12	Exposure cubicle 1	0.26±0.05
13	Exposure cubicle 2	0.24±0.02
14	Film reporting room	0.25±0.05
15	Doctors call room	0.27±0.01
16	Radiographers call room	0.28±0.03
17	Secretary's office	0.24±0.01
18	HOD's office	0.24±0.02
19	Residents' office	0.26±0.02
20	Nurses' office	0.25±0.03

Mean(±SD): 0.26±0.02

Fig. 1: Radiology department dose rate compared to the standard value.

Table 2 below shows background ionizing radiation in the wards of the hospital. The values range from 0.248±0.01µSv/hr to 0.308±0.01µSv/hr with a mean of 0.279±0.017 µSv/hr. Neurosurgical ward had the lowest equivalent dose rate of 0.25±0.01 µSv/hr while Gynaecology and antenatal wards had the highest equivalent dose rates (0.31±0.01µSv/hr). **Figure 2** (below) represents the mean equivalent dose rate for the different wards and the standard mean natural background ionizing radiation (0.274µSv/hr).

Table 2: Dose rate for the wards within the hospital.

S/N	LOCATION	Mean Dose equivalent (µSv/h)
1	Male medical ward 1	0.27±0.01
2	Male medical ward 2	0.26±0.01
3	Female medical ward 1	0.26±0.01
4	Female medical ward 2	0.26±0.01
5	Neurosurgical ward	0.25±0.01
6	Male Orthopaedic ward	0.29±0.01
7	Female Orthopaedic ward	0.29±0.01
8	Post natal ward 1	0.29±0.01
9	Post natal ward 2	0.29±0.02
10	Gynae ward	0.31±0.01
11	Antenatal ward	0.31±0.01
12	Paediatric medical ward	0.28±0.03
13	Paediatric surgical ward	0.29±0.02
14	Special care baby unit	0.30±0.02
15	Intensive care unit	0.27±0.01
16	Emergency paediatric unit	0.29±0.03
17	ENT ward	0.29±0.02
18	E/A ward	0.27±0.02

Mean (±SD): 0.28±0.02

Fig. 2: Wards dose rate compared to the standard value.

Table 3 shows background ionizing radiation for clinics within the hospital. The values range from 0.22±0.049 µSv/hr to 0.298±0.0287 µSv/hr with a mean of 0.254±0.026µSv/hr. The clinic with the lowest equivalent dose rate was the MOPD (0.22±0.05µSv/hr) while the clinics with the highest were GOPD2 (0.30±0.01 µSv/hr) and O&G OPD (0.30±0.03 µSv/hr). Figure 3 represents the mean values at the clinics and the standard natural background ionizing radiation (0.274µSv/hr).

Table 3: Dose rate for clinics within the hospi tal.

S/N	LOCATION	Mean Dose equivalent (µSv/hr)
1	Gynae. Emergency	0.26±0.03
2	Paediatric OPD	0.23±0.02
3	Medical OPD	0.22±0.05
4	Surgical OPD	0.23±0.01
5	Orthopaedic OPD	0.24±0.04
6	Maxillofacial OPD	0.25±0.03
7	O&G OPD	0.30±0.03
8	A&E	0.25±0.02
9	CMC/IMMUNIZATION	0.28±0.04
10	GOPD1	0.25±0.08
11	GOPD2	0.30±0.01

Mean (±SD): 0.25±0.03

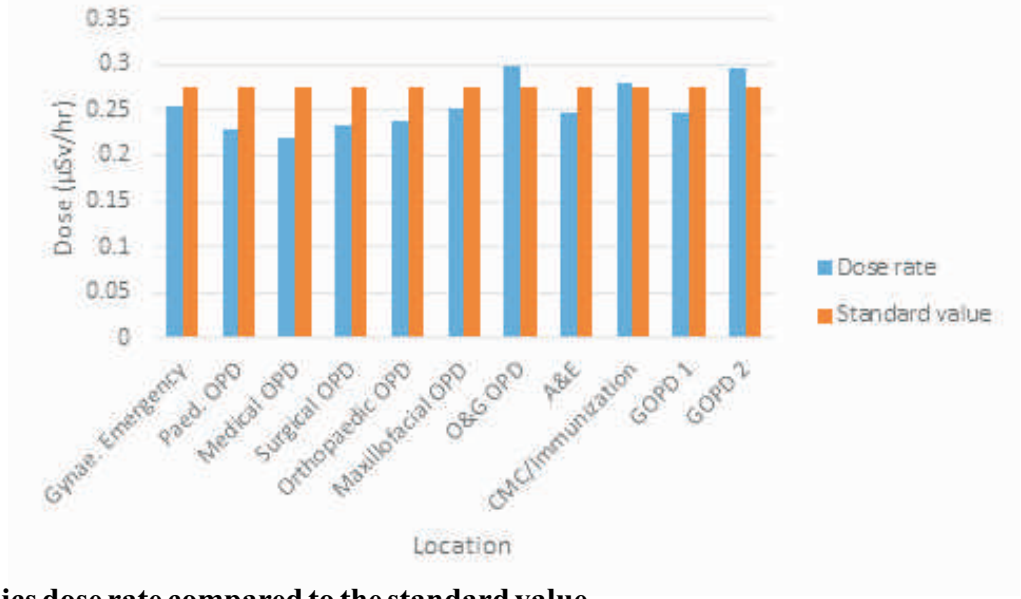

Fig. 3: Clinics dose rate compared to the standard value.

Table 4 shows background ionizing radiation within the laboratories and other locations within the hospital. The values range from 0.203±0.01µSv/hr to 0.328±0.0189µSv/hr with an average of 0.27±0.0382µSv/hr. Two locations (Main store and Record library) had the lowest value (0.21±0.02µSv/hr) while Physiotherapy had the highest reading (0.34±0.06µSv/hr). Figure 4 shows the mean equivalent dose rate from the laboratories and the mean standard natural background ionizing radiation (0.274µSv/hr).

Table 4: Dose rate for the laboratories and other locations

S/N	LOCATION	DOSE RATE **(µSv/hr)**
1	Endoscopy	0.27±0.03
2	Mortuary	0.27±0.03
3	Record library	0.21±0.02
4	Main pharmacy	0.29±0.03
5	Physiotherapy	0.34±0.06
6	Main passage	0.27±0.02
7	Theatre	0.28±0.02
8	Dialysis	0.23±0.01
9	Library	0.30±0.03
10	Power House	0.27±0.01
11	CMC/IMMU	0.28±0.04
12	Admin block	0.25±0.01
13	Works dept	0.25±0.04
14	Main store	0.21±0.02
15	Laundry	0.22±0.04
16	Histology lab	0.32±0.03
17	Chemical pathology lab	0.33±0.02
18	Hematology lab	0.29±0.01
19	Blood bank	0.27±0.04
20	Bacteriology lab	0.30±0.03
21	Parasitology	0.23±0.02
22	Immunology lab	0.30±0.01

Mean (±SD): 0.27±0.03

Fig. 4: Laboratories and other locations dose rate compared to the standard value.

