Research Article

Hypertension in Pregnancy among Rural Women in Katsina State, Nigeria

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ABSTRACT

Hypertension in pregnancy (HIP) is defined as a systolic blood pressure ≥140 or diastolic blood pressure ≥90 mmHg or both. It could be described as chronic, gestational, preeclampsia or eclampsia depending on the gestational period, tendency for postpartum resolution, presence of proteinuria or convulsion. Hypertension in pregnancy affects about 5-22% of pregnancies especially in developing countries. Though preeclampsia and eclampsia seems to create more concern than others, evidence abound that any form of hypertension in pregnancy places women at increased risk of adverse outcomes.

Keywords: Hypertension, Pregnancy, Women, Eclampsia, Nigeria

INTRODUCTION

Hypertension in pregnancy (HIP) is defined as a systolic blood pressure ≥140 or diastolic blood pressure ≥ 90 mmHg or both [1,2]. It could be described as chronic, gestational, preeclampsia or eclampsia depending on the gestational period, tendency for postpartum resolution, presence of proteinuria or convulsion [1,3-5]. Hypertension in pregnancy affects about 5-22% of pregnancies especially in developing countries [2,6-9]. It is the most common medical problem of unknown aetiology during pregnancy and associated with adverse risk across the globe especially in developing countries [5,8,10-14]. Though preeclampsia and eclampsia seems to create more concern than others, evidence abound that any form of hypertension in pregnancy places women at increased risk of adverse outcomes [15,16].

A few studies have examined prevalence of hypertension in pregnancy in Nigeria. Most of these studies to the best of our search were in southern Nigeria [7,12,17-19]. However, studies have shown that northern Nigeria has the worst statistics of maternal death in Nigeria and probably in the world [5,20,21]. Hypertension related disorder was reported as a leading cause of this mortality in northern Nigeria. It is therefore necessary to uncover factors associated with the condition in the region in order to design appropriate intervention. It is against this backdrop that this study was undertaken to determine the prevalence of Hypertension in pregnancy and its associated factors among women in Functua Local Government area of Katsina state, with the aim of providing preliminary information for intervention as well as for a more detailed future investigation.

SUBJECTS AND METHODS

The study was conducted in Functua General Hospital located in functua Local Government Area of Kaduna state. The hospital was the only referral centre serving other health facilities in the local Government Area, and therefore attract people from different part of the local Government. The study involved 159 mothers (based on sample size computation) attending antenatal care clinic, whose gestation period has exceeded 20 weeks. This was to ensure that the gestational periods were ripe enough to detect both chronic and gestational hypertension. The cross sectional study used simple random sampling technique to select the subjects. Data were collected using self-administered questionnaire, blood pressure and anthropometric measurement.

The questionnaires were developed based on works published in reputable journals; it was designed to collect data on socio-demographic, medical history and risk exposures. Risk factor prevalence was measured based on the pooled percentage of affirmative option (Yes) ticked by the subjects.

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Anthropometric variables such as height and weight were measured using standard meter rule and weighing scale respectively, while Body Mass Index was calculated by dividing weight (kg) by square of the height (M^2) as appropriate. Blood pressure was measured using sphygmomanometer. Measurement was established based on two consecutive readings with subjects in sitting position. Weight and heights were all measured with subjects in standing positions. Cut-off for Body mass index (BMI) was modified based on recommendations in view of weight gain during pregnancy [22].

Estimate of prevalence of hypertension during pregnancy before and after mid gestation (20 weeks) was based on the subjects' awareness of the time of the first diagnosis of the condition. Those that presented with the condition, and knew about its existence before mid-gestation were described as having the condition before mid-gestation, while those presenting with the condition, who knew about it as from the 20th week of gestation, or following this study were described as having it after mid gestation.

All data collection procedures were carried out by trained community health workers. The informed consent of the hospital administrators were obtained in writing while those of other health workers and the respondents were obtained orally. Completed Questionnaires were collected at the spot by the researchers.

Bivariate associations were determined using Chi square test of independence, while logistic regression model was used to identify significant predictors after multiple imputations for a few missing values. Level of significance taken at 0.05.

