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ORIGINAL RESEARCH

Relationship Between Serum Magnesium Levels in Pregnancy and Pregnancy Outcomes at the University of Ilorin Teaching Hospital, Ilorin, Nigeria

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Abstract

Background: In pregnancy, Magnesium is essential in the formation of new tissues (maternal and foetal), and hyomagnesaemia has been associated with adverse pregnancy outcomes.
Objectives: To determine the relationship between magnesium levels and pregnancy outcomes among pregnant women attending the University of Ilorin Teaching Hospital.
Methods: It is a hospital-based, cross-sectional study. The study population was divided into two groups based on the serum magnesium levels (normal and low). Serum magnesium levels were recorded at recruitment and delivery. Maternal outcomes were compared between the two study groups and correlated with serum magnesium levels.
Results: A total of 126 pregnant women were recruited (out of the 256 pregnant women screened); each arm of the study consisted of 63 participants. Ten participants were lost to follow-up. The mean serum magnesium level for the normomagnesaemic and hypomagnesaemic groups at recruitment was 1.18±0.09mmol/L and 0.40±0.14mmol/L, respectively. The prevalence of hypomagnesaemia was higher at delivery than in pregnancy. Hypomagnesaemia occurred more frequently among women of a higher social class ($p = 0.049$). Women with hypomagnesaemia were three times more likely to have preterm birth, pre-eclampsia, and postpartum cramps with significant levels of association ($p = 0.041, 0.014, 0.001$). Age and hypomagnesaemia were predictors of pre-eclampsia ($p = 0.041$ and 0.028).

Conclusion: Hypomagnesaemia is associated with adverse pregnancy outcomes such as pre-eclampsia, preterm labour/delivery and postpartum uterine cramps. Interventional studies to prove the efficacy or otherwise of dietary counselling or routine magnesium supplementation in pregnancy involving these high-risk groups should also be undertaken.

Keywords: Hypomagnesaemia, Pre-eclampsia, Preterm birth, Pregnancy, Maternal outcomes.

Introduction

Magnesium is known to play roles in obstetrics as an essential element for both foetal and maternal well-being. [1] In pregnancy, it is necessary for the formation of new tissues (maternal and foetal). A higher intake of magnesium is required in pregnant women when compared to non-pregnant women of the same age. [2, 3] The daily requirement for magnesium is about 400 mg for men and 300 mg for women, with more being required during pregnancy and lactation. [4] The normal serum magnesium level in the non-pregnant woman is 0.66 – 1.07mmol/L. Out of this, 60% is ionised, 10% is complexed with other ions and 30% is bound to proteins. [5, 6] Magnesium deficiency can cause symptoms such as headache, depression and anxiety, high blood pressure and muscle cramps. Cereals (maize, sorghum, millet), beans, leafy vegetables and fish are primary dietary sources of magnesium. [7] Vitamin D increases magnesium absorption.[4]

Lower magnesium levels in pregnancy occur secondary to haemodilution, increased renal clearance and increased utilisation by the growing foetus. [8,9] In normal pregnant women, the serum magnesium levels show no gestational age dependence until 30 weeks, after which they continuously decline. [10] Kumar and co-authors found a hypomagnesaemia prevalence of 48% in their study in Mauritius. [10] Pathak et al. reported an incidence of 43.6% among rural Indian women in a community-based, cross-sectional study. [11] In a survey conducted by Olatubosun in Lagos, Nigeria, an average serum magnesium level of 1.03mg/dL (0.45 mmol/L) was observed in the eighth month of pregnancy, a decrease from the non-pregnant average of 1.47mg/dL (0.64 mmol/L). [12]

Magnesium has an inhibitory role on myometrial contractions, dilates blood vessels and improves cerebral blood flow. [13] Hypomagnesaemia leads to neuromuscular hyper-excitability, resulting in muscle cramps and uterine hyperactivity. [14] Its deficiency during pregnancy has been reported to be associated with pre-eclampsia, small for gestational age, preterm labour and leg cramps. [13,15] Magnesium supplementation during pregnancy may improve foetal and maternal outcomes by decreasing the incidence of preterm labour, preventing and controlling seizures and reducing the incidence of maternal and neonatal hospital admissions. [13,16]