Discussion

The location with the highest value of background radiation in radiology department was the departmental lounge with a value of 0.298+/-0.032µSv/hr even though there is no machine emitting ionizing radiation within 10 meters radius to the lounge. There is no documented record of radiology lounge from previous studies because this study is more comprehensive covering more locations than other similar researches. The high value from the lounge could likely be due to the building materials used which are mainly gotten from old mining site where there is likely high radioactivity from poor environmental management. Overall, the mean value recorded in the radiology department is 0.256+/-0.029µSv/hr which is higher than the value of study carried by Okoye et al in Port Harcourt who documented a mean value of 0.146+/-0.02µSv/hr, this could possibly be due to the fact that there are more radiation emitting machines in the radiology department of JUTH than in Braithwaite memorial specialist hospital Port Harcourt. Conversely, the JUTH radiology department value is lower compared with the work by Jwanbot et al who documented a mean value of 0.29µSv/hr and 0.37µSv/hr for Skene Radiodiagnostic center and Radiology department, Plateau Specialist Hospital respectively. The reason for the low mean value in radiology department in JUTH could be that as a tertiary health institution, it was built using standard universal precautionary measures such as such as leaded walls and glasses as well as the radiation exposure safety guides used by the highly trained staff who keep the level of radiation exposure at a lower permissible level when compared to most private diagnostic center where global standards are not always put into consideration. The mean value recorded from the wards within the JUTH radiology department is 0.279±0.017µSv/hr which is higher than the global average natural dose of background ionizing radiation to human and also that documented by Okoye et al (0.136 ± 0.02µSv/hr). This could possibly be contributed by the soil used for the construction of the building which were gotten from mining site which is known to have high level of radioactivity.

The highest value for background ionizing radiation in this study was obtained from the physiotherapy department with a value of 0.34+/-0.06µSv/hr. This could be from the building materials used and possibly from some of the equipment being used in the department. In a study done by Mohammed et al[4]. it was also shown that the physiotherapy department had one of the highest values of background ionizing radiation.[4] Similarly, a study conducted by Okoye et al.[7] physiotherapy department had the highest value (0.17+/-0.02µSv/hr) among other locations, even though it is much lower than the standard natural

background dose of ionizing radiation (0.274μSv/hr). More studies should be carried out on the level of background ionizing radiation in the physiotherapy department to ascertain the possibility of emission of ionizing radiation by some equipment used in the department.

In general, the values of background ionizing radiation obtained from this study are higher than those obtained by Mohammed et al.[4], Okoye et al.[7] and James et al.[8], whereas the values recorded in this study is similar to the values obtained by Jwanbot et al.[5] The high values documented in these two studies carried out in Jos, Plateau state even though at different hospitals and at different years, these high values could mainly be due to the greater concentrations of radioactive materials in the soils of Jos resulting from the mining activities in Jos and environs as well as to some extent the increase in cosmic radiation at higher altitudes in the study area Jos.

Conclusion

The measurements of the background ionizing radiation different departments and locations at the Jos University Teaching Hospital (JUTH) are as documented, most of the values were within permissible limits while some departments were above the permissible limits.

Recommendation

Regular yearly interval measurement of the background ionizing radiation level of the hospital should be carried out and documented by the radiation safety committee lead by the radiation safety adviser.

Those departments such as physiotherapy with higher values of ionizing radiation be studied further to determine source of radiation in other to take measures in preventing unnecessary exposure of hospital staff and patients.

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LARGE DERMOID CYST OF THE TONGUE IN A NEONATE: A CASE REPORT AND REVIEW OF LITERATURE

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ABSTRACT

Background: Dermoid cysts of the tongue are very rare masses of the oral cavity derived from ectodermal elements. These tumours are benign and slow-growing, typically asymptomatic but large cysts that fill most of the oral cavity can cause complications of dyspnoea, dysphagia, respiratory obstruction, and difficult intubation. The definitive treatment is surgical excision. The aim of this report is to demonstrate that large intralingual cyst located at the anterior two-thirds of the tongue can present without difficulty in breathing, unlikely to have difficult intubation and, early excision can give a good outcome.

Patient: The patient is a new-born male who was brought to the Emergency Paediatric Unit of the hospital 13 hours after birth with a huge swelling in the tongue protruding outside the oral cavity. There was difficulty feeding, however no difficulty in breathing and no other congenital anomalies. The swelling obliterated most of the anterior two-thirds of the tongue up to the foramen caecum. Ultrasound and magnetic resonance imaging were diagnostic of dermoid cyst.

Intervention: The patient had surgical excision of the cyst under general anaesthesia on the 15th day of life. Histology was in keeping with a lingual dermoid cyst .

Conclusion: This is a rare large intralingual cyst successfully managed by early excision with an uneventful post-operative course.

Key words: Neonate, Tongue, Large congenital dermoid cyst, Surgical excision

Introduction

Dermoid cysts are benign congenital lesions of ectodermal origin.[1] They are caused by the encasement of ectoderm at the time of closure of an embryogenic tissue.[2] They contain sebaceous glands and secretions, and rarely ,may contain hair and hair-like follicles.[2] Dermoid cysts contain hair follicles and sebaceous glands but epidermoid cysts are lined by epithelium, while teratoma contains mesodermal elements.[3] Congenital cystic lesions are commonly found throughout the body but are rare in the floor of the oral cavity.[1-5] The majority of reported cases are in the midline of the body especially in the testis and ovaries.[4] In the head and neck region they occur most frequently in the periorbital area with 6.5% of dermoid cysts involving the oral cavity.[4] Most oral dermoid cysts are located on the floor of the mouth and involvement of the tongue is rare.[6-9]

Dermoid cysts of the tongue are benign and slow-growing and may be asymptomatic but large cysts can cause complications such as inflammation or dysphagia, dystonia, and dyspnoea due to pressure effects.[5] Large cysts may fill the entire oral cavity and make tracheal intubation extremely difficult.[10]

Lesions that present as cyst in the floor of the mouth include neoplasms, infections and developmental processes i.e. lymphangioma, acute infection, neurofibroma, haemangioma, sublingual ranula, and lipomas.[6,11] Although rare, dermoid cyst should be included in the differential diagnosis of cystic lesions of the tongue.[6] The definitive treatment of these lesions is complete surgical excision[1,11] with a very low recurrence rate, and it is facilitated by the fibrous capsule surrounding the cyst that makes it easy to be enucleated.[11] The index patient presented with large intralingual cyst located at the anterior two-thirds of the tongue without difficulty in breathing had uneventful intubation and successful excision with good outcome..