RESULTS

The socio demographic data according to Table 1 indicates that women aged 15-24yrs old were dominant in number 82 (51.7%), followed by those aged 25-34yrs 49 (30.9%), then women aged 35-50, 28 (17.6%). Housewives with 75 (47.2%) have the highest representation followed by artisans 27 (17%). About 42 (26.4%) have tertiary education, followed by 36 (22%) that has Arabic education, while 27 (17.0) have primary education. Most of them 129 (81.1%) have Islamic background; while about 138 (87.4) were married. The dominant tribe was Hausa108 (67.9%), followed by Fulani, 17 (10.7).

Variables	Frequency (%)
Age	**F (%)**
15-24	82 (51.7%)
25-34	49 (30.9%)
35-50	28 (17.6%)
Total	159 (100)
Mean	27.18 years
Occupation	**F (%)**
Civil servant	17 (10.7)
Trader/business	22 (13.8)
Artisan	27 (17)
House wife	75 (47.2)
Student	16 (10.1)
Professional	2 (1.3)
Total	159
Level	**Frequency**
<Primary school	19 (11.9)
Primary	27 (17.0)
Secondary	34 (21.4)
Tertiary	42 (26.4)
Arabic	36 (22.6)
NR	1 (10.6)
Total	159
Religious back ground	**Frequency**
Islam	129 (81.1%)
Christianity	17 (10.7%)
Others	13 (8.2)
Total	159
Marital status	**Frequency**
Single	6 (3.8)
Married	138 (87.4)
Divorced	5 (3.1)
NR	9 (5.7)
Total	159
Tribe	**F (%)**
Hausa	108 (67.9)
Fulani	17 (10.7)
Yoruba	13 (8.2)
Igbo	5 (3.1)
NR	1 (0.63)
Total	159 (100)

Table 1: Socio-demographic characteristics.

Table 2 shows that greater number 47 (29.6%) were mildly overweight, about 44 (27.7%) have normal weight, about 35 (22%) were moderately overweight while about 26 (16.45%) were seriously overweight. Underweight was recorded only in 6 (3.8%) of the population.

BMI (Kg/m^2)	F	(%)	Interpretation
< 19.8	6	-3.80%	Under weight
19.9 –25.9	44	-27.70%	Normal
26 –29.9	47	-29.60%	Mildly over weight
30 – 35	35	-22%	Moderately over weight
>35	26	-16.45%	Seriously overweight
NR	1	-0.63	
Total	159	-100%	

Table 2: Body Mass Index (Modified) [19].

Table 3 indicates a prevalence of 25.8% for hypertension in pregnancy with an estimated 10.7% thought to have occurred before mid-pregnancy (20 weeks of gestation), while about 15.1% was thought to have occurred after mid pregnancy.

Prevalence measurement	F (%)
Estimated number with BP ≥140/90 mmHg before 20 weeks	17 (10.7)
Estimated number with BP ≥140/90 mmHg after 20 weeks and above	24 (15.1)
Total number with BP ≥140/90 mmHg and above	41 (25.8)
N=159	

Table 3: Prevalence of Hypertension during pregnancy.

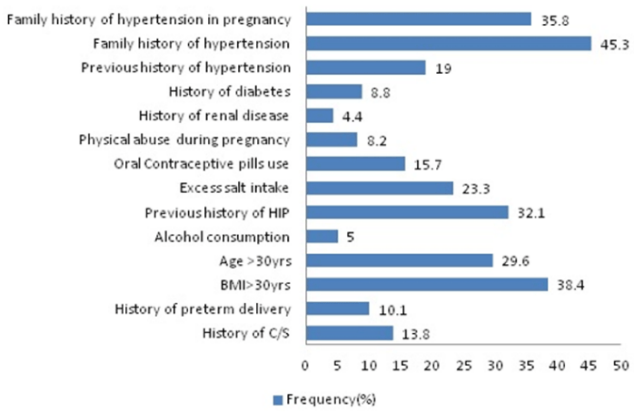

Figure 1: Prevalence of hypertension in pregnancy potential risk factors.