The prevalence of hypomagnesaemia in pregnancy has been reported in some developing countries to range between 25.6% and 48%. [10,17,18] In Nigeria, a rate of 16.25% was found in a study in Benin.[19] In another Nigerian study, Kehinde et al. in Lagos, reported a prevalence of 36%.[20] They also found an association between low serum magnesium level and the onset of preterm labour. Other studies have found associations between low serum magnesium level and gestational hypertension, pre-eclampsia, eclampsia and sudden infant death syndrome, which are common complications of pregnancy in our environment. [21,22] The high level of poverty and other social deprivation in this environment predisposes pregnant women to the risk of nutritional deficiencies and their attendant adverse effects on pregnancy. There is a paucity of studies on the prevalence of hypomagnesaemia in pregnancy in the north-central zone of the country and its relationship to pregnancy outcomes; hence, the need to undertake this study in a centre in Kwara State, within the north-central zone of the country.

Methods

Study area

The study was carried out at the Obstetrics and Gynaecology Department of the University of Ilorin Teaching Hospital (UITH), Ilorin, Kwara State. The hospital is located in Oke-Ose, Ilorin East Local Government Area of Kwara State. It serves as a referral centre for patients not only in Kwara state but also in neighbouring states such as Niger, Kogi, Ekiti, and Osun. In addition to tertiary health care, it also provides primary and secondary health care services. It is also a training centre for medical undergraduate and postgraduate students, midwives, Community Health Extension Workers, Health Information Managers and plaster technicians.

Study design

A cross-sectional study of pregnant women attending antenatal care at the University of Ilorin Teaching Hospital (UITH), Ilorin, was conducted with approval from the Institutional Ethics Committee. The subjects were healthy pregnant women between 24 and 30 weeks of gestation with uncomplicated pregnancies at the time of recruitment. They were followed up through delivery and for 1 week postpartum. These women were grouped based on their serum magnesium levels, using a mean normal serum magnesium level of 1.0±0.25 mmol/L reported in a study in Benin, Nigeria.[19] The hypomagnesaemic group was defined as having a serum magnesium level below the mean minus 2 SD (i.e., 0.52 mmol/L). In comparison, the normomagnesemia group had serum magnesium levels ranging from 1±0.25 mmol/L to no more than 2 SD above the mean.

Ethical consideration

An institutional research ethics approval was obtained from the Ethical Review Committee of the University of Ilorin Teaching Hospital before the commencement of the study, with registration and approval numbers ERC PIN/2017/05/0574 and ERC PAN/2017/1700, 07/07/2017, respectively. Confidentiality was maintained throughout the study period.

Study population

All consenting pregnant women aged 24 to 30 weeks of gestation attending the antenatal clinic during the study period were recruited until the targeted sample size was reached.

Eligibility criteria

All pregnant women with gestational ages of 24 to 30 weeks who were not receiving any magnesium-containing medication, except routine haematinics that do not contain magnesium, were screened.

Inclusion criteria

All consenting pregnant women who fit the eligibility criteria.

Exclusion criteria

These included multiple gestations, chronic medical disorders such as hypertension, diabetes mellitus, sickle cell disease, chronic liver and kidney diseases and HIV infection or other immune-suppressing illnesses. Other criteria included peptic ulcer disease with regular use of magnesium-containing antacids and women on nutritional supplements containing magnesium salts.

Sample size

The sample size was calculated based on a previous study that reported 16.25% prevalence of hypomagnesaemia in pregnancy at the University of Benin Teaching Hospital, Benin City, Nigeria. [17] Accepting a statistical power of 80% and a confidence interval of 90%, with a level of significance of 0.05 and up to 10% of participants expected to drop out, a sample size of 126 patients was determined. These women were grouped at recruitment into two halves of 63 to make up the cohort and the control group.

Sample size determination

Sample size was determined using data from previous study. The formula for sample size calculation for cohort study. [23]

$$\frac{\left[Z_{\alpha/2}\sqrt{(1+1/\mathrm{m})\bar{P}(1-\bar{P}} \;+ Z_{\beta}\sqrt{\frac{P_0(1-P_0)}{m}+P_1(1-P_1)}\right]^2}{(P_0-P_1)^2}$$

The calculated sample size was 57 for each arm using the above formula. To account for attrition, 10% of the sample size (approximately 6) was added to the calculated sample size. Thus, the total sample size was 63 per arm of the study, for a total of 126.