Case Report

A 13-hour-old male neonate, born to a 38-year-old woman who was brought to the Emergency Paediatric Unit of the hospital with a large tongue noticed at birth. He was unable to close the mouth with difficulty in feeding. However, no difficulty in breathing or stridor and no associated anomalies on other parts of the body .The pregnancy was booked at a primary health care facility, had several uneventful visits, and the delivery was at term via spontaneous vaginal delivery.

Examination findings were those of a neonate with stable vital signs, Weight of 4 kg, Length of 60 cm and occipito-frontal circumference (OFC) of 36 cm. There was a large swelling within the tongue, from about the junction of the anterior two-thirds and posterior one-third to the tip of the tongue obliterating most of the oral cavity and protruding outside the mouth. It measured about 8 x 8 cm with healthy overlying mucosa. The swelling was soft, fluctuant, non-reducible, and non-pulsatile. (Fig 1) There was no other congenital anomalies.

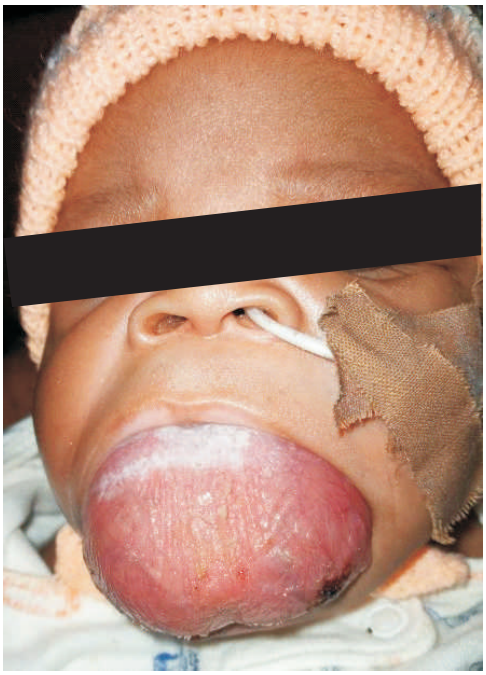

Figure 1 .The large protruding tongue with lesion at birth

The following differentials were entertained; congenital haemangioma, ranula, lymphatic malformation, harmatoma, salivary gland tumour, and congenital dermoid cyst. The patient was co-managed with paediatricians in the special care baby unit of the hospital.

Ultrasound Scan revealed a cystic an-echoic swelling that was occupying most of the tongue, with multiple septations and tiny internal echoes that did not change colour on Doppler scanning. The mass measured 4.3 x 3.1 x 3.8 cm with a volume of 25.3 mls. Magnetic Resonance Imaging (MRI) findings showed a large well-defined, thin-walled lesion noted at the floor of the mouth and occupy most of the oral cavity with protrusion of the anterior aspect of the mass outside the oral cavity. It appears homogenously hypotense on T1 and fluid attenuated inversion recovery (FLAIR), and hyperintense on T2, measuring 4.5 x 5.0 x 6.2 cm in craniocaudal, transverse and anteroposterior dimensions respectively. It was observed to stretch and displace the genioglossus muscle upwards and backwards, and severely compress on the surrounding soft tissues. (Fig 2)

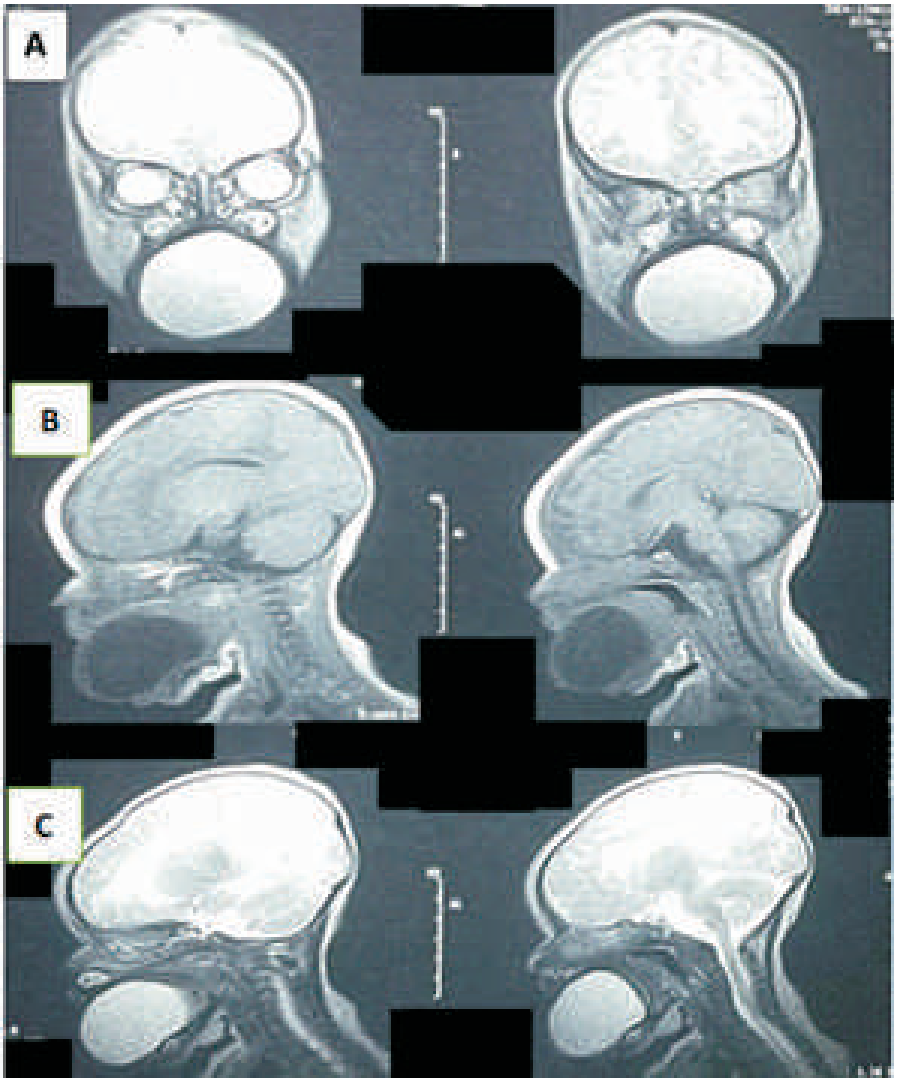

Figure 2; The cyst on MRI; Coronal T1W image showing a homogenously hypointense lesion(A), Sagittal T1W image showing a homogenously hypointense lesion(B) and Sagittal T2W image showing hyperintense lesion in keeping with dermoid of the tongue©