Figure 1 shows that the most prevalent risk factor was family history of hypertension (45.3%), and obesity (38.4%). Family history of hypertension in pregnancy (35.8%), previous history of hypertension in pregnancy was also substantial (32.1%), as well as extreme maternal age and excessive salt consumption (23.3%), previous history of hypertension (19%), oral contraceptives use (15.7%), and history of preterm delivery (10.1%). The least was history of renal diseases (4.4%).

Table 4 indicates factors whose prevalence could significantly influence the prevalence of Hypertension in Pregnancy. These were factors whose p values were less than 0.05 hence interpreted as significant; otherwise the factor was designated non-significant, implying that its prevalence did not significantly influence the prevalence of hypertension in pregnancy in univariate analysis.

Table 5 present significant risk factors based on logistics regression model. The model gives a better prediction than the model without predictors with an overall performance of 79.7%. Specifically it predicted correctly 43.9% of positive cases compared to 0% in the intercept model. This was further confirmed by the significance result of omnibus tests of model coefficient. Both the non-significance results of SNagelkerke R2 and Hosmer and Lemeshow suggest that model approximately fits the data. Stepwise logistics model results shows that previous history HIP (0.001) and age (0.038) were the only significant predictors.

Variable 1	Variable 2	X2	Df	P value	Interpretation
HIP	BMI	12.007	4	0.02	Significant
HIP	Family history of PIH	13.762	1	0.001	Significant
HIP	Previous history of PIH	19.99	2	0.001	Significant
HIP	Family history of hypertension	2.513	1	0.113	Not significant
HIP	Age	12.185	2	0.002	significant
HIP	No of pregnancies	13.156	3	0.004	significant
HIP	Socioeconomic status	7.185		0.028	significant
HIP	History of induced delivery	4.025	1	0.044	significant
HIP	History of still birth	6.981	1	0.008	significant
HIP	History of Diabetes	7.56	1	0.006	significant
HIP	History of renal disease	0.02	1	0.89	Not significant
HIP	History of C/S	0.405	1	0.5	Not significant
HIP	Excess salt intake	1.5	1	0.2	Not significant
HIP	Oral contraceptive use	8.235	1	0.004	Significant
HIP	History of preterm delivery	1.158	1	0.282	Not significant
HIP	History of hypertension	4.191	1	0.041	Significant

Table 4: Significant factors affecting the prevalence of hypertension in pregnancy.

Models	B	S.E	Wald	df	Sig	Exp (B)	95%CI	Predictive power
Intercept only model	1.005	0.183	30.31	1	0	2.732		73.2 (0%, 100%)
Logistic model								79.7 (43.9%, 92.9%)
Step 1: Previous HIP	-1.504	0.409	13.522	1	0	0.222	0.100-0.495	
Step 2: Age	-0.053	0.025	4.316	1	0.038	0.949	0.903-0.997	2

Table 5: Significant risk factors on a logistics regression model.

DISCUSSION

The socio demographic data on Table 1 indicates that most of the respondents were young. Housewives with 75 (47.2%) had the highest representation followed by artisans 27 (17%). This suggests that many of the respondents were less involved in structured or regimented occupations.

Data on level of education suggest a discrepancy between occupational status and level of education. Civil servants and professionals who may be expected to have higher education comprised only about 12%, of the 26% that had tertiary education. However about 10.1% indicated that they were students probably in higher institutions. Most of respondents 129 (81.1%) had Islamic background; while about 138 (87.4%) were married. The dominant tribes were Hausas 108 (67.9%) and Fulanis, 17 (10.7%). The higher percentage of housewives may be attributed to the influence of culture and religion which in some places encourage married women to stay at home.