Sampling technique

The purposive sampling method was used.

Subject recruitment

Patient recruitment was conducted by the researcher and research assistants from the antenatal clinic until the required number of participants was reached. A total of 256 pregnant women were screened for the study after satisfying the inclusion criteria. They were counselled on the nature and purpose of the study, as well as the potential benefits and risks of participation. Consenting women were given the information sheet to read through, and written consent was obtained. Recruitment of the patients was carried out between 24 and 30 weeks of gestation. This was because some studies showed that serum magnesium levels decreased during pregnancy before the third trimester [11,18], while others suggested a fall later in the third trimester. [11] Their serum samples for magnesium level determination were then obtained using an aseptic technique. Sampling into the two groups was done simultaneously, and the normomagnesaemic group was completed first. The screening of eligible pregnant women continued until the hypomagnesaemic group reached its target size. These patients were followed up to delivery, at which time another sample was obtained for the determination of serum magnesium levels. Following delivery, the mothers were followed up in the lying-in ward along with their babies and until one week after delivery via phone calls. Recruitment was conducted over ten months until the desired sample size was reached.

Data collection method

The data was collected between July 2018 and April 2019. The questionnaire designed for data collection was administered. The blood samples were collected, and the sample bottles were labelled with the corresponding serial numbers. The folders were marked with a colour code to prevent multiple sampling and for ease of record retrieval. The information obtained included age, place of residence, gestational age, marital status, educational status and occupation of the woman and the spouse. A history of complaints such as leg cramps, tingling sensations, twitching and body weakness during pregnancy was noted. Adverse pregnancy outcomes and outcomes of delivery were noted in the study participants' outcome forms. Following delivery, the mothers were followed up in the lying-in ward along with their babies. The presence of and need to treat uterine cramps were assessed. A phone call was made to the mothers on the seventh postpartum day to assess other outcomes of interest that occurred after hospital discharge. The results of testing and other outcome measures were input by the researcher as obtained.

Laboratory analysis

Serum magnesium was measured by using the endpoint colourimetric method with AGGAPE kits, manufactured by AGGAPE Diagnostics Switzerland. The reference value for normal was between 1.0±0.25 mmol/L and not more than 2 SD above.

Data analysis

The data were analysed using the Statistical Package for the Social Sciences (SPSS) version 26.0. The data were presented using frequency tables and relationships between socio-demographic variables, and hypomagnesaemia was determined using the Chi-square test. In contrast, the means of continuous variables were compared using the Independent Samples t-test. Variables that showed significant associations with hypomagnesaemia were subjected to multivariate analysis using multiple logistic regression. Binary logistic regression analysis was used to correct the effect of cofounding variables, and the level of significance was set at a probability (p) value < 0.05.

Results

A total of 256 patients were screened, of whom 126 were selected based on their serum magnesium levels. They were divided into two groups of 63 each. Ten participants were lost to follow-up: four in Group 1 and six in Group 2. Group 1 comprised pregnant women who had low serum magnesium (Hypomagnesaemia), while Group 2 had normal serum magnesium levels at recruitment. The mean serum magnesium level for the hypomagnesaemic group was 0.40±0.14 mmol/L, while group 2 had normal magnesium levels, with a mean of 1.18±0.09 mmol/L. Twelve women in group 2 at recruitment became hypomagnesaemic at delivery, while 17 women who were hypomagnesaemic at recruitment became normomagnesaemic at delivery. Thus, a total of 54 participants were in group 1 and 62 were in group 2 at the end of the study.

The participants aged 22-24 years constituted the bulk (39.7%) of the population studied. This age group accounted for 40.7% of the hypomagnesaemic group, while the normomagnesaemic group accounted for 38.7%. The participants were mainly tertiary-educated (82.0%), while 93.1% were married and 56.9% belonged to the upper social class. There was no maternal or perinatal mortality recorded in the course of this study. Women with postpartum uterine cramps were treated with an appropriate analgesic according to the departmental protocol.

Serum magnesium level of the study participants at recruitment and at delivery

The mean normal serum magnesium level at recruitment was 1.18±0.09 mmol/L, and at delivery it was 1.03±0.26 mmol/L (p = 0.001), as shown in Table I.