A diagnosis of a large congenital dermoid cyst of the tongue was made. Patient was prepared for and had surgical excision of the cyst on the 15th day of life, under general anaesthesia with successful endotracheal intubation. The excision was effected via a midline longitudinal incision on the ventral surface of the tongue. The submucosal tissue was bluntly dissected until the cyst wall was seen. The cyst was dissected from the tongue muscle and enucleated while safeguarding the lingual nerve. The cyst was a well-circumscribed, thin-walled sac with clear gelatinous content. The wound was closed in layers with absorbable sutures. (Fig 3a to 3c)

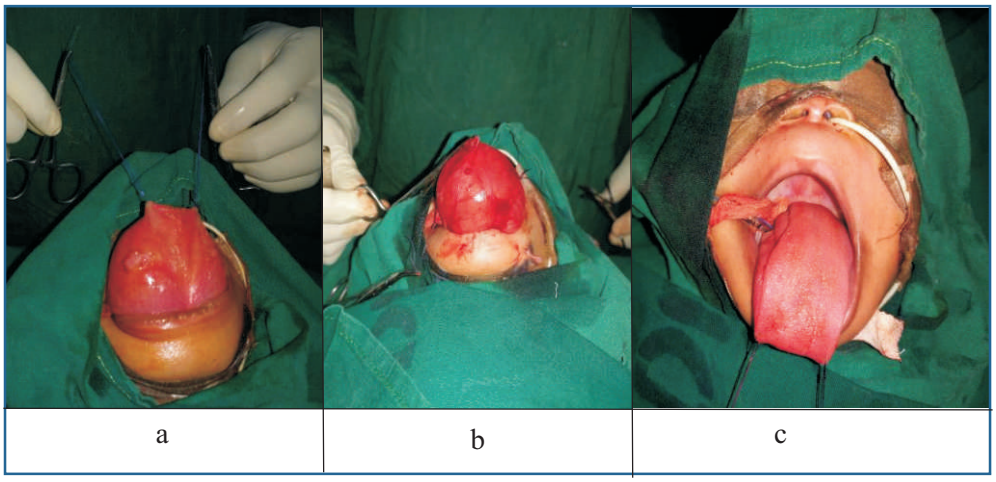

Figure 3: Sutures used to pull the tongue out of the oral cavity(a), Cyst demonstrated after blunt dissection(b), Tongue after closure of the cavity in layers(c)

He had uneventful post operative period and was discharged on day eight of surgery (24th day of life) with follow up visits at 2 weeks and 8 weeks of the discharge. (Fig 4)
The histology revealed features consistent with dermoid cyst.

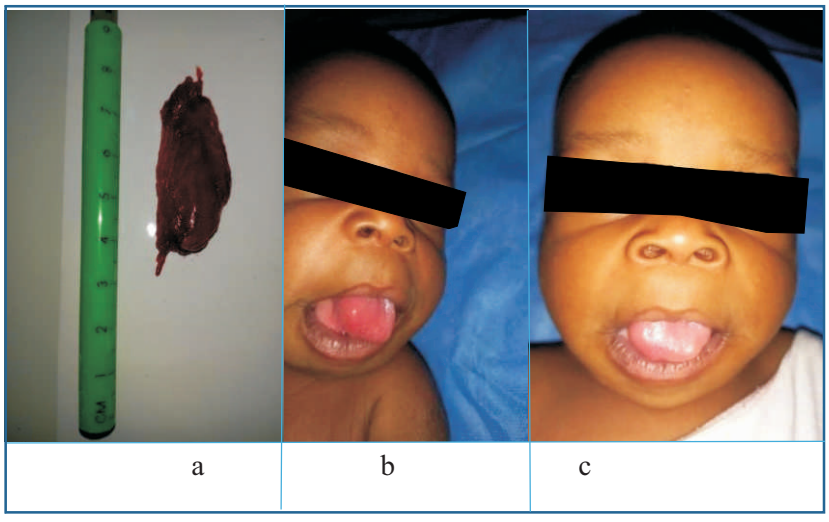

Figure 4: excised cyst sac(a), the tongue at 2 weeks after discharge(b), the tongue at 8weeks after surgery(c)

Discussion

Dermoid cyst is a term used to describe congenital cystic lesions where adnexae such as sweat glands, sebaceous glands and hair follicles are present.[12] They are believed to arise as a result of entrapped pluripotent cells during embryogenesis.[13] Histologically, they are lined by epidermis and are extremely rare in the tongue.[13] Based on histology dermoid cysts in the floor of the mouth are classified by Meyer into dermoid, epidermoid, and teratoid/teratomata cysts.[4] Dermoid cysts have a wall of stratified squamous cornified epithelium and contain smegma and keratin scales as well as cutaneous appendages such as hair follicles, hairs, and sebaceous and sudoriparous glands. However, epidermoid cysts have a wall of stratified squamous cornified epithelium and contain smegma and keratin scales without cutaneous appendages. Lastly, teratoid/teratomata cysts have a wall of stratified squamous epithelium with or without cornification and contain smegma and keratin scales as well as elements of the middle blastoderm such as vascular formations, elements of muscle and bone, dental tissues, or even whole teeth.[4] In this patient, the cyst was lined by stratified squamous epithelium, with foci of sebaceous glands, and numerous thin-walled blood vessels, which was consistent with a dermoid cyst. About 34% of dermoid cysts are found in the head and neck, of which 6.5% are located at the floor of the mouth.[5] and cyst of the tongue represent less than 0.01% of all oral cavity cysts.[11] Oral sublingual dermoids can vary in size from a few mm to 12 cm in diameter.[14] They are slow in growth, most commonly diagnosed in the first to third decades of life, and are either acquired (85%) or congenital (15%), both of which are histologically identical[14] with no gender predilection.[15]

The patients with dermoid cyst usually present early in life with asymptomatic mass that is slow growing[1] however the cyst in this patient was large occupying almost the entire oral cavity which affected feeding. Despite the size of the lesion, there was no difficulty in breathing and nasogastric tube was passed successfully. This was most likely because of the location of the cyst at the anterior two-thirds of the tongue. Embryologically, the tongue consists of two separate parts; the anterior two-thirds and the posterior one-third.[6] The mucous membrane of the anterior two-thirds of the tongue develops from the first branchial arch. Specifically, three swellings of primitive mesenchyme; the midline tuberculum impar and bilateral lingual swellings, merge to form a single mass from which the anterior two-thirds of the tongue is formed. The mucosa of the posterior third of the tongue is formed from a large midline swelling of mesoderm of the second, third, and fourth branchial arches.[6] Therefore, entrapment of ectoderm resulting in formation of the huge cyst in the anterior two-thirds of the tongue will not obstruct the posterior oral cavity, this explains why there was no difficulty in breathing and nasogastric tube was passed successfully.