Overweight among respondents is indicative of their less involvement in energy-demanding jobs. A prevalence of 25.8% for HIP seemed to be comparatively higher than the figures reported in several literatures [2,6-9]. This could be attributed to differences in sociodemographic factors or probably measurement bias. However, the figure was lower than 32.7% reported in Owerri, Southern Eastern Nigeria in 2012 among 153 women studied but higher than 17.1% reported at Usmanu Danfodiyo University Teaching Hospital, Sokoto, North West of Nigeria [23]. This seemed to underscore the need for more studies to confirm the exact prevalence of Hypertension in pregnancy in Nigeria. Recent Nigerian based studies such as that by Koofree et al. [18] have reported specific prevalence of 1.2% for preeclampsia, however that was not specifically measured in the present study. The estimated 10.7% which occurred before mid-pregnancy (20 weeks of gestation) was thought to be as a result of chronic hypertension in pregnancy, while about 15.1% estimated to had occurred after mid pregnancy was thought to be due to gestational hypertension and probably preeclampsia [1,3-5]. One limitation of this classification could be related to information and recall bias as it relied on the ability of the women to recall accurately the first time they were diagnosed of the condition. It also assumed that those who had not developed the condition during the study period were most likely not going to have it. However, the findings provide a strong basis for further investigation. The difference between the prevalence before and after mid gestation tended to reflect the consistent thought in literature that gestational hypertension represents a higher percentage of hypertension experience during pregnancy [6,7,24]. The most prevalent risk factor according to Figure 1 was family history of hypertension (45.3%). Hypertension during pregnancy had been reported to be affected by family history of hypertension especially in the father and siblings [2]. The high prevalence of family history of hypertension here therefore might lead to suspicion of a possible increased risk of HIP among the subjects. However, no significant association was recorded between the two (P=0.11). More so, the role of family history of HIP as a risk factor to HIP had been severally reported [7,25,26]. This might suggest a genetic basis for the condition. This possibility for a hereditary basis for the condition was even reported as an opinion held by community members in a qualitative study conducted in Ogun State, South western Nigeria [19]. The prevalence of family history of HIP in this study seems also to be comparatively high, and significantly associated with prevalence of HIP in bivariate analysis (P=0.001). A tendency for the condition to repeat in subsequent pregnancies also seemed to have been suggested. Significant association between HIP prevalence and that of its previous occurrence was established in bivariate analysis (P=0.001) and confirmed in a logistics regression model (P=0.001). While about 49% of women with previous history of HIP had the condition it was only 17% of women without previous history of HIP that had the condition. Previous history of HIP was identified as the only significant risk factor to the condition in Netherlands [27], while about 10.5 fold increased risk among multiparous women was established in Zimbabwe [28]. The lower odd ratio in our result therefore might not be interpreted as protective as it might suggest an effect of possible unexplained protective confounders related to previous history of HIP. This suggests a need for a more robust study to determine the exact magnitude of risk associated with previous history of HIP in this specific population. The role of personal history of hypertension in pregnancy as a risk factor has also been highlighted in other previous

studies [2,7,11,29]. Previous history of hypertension prevalence was 19% and it seemed to be significantly affect prevalence of hypertension during pregnancy in bivariate analysis (P=0.04). Preeclampsia has been reported to occur in about 20-25% of women with a history of chronic hypertension [7,25]. There seem not to be a direct relationship between salt consumption and hypertension during pregnancy except probably in relation to its association with chronic hypertension in the general population [26]. It may probably be in this light that moderate salt consumption was perceived by some community members as appropriate method for preventing hypertension in pregnancy in a qualitative study by Akeju et al. [19]. The association between the two in this study was not significant (p=0.2). On the other hand, oral contraceptive use in between pregnancy, with a prevalence of 15.7% seemed to significantly affect the prevalence of HIP (P=0.004). The few available studies on the nature of relationship between oral contraceptive use and hypertension during pregnancy seemed to be conflicting. While Thadhani and colleagues thought that recent use could be protective to gestational hypertension but increases the risk of preeclampsia [30], Eduard Gratacosetal felt that it does not reduce the risk of pregnancy induced hypertension [31]. In this study however, 50% of users had hypertension in pregnancy compared to 21.6% non-users. There is need for further investigations on the role of oral contraceptive use among this population because significant association was seen in a multivariate analysis stratified by age but absent on a continuous scale.