Association between socio-demographic variables and magnesium level at delivery (all participants)

Pregnant women between the ages of 26 and 30 had a slight increase in the risk of hypomagnesaemia, but this did not reach statistical significance (40.7% vs 38.7%, p = 0.809; Table II). However, the risk of having hypomagnesaemia in pregnant women in the upper social class was higher than those in the middle and lower social classes, with significance (p = 0.049) as shown in Table II.

Association between maternal outcome and magnesium level at delivery (all participants)

Preterm birth was 3 times more likely in women with hypomagnesaemia than those with a normal serum magnesium level (18.5% vs 6.5%), as shown in Table III. The occurrence of pre-eclampsia was three times more likely in women with low serum magnesium levels compared to those with normal levels of magnesium (22.2% vs 6.5%), as shown in Table III. Postpartum uterine cramps occurred four times more amongst the hypomagnesaemic group compared with the normomagnesaemic group, with statistical significance (29.6% vs 6.5%). The associations between preterm delivery, pre-eclampsia, and postpartum uterine cramps were also statistically significant (p = 0.041, 0.014, and 0.001, respectively).

Logistic regression for preterm delivery, preeclampsia and postpartum uterine cramps

In Table IV, a binary logistic regression was used for both univariate and multivariable analyses to control for confounders of preterm delivery, preeclampsia, and postpartum uterine cramps. All the parameters had significant associations with hypomagnesaemia at delivery. Apart from hypomagnesaemia, social class was associated with preterm delivery; age and social class were significantly associated with preeclampsia, while parity was significantly associated with postpartum uterine cramps (Univariate analysis). At the multivariable level, neither social class nor hypomagnesaemia independently predicted preterm delivery. Age and hypomagnesaemia remained significant predictors of pre-eclampsia (p = 0.041 and 0.028, respectively). Patients with hypomagnesaemia had about 4.7 times the increase in the odds of having preeclampsia as compared with those with normal magnesium levels (OR = 4.699; 95% CI = 1.185 – 18.634). Postpartum uterine cramps were independently significantly associated with parity and hypomagnesaemia (p = 0.024 and 0.003, respectively). Patients with hypomagnesaemia have 6 times increase in the odds of having postpartum uterine cramps (OR = 6.068; 95% CI = 1.845 – 19.955).

Table I: Serum magnesium level of the study participants at recruitment and at delivery

Serum magnesium level	*Normal* **Mean ± SD**	*Hypomagnesaemia* **Mean ± SD**	*t*	*p-value*
At recruitment	1.18 ± 0.09	0.40 ± 0.14	37.451	<0.001
At delivery	1.03 ± 0.26	0.68 ± 0.38	5.815	<0.001
t (p value) #	*4.479 (<0.001*)*	*-6.358 (<0.001*)*		

Table II: Association between socio-demographic variables and magnesium level at delivery (all participants)

	Magnesium level				
Variable	*Low* **n (%)**	*Normal* **n (%)**	*Total* **N (%)**	**χ^2**	***p* value**
Age group					
≤20	2 (3.7)	2 (3.2)	4 (3.4)	1.598	0.809
21 – 25	8 (14.8)	14 (22.6)	22 (19.0)		
26 – 30	22 (40.7)	24 (38.7)	46 (39.7)		
31 – 35	16 (29.6)	14 (22.6)	30 (25.9)		
>35	6 (11.1)	8 (12.9)	14 (12.1)		
Educational level					
None	3 (5.6)	1 (1.6)	4 (3.4)	1.935 F	0.603
Primary	3 (5.6)	2 (3.2)	5 (4.3)		
Secondary	12 (22.2)	13 (21.0)	25 (21.6)		
Tertiary	36 (66.7)	46 (74.2)	82 (70.7)		
Marital status					
Single	4 (7.4)	3 (4.8)	7 (6.0)	1.512F	0.564
Married	49 (90.7)	59 (95.2)	108 (93.1)		
Separated	1 (1.9)	0 (0.0)	1 (0.9)		
Social class					
Upper	26 (48.1)	40 (64.5)	66 (56.9)	6.047	0.049*
Middle	20 (37.0)	20 (32.3)	40 (34.5)		
Lower	8 (14.8)	2 (3.2)	10 (8.6)		

Table III: Association between maternal outcome and magnesium level at delivery (all participants)