Different imaging techniques have been reported as adjuncts in the diagnosis of dermoid cyst.[16,17] Histology remains the definitive diagnosis of dermoid cyst.[17] Ultrasound imaging is the initial diagnostic modality of choice for oral lesions.[5] Dermoid appear as well circumscribed, unilocular cysts that may contain either anechoic or hypoechoic regions or multiple echogenic nodules because of the presence of epithelial debris or skin appendages.[5] In this patient the Ultrasound revealed cystic anechoic collection that was occupying most of the tongue, with multiple septations and tiny internal echoes that had no colour changes on Doppler interrogation. Contrast enhanced Computer tomographic (CT) is a preferred method of imaging however MRI and plain CT allow more precise localization of the lesion and also enable the surgeon to choose the most appropriate approach.[16] Magnetic resonance imaging is an accurate modality for the diagnosis and follow-up of tongue dermoid cyst and has the advantage of having no radiation exposure, it can also delineate the cyst and demonstrate its extension throughout the floor of the mouth.[7]

The differential diagnosis of intralingual cyst include, but not limited to, the following; dermoid cyst, lymphatic malformation, haemangioma, thyroglossal duct cyst and bronchogenic cyst. *Dermoid cysts* are mainly seen in the midline of the body and in the testis and ovaries but the floor of the mouth is the commonest intraoral site and extremely rare in the tongue.[13] Histologically they are lined by epidermis and characteristically contain skin adnex.[13] Therefore, it should be considered as differential in congenital cystic swellings of the tongue.

The effective treatment is surgical excision/enucleation of the cyst under general anaesthesia[1,7,10,11,13,16,17] which could be via extraoral, intraoral, or both approaches depending on the anatomical location, and size of the lesion with the aim of complete removal and preventing recurrence.[3,11,17] However, giant extensive cysts abutting or involving vital structures might be considered for marsupialization.[3,6] Nevertheless, irrespective of the approach, special consideration must be given to the Wharton's duct, lingual nerve and vessels.[17] Though difficult intubation was anticipated, patient successfully had an endotracheal intubation which was uneventful. Oluleke et al.[1] who reported 14 cases of sublingual dermoid cysts experienced difficult intubation in most of the patients. Oftentimes, needle decompression of the fluid was done to reduce the volume of the cystic fluids to facilitate endotracheal intubation.[1,10] Postoperative management was uneventful except for mild tongue oedema without airway challenges which improved with dexamethazone for 24 hours. But Oluleke et al.[1] reported respiratory infection, respiratory obstruction, feeding difficulties and secretions in their series.

Conclusion

Giant lingual dermoid cysts in a newborn are rare. It can present with difficulty feeding, but without challenge in breathing and endotracheal intubation as in the index patient. However, when the cyst is located at the posterior aspect of the tongue or oral cavity, there may be considerable technical challenges to the anaesthesiologist and the surgeon.

Conflict of interest

The authors declare that there is no conflict of interest

Informed consent

The authors certify that the necessary and appropriate consent was obtained from the parents of the patient to publish the clinical information and images. The parents were made to understand that the name and initials will not be published and all efforts will be made to conceal his identity. However, anonymity will not be completely guaranteed.

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SEPTATE UTERUS WITH BILATERAL TUBAL BLOCKAGE: A CASE REPORT AND LITERATURE REVIEW.

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ABSTRACT

Septate uterus is a form of congenital anomaly of the müllerian ducts. This anomaly of the female reproductive tract may be associated with various reproductive problems including infertility, recurrent miscarriages, increased risk of preterm delivery, abnormal fetal presentation, delivery by caesarean section, intrauterine fetal growth restriction, low birth weight, and perinatal mortality. Diagnosis of a septate uterus on imaging may be challenging due to its similarity with other congenital uterine anomalies. We present a case of septate uterus with bilateral tubal blockage in a young woman being evaluated for primary infertility who was referred for hysterosalpingography.

Keywords: Septate uterus, Mullerian ducts, Hysterosalpingography.

Introduction

The female reproductive tract arises from complex processes that involves differentiation, migration, fusion, and resorption of the mullerian ducts during embryogenesis. Anomalies of the mullerian ducts may arise from failure of any of these processes.[1]

The prevalence of congenital uterine anomalies varies, depending on the population and the diagnostic method. A prevalence of 5.5% in unselected populations, 8% in infertile women, 13.3% in those with miscarriages, and 24.5% in infertile women who also had a history of miscarriage has been reported.[1,2]

The septate uterus is the most common congenital uterine anomaly, accounting for 35% to 55% of all uterine anomalies, with a prevalence of 0.2–2.3% in women of reproductive age.[2,3] It occurs as a result of failure in the resorption of the utero-vaginal septum and is associated with the poorest obstetrical outcome with a fetal survival rate ranging between 6% and 28% and a spontaneous miscarriage rate >60%.[3,4] The utero-vaginal septum may extend to the internal os of the cervix giving rise to a complete septate uterus or may stop midway (subseptate uterus). Women with septate uterus may present with infertility, recurrent miscarriages, history of preterm delivery, abnormal fetal presentation, delivery by caesarean section, intrauterine fetal growth restriction, low birth weight, and perinatal mortality. Imaging modalities such as ultrasonography, hysterosalpingography (HSG) and magnetic resonance imaging (MRI) play a vital role in the management of septate uterus.[5]

Case Presentation

The case is of a 25yr old female P_0^{+0} who is a Hausa student, and consented for the publication of this article. She presented to the general out-patient department (GOPD) of Jos university Teaching Hospital on account of inability to conceive. She has been married for about 6yrs but has never been pregnant. Her monthly menstrual cycle has been normal. She had been having recurrent foul smelling vaginal discharge and lower abdominal pain. No

history suggestive of polycystic ovarian syndrome, hyperthyroidism or hyperprolactinaemia was reported. She is not a known diabetic or hypertensive; however, a high blood pressure measurement was reported during one of her clinic visits. She does not consume alcohol nor smoke cigarette. She is from a monogamous setting with no history of change of spouse. Her husband is a 31year old trader who has never fathered a child before. He does not consume alcohol nor smoke cigarette. There was no family history of infertility or congenital anomalies. She had presented to different hospitals for evaluation where different investigations were carried out, but was told everything was normal except for a HSG which showed bilateral blocked fallopian tubes.