Furthermore, the study seemed to suggest increasing prevalence of hypertension during pregnancy with age, 15.7%, among those aged 15-24 yrs, 26%, among those aged 25-34 yrs, and 47.2% among those aged 35-50 yrs. Association between the condition and age was significant in both bivariate (P=0.002) and multivariate analysis (P=0.038). Several studies and literature [2,6,11,12,32] have cited extreme ages (Usually <18 and >30 or 35 yrs) as a risk factor to hypertension during pregnancy. According to studies, Preeclampsia seems to predominate at a younger age, while chronic hypertension tends to predominate among older mothers [2, 11,17,33,34]. However, the specific prevalence of each category of these disorders was not measured. Further study with a larger sample size may be needed to determine more accurately the level of risk age poses in this population.

Suggestion of a possible relationship between prevalence of hypertension during pregnancy and that of body mass index was observed in a bivariate analysis (P=0.02). Prevalence of obesity (38.45%) was lower than 47.1% recorded in a similar study in Owerri, Nigeria in 2010. This possibly might has contributed to the higher prevalence of HIP (32.7%) recorded in that study. The possible role of BMI as a risk factor has been echoed in several literatures [12,32,35,36]. Increasing obesity and maternal age had been cited as part of the key reasons for increasing prevalence of hypertension during pregnancy around the world [36,37]. More so people's socioeconomic status seems to be a risk factor for the condition (P=0.028). However similar findings seemed to be scanty in literature to the best of our review, but it is obvious that socioeconomic factor could be related to other potential risk factors such as BMI,oral contraceptive use, age, number of pregnancy etc. The risk seemed to be higher among those with high socioeconomic status (39.62%) and those with low socioeconomic status (20%) compared to people with average socioeconomic status (19.4%). Furthermore Number of pregnancy (parity) according to this study seemed to be significantly associated with prevalence of hypertension in pregnancy in bivariate analysis (P=0.001). This may possibly be related to increasing risk in subsequent pregnancies among those with previous history of the condition [29]. Prevalence of 17.07% was recorded among those with 1-2 pregnancies, 24.39% among those with 3-4 pregnancies, while 58% was among those that had heard more than 4 pregnancies. According related studies by Hogan et al., obese multigravidas were more likely to develop hypertensive disorders in Pregnancies [38]. Significant effect of parity on blood pressure was also noted by Ayala and Hermida [39]. However while those studies compared nulliparous and multiparous women, this study considered parous women only.

Moreover, Though low birth weight and preterm delivery had been cited as a possible adverse outcomes of hypertension during pregnancy [40,41], significant association were not recorded in this study (P=0.2 and 0.4 respectively). On the contrary, significant associations were recorded in bivariate analysis for history of induced delivery (P=0.044) and history of still birth (P=0.008). Though the prevalence of the above two outcomes has been evaluated in a previous study [6], the authors of that study did not seek to establish the presence of an association between these outcomes and hypertension during pregnancy

The limitations of this study lies in its inability to measure protein in urine and its relatively small sample size. It could not also adequately assess occurrence within age brackets as well as with subsequent pregnancies. It however provides a good starting point for further investigation of the matter within the target population.

CONCLUSION

The study recorded a high prevalence of hypertension during pregnancy which tends to occur more after mid pregnancy among the subjects. The associated risk factors seem to be dominantly non-modifying in nature with previous history and age being most prominent. However there is evidence that certain modifying risk

factors such as oral contraceptive use might be implicated. There is need for further investigation.

RECOMMENDATIONS

It is hereby recommended that a similar prospective study using a larger sample be carried out within the study location or other parts of Northern Nigeria and should include as its aim test for proteinuria.

SUMMARY

The study was undertaken to determine the prevalence of hypertension in pregnancy and its associated risk factors among rural Nigerian women. Results suggest that the prevalence of hypertension among rural dwellers in Nigeria is high and occurring predominantly after mid gestational period. Substantial number has family history of hypertension in pregnancy. The leading risk factors tended to be non-modifiable in nature with previous history of PIH and age being most implicated. However there is evidence that certain modifiable risk factors such oral contraceptive use may be implicated. There is need for a more robust investigation to clarify the findings of this study.

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