Variable	*Magnesium level* *Low* n (%)	*Normal* n (%)	*Total* N (%)	χ²	*p* value
Preterm delivery					
Yes a	10 (18.5)	4 (6.5)	14 (12.1)	3.960	0.047*
No	44 (81.5)	58 (93.5)	102 (87.9)		
Mode of delivery					
SVD	46 (85.2)	54 (87.1)	100 (86.2)	1.128 [F]	0.884
CS	8 (14.8)	7 (11.3)	15 (12.9)		
ECS	0 (0.0)	1 (1.6)	1 (0.9)		
Preeclampsia					
Yes	12 (22.2)	4 (6.5)	16 (13.8)	6.037	0.014*
No	42 (77.8)	58 (93.5)	100 (86.2)		
Post-partum uterine cramps					
Yes	16 (29.6)	4 (6.5)	20 (17.2)	10.867	0.001*
No	38 (70.4)	58 (93.5)	96 (82.8)		

Table IVa: Logistic regression for preterm delivery, preeclampsia and postpartum uterine cramps

Variable	*Preterm delivery* *Univariate* *p* value	*Multivariable* *p* value	OR (95% CI)
Age	0.090	*NA*	
Parity	0.290	*NA*	
Social class			
Upper [REF]	1		1
Middle	0.598	0.499	0.610 (0.145 – 2.558)
Lower	0.023*	0.078	4.025 (0.857 – 18.916)
BMI	0.964		
Hypomagnesaemia	0.049*	0.123	2.733 (0.760 – 9.823)

Table IVb: Logistic regression for preterm delivery, preeclampsia and postpartum uterine cramps

	Preeclampsia			***Postpartum uterine cramps***		
	Univariate	***Multivariable***		***Univariate***	***Multivariable***	
Variable	*p* value	*p* value	OR (95% CI)	*p* value	*p* value	OR (95% CI)
Age	0.023*	0.041*	0.855 (0.736 – 0.994)	0.061	*NA*	
Parity	0.288	*NA*		0.024*	0.033*	0.321 (0.113 – 0.911)
Social class						
Upper [REF]	1		1	1	*NA*	
Middle	0.921	0.438	0.572 (0.140 – 2.344)	0.342	*NA*	
Lower	0.004*	0.241	2.827 (0.498 – 16.065)	0.669	*NA*	
BMI	0.991	*NA*		0.904		
Hypomagnesaemia	0.020*	0.028*	4.699 (1.185 – 18.634)	0.002*	0.003*	6.068 (1.845 – 19.955)

Discussion

During pregnancy, micronutrients, including magnesium, are essential for the normal growth and development of the foetus. Deficiency of magnesium in pregnancy can impact not only the health of the mother but their babies. In this study, the mean normal serum magnesium level at recruitment was 1.18±0.09 mmol/L, while at delivery it was 1.03±0.26 mmol/L. The mean incidence of hypomagnesaemia was higher at delivery than at recruitment. The incidence of hypomagnesaemia was 6.8% less than usual at recruitment and at delivery. While the study by Enaruna and co in Benin found mean serum magnesium levels at recruitment and delivery to be 1.54±0.46 mEq/L (0.77±0.23 mmol/L) and 1.37±0.45 mEq/L (0.69±0.23 mmol/L), respectively. [19] They also found the prevalence of hypomagnesaemia to be 8% higher at delivery than at recruitment. [19] Suggested reasons for the low levels of magnesium in pregnancy include inadequate intake, increased metabolic demand of pregnancy, especially as gestation advances, physiological haemodilution in pregnancy, and increasing parity. [19]

In this study, age and parity were not significantly associated with the level of serum magnesium. This is similar to what was observed in the study by Shahnaz and co, who examined the correlation between maternal serum magnesium levels and infant low birth weight but found no association between maternal magnesium levels and parity, social class, or low birth weight. [24] While in studies by Enaruna, Pathak and Khalid, the prevalence of hypomagnesaemia was higher in teenagers and higher parity. This is likely a result of higher demands of pregnancy at an age characteristic of poor nutrition. An earlier study also reported that a frequent cycle of reproduction may exert a significant stress, leading to a general risk of undernutrition among pregnant women. [11, 13,19] Low magnesium levels were higher among women in the high social class and showed a significant association in our study. [25] This may be because the majority (about 3/5th) of the participants fall into this social class category (56.9%). This is contrary to what Enaruna observed in their study in Benin, which found a significant correlation between magnesium deficiency and a low socioeconomic class. A similar study also reported that high levels of serum magnesium occurred in women of high social class. [26] On the other hand, Kumar and coworkers found no correlation between the prevalence of magnesium deficiency and social class. [10] Low social class is likely associated with lower consumption of a magnesium-rich diet, such as green leafy vegetables, legumes, nuts, peas, and soya flour.