Her physical examination findings were unremarkable. Bi-manual pelvic examination showed a normal sized uterus, no cervical motion tenderness was noted. Speculum examination showed a normal vagina and cervix. Several investigations were requested for including a high vaginal swab (HVS) microscopy, culture, and sensitivity, Abdominopelvic ultrasound scan and HSG. Seminal fluid analysis (SFA) was also done for the husband. HVS done showed numerous pus cells and epithelial cells, Hemolytic streptococci specie, Gram negative bacilli and Candida albicans were also isolated. The SFA result showed Oligospermia with sperm concentration of 10million per mm^3, active mobile sperm cells were 10%, sluggish sperm cells were 40% and non-motile cells 50%.

She was then referred to the radiology department of Jos university teaching hospital for HSG. A speculum vaginal examination showed a single external cervical os and a single vagina. No vaginal septum was seen. A HSG was then carried out which showed two separate contrast outlined uterine cavities with two cervices with an acute angle separating the two uterine horns. Both Fallopian tubes were not demonstrated (Figure 1). An assessment of septate uterus with bilateral non patent tubes was made.

The patient later had a trans-abdominal and pelvic ultrasound scan which showed a normal sized uterus with a convex fundus on longitudinal plane (Figure 2) and two endometrial complexes with myometrial tissue separating them on transverse plane (Figure 3). The intra-abdominal organs including the kidneys were normal. No other congenital anomalies were seen. A final diagnosis of septate uterus with bilateral non patent tubes was then made.

With the findings from HVS, Abdominal ultrasonography, HSG and SFA, the couple was placed on medications and were subsequently referred from the out-patient department of Jos University Teaching Hospital to the Gynaecology Clinic of the same Hospital for further evaluation.
In the Gynaecology clinic, the husband was placed on Addyzoa and other multivitamins, while the wife was placed on antibiotics. The couple was then counseled for a possible septoplasty and assisted reproductive technology (ART) procedures due to the findings of bilateral non patent Fallopian tubes, Septate uterus and Oligospermia. As at the time of writing this report, the couple is yet to return to the Hospital for follow-up.

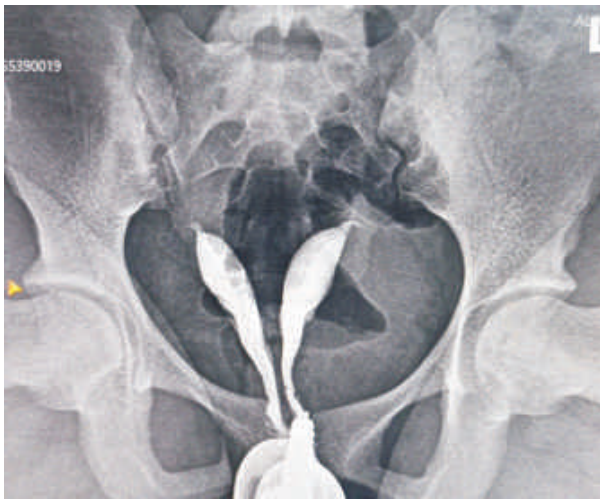

Figure 1: An anteroposterior hysterosalpingogram demonstrating two contrast outlined uterine horns and cervices separated by an acute angle. Both fallopian tubes were also non patent.

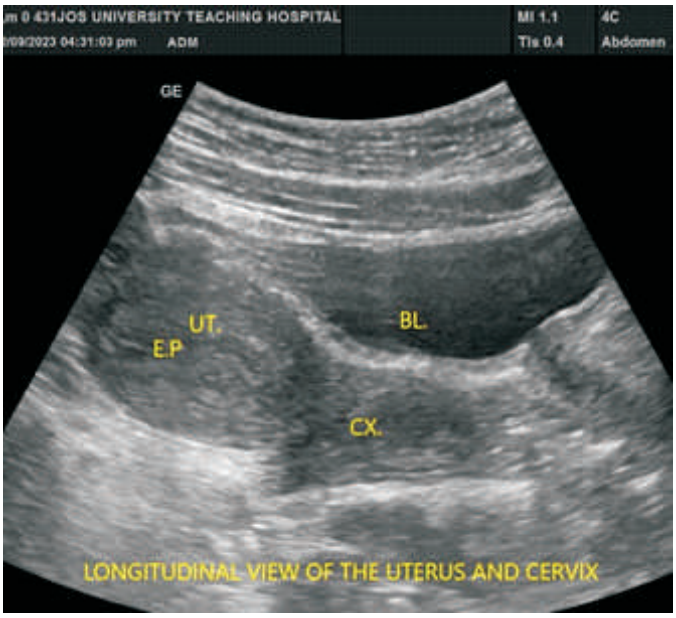

Figure 2: A grayscale transabdominal longitudinal sonogram demonstrating a normal sized uterus (UT) with a convex fundus. The endometrial plate (EP), the cervix (CX) and the urinary bladder (BL) were also demonstrated.

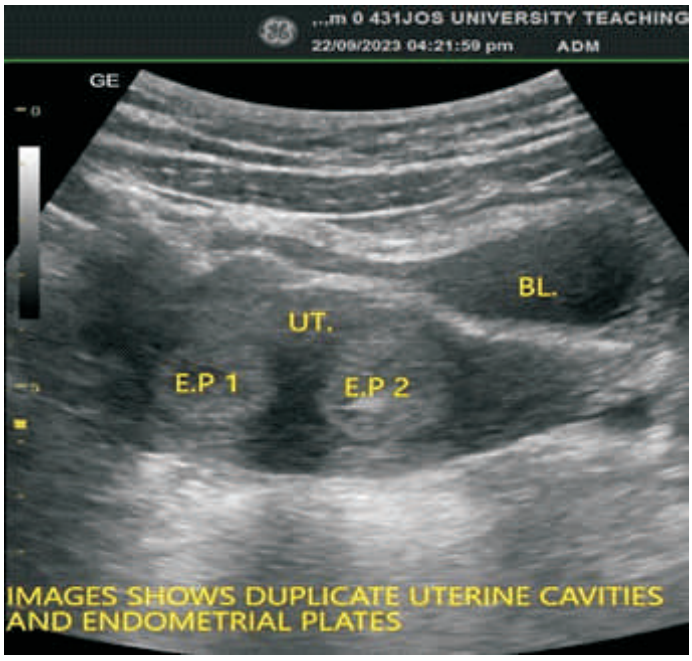

Figure 3: A grayscale transabdominal transverse sonogram of the uterus (UT) demonstrating two endometrial complexes (E.P 1 and E.P 2) separated by myometrial tissue.

Discussion

Mullerian duct anomalies (MDAs) are congenital defects of the female genital system that arise from abnormal embryological development of the Mullerian ducts. These anomalies may be due to failure of development, fusion, canalization, or reabsorption of the mullerian ducts which normally occurs between 6 and 22 weeks in utero. Most sources estimate an incidence of these abnormalities to be 4 to 7%, one of which was done by the American Fertility Society (AFS) who classified them into seven classes [7]. These anomalies include uterine hypoplasia / agenesis, unicornuate uterus, uterine didelphys, bicornuate uterus, septate uterus, arcuate uterus and diethylstilbesterol drug related uterine anomaly (T-shaped uterus) [7].

Septate uterus is the commonest uterine anomaly

with a mean incidence of 35% - 50% followed by bicornuate uterus (25%) and arcuate uterus (20%) [6,8]. It results from partial or complete failure of resorption of the uterovaginal septum after fusion of the paramesonephric ducts. It is a class V anomaly according to the American Fertility Society (AFS) [7]. This septum may be fibrous or muscular and depending on the stage when the resorption failure occurs, the septum can be complete or partial, however, the external contour of the uterus is usually normal [3,6].

Septate uterus is the most common anomaly associated with reproductive failure (in 67%). This may include infertility, miscarriages, malpresentation, and preterm delivery. The clinical presentation ranges from being asymptomatic to complete reproductive failure. An incidental finding of a uterine septum may sometimes occur during the evaluation of infertility [8,9].
This index patient was diagnosed to have septate uterus with bilateral tubal blockage in the course of evaluation for infertility, therefore, septate uterus may be an incidental finding in sub-fertile population.

Relevant imaging modalities in the diagnosis of mullerian duct anomalies are Ultrasonography, Hysterosalpingography (HSG) and Magnetic Resonance Imaging (MRI). The role of imaging is to help detect, diagnose, and distinguish surgically correctable forms of Mullerian duct anomalies from inoperable forms.

Pelvic ultrasound (US) is the first radiological investigation ordered in evaluation of Mullerian duct anomalies because it is simple, non-invasive, affordable, available and provides good information; however, it is highly dependent on the experience of the examiner [5]. In a septate uterus, there are two endometrial complexes separated by muscular or fibrous tissues (figure 3). Ultrasonography also has the advantage of outlining the uterine fundus in septate uterus, which is usually convex, flat, or slightly depressed (not >1.0cm in dept) [3].

Hysterosalpingography provides information only about the uterine cavity and tubes and is used more in cases of infertility. It is an invasive, painful exam that doesn't evaluate the external contour and does not differentiate septate uterus from bicornuate uterus. Accuracy of hysterosalpingogram alone is 55% in the differentiation of septate from bicornuate uterus. An angle of less than 75° between the uterine horns is suggestive of a septate uterus, and an angle of more than 105° is more consistent with bicornuate uterus. Unfortunately, the majority of angles of divergence between the horns fall within this range, and considerable overlap between the two anomalies is noted [3,7].

MRI is considered the gold standard in the evaluation of MDAs because it offers objective and reliable three-dimensional information about all the genital and peritoneal anatomy, except for the tubes. It can be used in all cases, including obstructive malformations.

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ACUTE UTERINE INVERSION IN A STABLE PATIENT: A CASE REPORT

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ABSTRACT
Acute uterine inversion is a rare and unpredictable obstetric emergency often associated with devastating consequences when not properly treated. Shock and uterine replacement must be addressed simultaneously. Delivery unsupervised by a skilled birth attendant is a risk factor and should be discouraged. We present a case report of a 29year old Para 4^{+0}(4 Alive) diagnosed with acute second-degree uterine inversion who presented one hour after home delivery, but in a stable condition.

Keywords: Acute uterine inversion, uterine replacement

Introduction

Acute uterine inversion is an extremely rare but life-threatening post-partum complication in which the uterus is turned inside out partially or completely.[1]The incidence is about 1 in 20,000 deliveries, worldwide with limited publications in our environment, this wide range may be related to differences in definition of inversion, patient populations, case ascertainment, routine obstetric procedures and postpartum care. It occurs mostly in the puerperium but can also occur in the non-puerperal period.[1,2,13] The risk factors include poorly managed third stage of labour, short umbilical cord, retained or abnormally adherent placenta, prolonged labour, use of uterine relaxants such as magnesium sulphate among others.[1]The pathogenesis of uterine inversion is not completely understood. It has been attributed to use of excessive cord traction and fundal pressure (Credé maneuver) during the third stage of labor, especially in the setting of uterine atony with fundal placental implantation.[13] However, evidence is inconsistent, and a causal relationship between management of the third stage and puerperal uterine inversion is unproven. [13] It is likely that other factors play a role since spontaneous inversions occur and inversion is rare even though cord traction and the Credé maneuver are commonly performed. Haemorrhage may occur because the invaginated fundus may not contract normally and the inverted endometrium is stretched, which exacerbates bleeding from any areas of placental separation.

Death may occur in 15% of affected mothers due to pain, blood loss and shock. The shock is usually described as being out of proportion to the bleeding.[2] Morbidity and mortality are reduced by early recognition and prompt management.[2] Modalities for management include resuscitation, replacement as early as possible manually or using surgical techniques as the case may be.[2,3]

Case Report

The patient was a 29-year-old Para 4^{+0}(4 Alive) who delivered 1 hour prior to her presentation in our facility. She was married and of low socioeconomic status and received antenatal care in a primary health care within her neighborhood. She had a home delivery of a live male neonate at term before presentation reason being she was not aware labour had progressed that far. The delivery was conducted by her neighbor who lacked the necessary knowledge and skills to do so. On delivery of the placenta, they noticed protrusion of a mass outside the vagina, this necessitated their presentation to Our Lady of Apostle Hospital Jos (OLA) in Jos where she was promptly referred to Jos University Teaching Hospital (JUTH) for expert care.

On examination she was anxious and not in painful distress, not pale and not dehydrated. Her pulse rate was 115 beats per minute with a blood pressure of 120/90 mmHg. Her respiratory rate was 16 cycles per minute and the chest was clinically clear.On abdominal examination; there was no area of tenderness, she had a suprapubic mass about 12 weeks size.

Vaginal examination revealed the entire cervix outside the vagina, it was oedematous with no active bleeding. The fundus of the uterus was felt within the cervical canal. An assessment of acute second-degree uterine inversion was made.