The role of Mg level in preterm birth has been documented previously by Shahid *et al.* [27] A possible mechanism of action of magnesium in attenuating preterm labour is by competing with intracellular calcium at its binding sites, thereby decreasing muscle contractility and stabilising membrane potentials. The study concluded that maternal serum magnesium level can be a valuable marker for preterm delivery. Kurzel also came to the same conclusion that hypomagnesaemia may be a marker for true preterm labour. [28] In this study, a significant association between low serum magnesium levels and preterm birth occurred. The survey by Ensuyeh *et al.* concluded that low serum magnesium level was associated with poor pregnancy outcomes, including preterm labour and low birth weight. [29] A proposed hypothesis is that magnesium has an immediate effect on placental vascular flow, and its depletion can impair placental vascular dilation, leading to placental insufficiency.[30] Other authors reported improved outcomes in patients receiving magnesium supplementation, with evidence of reduced frequency of preterm birth. [14,22]

Magnesium deficiency has been implicated as a possible cause of pre-eclampsia. [31-33] This link is attributed to vascular muscle spasm in the uterus, which is thought to be produced by magnesium deficiency. [21] Stanley et al. in their study demonstrated that all subjects who eventually developed pre-eclampsia showed a decrease in ionised magnesium concentration with increasing gestational age. [34] Similar findings were noted in a study in Benin, which showed a 24% higher incidence of preeclampsia in the hypomagnesaemic group than in the normomagnesaemic group. [19] This study also found a similar outcome, with the incidence of pre-eclampsia three times higher in the hypomagnesaemic group than in the normomagnesaemic group. Further logistic regression also showed that hypomagnesaemia was more likely to result in pre-eclampsia than age or BMI, a finding similar to that in the Benin study. [19] However, a study by Onyegbule showed no association between maternal age and pre-eclampsia. [35]

The literature suggests a possible role for magnesium deficiency in the causation of postpartum uterine cramps.[14] In this study, there is a significant association between the low serum level of magnesium and postpartum uterine cramps. Other studies reporting such associations were interventional and involved the use of supplemental magnesium salts without documentation of deficiency. However, the study by Enaruna and co did not show any correlation between the lack of magnesium and the occurrence of postpartum uterine cramps.[19] Other factors may be involved in the determination of what the patient considers to be significant uterine cramps necessitating reporting, such as previous experience during breastfeeding, parity, age, mode of delivery, and emotional state. Thus, in the light of these findings, health workers can consider routine serum magnesium assay in women with a history of preterm birth, pre-eclampsia and significant postpartum uterine cramps and give magnesium supplementation as appropriate.

Limitations and strengths

This is a hospital-based study involving participants in a teaching hospital and, therefore, not multicentre in design. Hence, it may not be representative of the general population. Also, the study did not exclude the possibility of concomitant deficiency of other elements, such as calcium, which can cause a similar symptomatology to hypomagnesaemia. The strength of the study is that it helps to fill the gap that exists in other local studies, as this is a comparative study of two equal-sized groups assessing and comparing pregnancy outcomes.

Conclusion

Low levels of maternal serum magnesium may be associated with adverse pregnancy outcomes, including preterm labour, pre-eclampsia and postpartum uterine cramps.

This hospital-based study will require replication across different centres and regions of the country to provide more representative data on the adverse outcomes that may be associated with low serum magnesium levels in pregnancy. Interventional studies are also required to prove the efficacy or otherwise of dietary counselling or magnesium supplementation in pregnancy involving these high-risk groups.

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Authors' Contributions: AMG conceived the study while SHA designed the study. AMG and AAE did the literature review while AMG, BTY and OLO curated the data, analysed and interpreted it. BTY and AAE drafted the manuscript while DJK, RHO, OLO and BS revised the draft critically for sound intellectual content. All the authors approved the final version of the manuscript.

Conflicts of Interest: None.

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