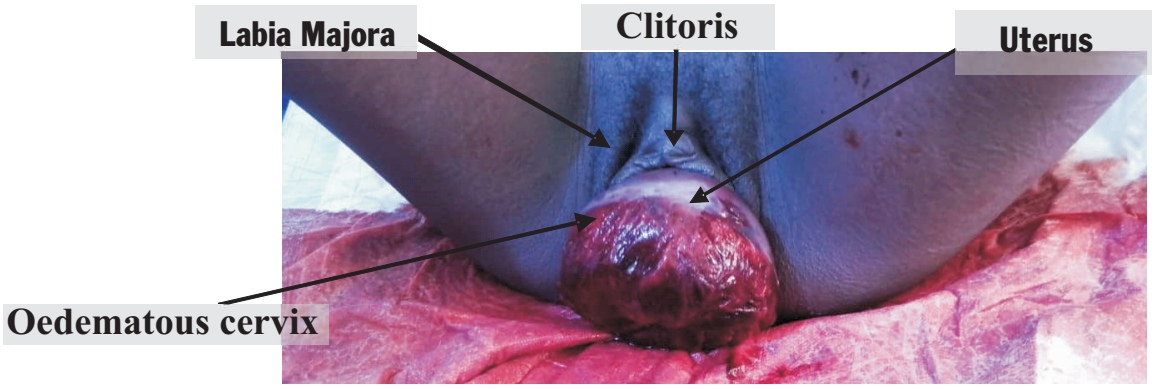

Figure 1: 2nd degree uterine inversion

She was admitted and counselled on her condition, Samples were taken for urgent parked cell volume which came out to be 37%, and she was commenced on 1 liter of normal saline, 1gram of intravenous ceftriaxone and 60mg of pentazocine. Attempt at manual replacement (Johnson's procedure) was done in the labour ward under analgesia (mentioned above) due to her stable state which was successful. This was followed by administration of oxytocics.

NB: Written informed consent was obtained before carrying out all procedures from the patient. Confidentiality, anonymity and voluntary participation were ensured during and after the study. The patient agreed to the publication of this case report in an ethical manner.

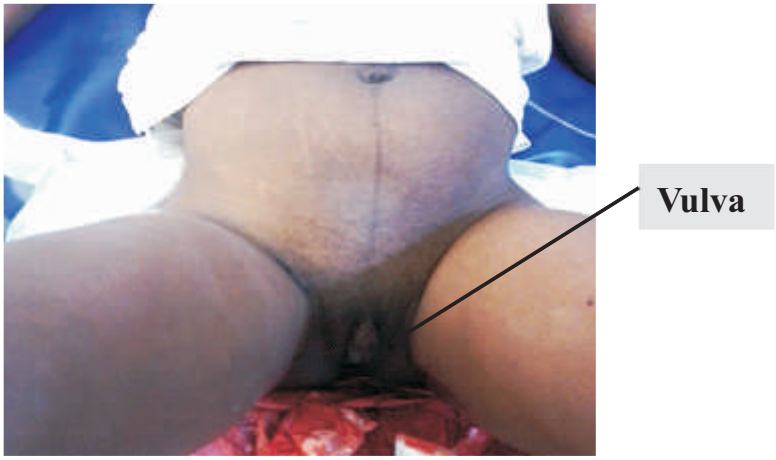

Figure 2. *After successful replacement of 2nd degree uterine inversion*

Discussion

Uterine inversion occurs when there is a telescoping of the uterine fundus through the endometrial cavity.[1,11] It is classified either by the extent of inversion or the time of occurrence. Based on extent of inversion, it could be 1st degree when the fundus is within the endometrial cavity, 2nd degree when the fundus protrudes through the cervical os, 3rd degree when the fundus protrudes beyond the introitus or 4th degree when both the uterus and the vagina are completely inverted.[2,16] Ninety percent of reported cases are 2nd degree.[2]

Based on the time of occurrence, it could be acute when it occurs within 24 hours of delivery, subacute when it occurs after 24 hours but less than 4 weeks and chronic when it occurs at or after one month.[2] In a review of 229 cases of puerperal uterine inversion 84.3% were acute.[2]

Our patient had an acute 2nd degree uterine inversion in keeping with the above criteria. Haemorrhage may occur because the invaginated uterus may not contract normally and the inverted endometrium is stretched which exacerbates bleeding from any areas of placental seperation.[3,19] Shock (neurogenic) out of proportion to the blood loss has been described and attributed to increase vagal tone from stretching of the pelvic parasympathetic nerves.[3,4] This index patient was hemodynamically stable owing to her early presentation in our facility.

Ultrasound examination of uterine inversion usually reveals the absence of normal uterine fundal contour and a homogenous globular mass within the uterus but this is hardly required as diagnosis is largely clinical with the need for urgent action.[4,9,21]There was no ultrasound evaluation in our patient. Other investigations required for the managements of these patients includes packed cell volume, blood typing and cross matching.[4]

Treatment depends on the mode of presentation.[6] For an unstable patient there is need for aggressive resuscitation followed by uterine replacement.[5,6] In a stable patient like in this index case, the goal is to achieve replacement as soon as possible in order to avoid formation of constriction ring.[5,6]

The modalities for replacement includes manual replacement (Johnson's method) which can be attempted immediately in a stable patient, with difficulty, this method should be done in the operating theatre under halothane to achieve uterine relaxation and with proper analgesia.[3,5] Our patient had a successful manual replacement in the labour ward due to her stable state at presentation.

Surgical procedures for replacement include the Huntington's procedures, Haultain's procedure and the Ocejo's incision.[3,5] In the Huntington's procedure clamps such as Allis or Babcock clamps are used to hold each round ligament entering the cup formed by the inversion, and a gentle pull is applied on the clamps to exert upward traction on the inverted fundus. Also, the clamps are repeatedly removed and reapplied in 2cm increments along the ligaments and traction exerted until the inversion is corrected.[5] There may be a need for a push through the vagina by a third assistant to aid replacement of the fundus. This is the easiest and most commonly performed surgical procedure[5].

In the Haultain's procedure, an incision approximately 1.5 inches in length on the posterior surface of the uterus is made to transect the constriction ring. Surgical release of the constriction ring should allow manual reduction of the uterine inversion.[6,7]

An anterior incision can also be made (Ocejo's incision) however, this is associated with the risk of bladder injury.[6,7] Other methods of reduction include the hydrostatic reduction with the patient placed in reverse Trendelenburg position and a bag of warm fluid is hung one meter above the patient and allowed to flow by gravity or with light pressure through a tubing connected to a silastic ventouse cup in the vagina (O'Sullivian method). There is however need for further investigation on the safety and efficacy of this method.[4,10]

A few cases of successful laparoscopic-assisted reduction of acute and chronic uterine inversion have been reported especially in the developed world.[8]

Conclusion

Acute uterine inversion is a rare but when it does occur, the consequences could be fatal but was not the case in our patient. There is need for hospital delivery and proper management of third stage of

labour in order to prevent this condition. There is a need for recurrent skills and drills training because of the rarity of the condition. The need for health education and skilled attendant at birth and hospital delivery is important to prevent this condition. Also, it is a wakeup call for doctors to update their skills on the various procedures for replacement in order to prevent mortality. The procedure for manual replacement was successful in this patient because she was attended to by an Obstetrician.

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