Determinants of Preeclampsia among Pregnant Women at Gestational Age of Above 20 Weeks Attending Antenatal Care at FPRRH.

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ABSTRACT

Despite several interventions put in place in many countries of the world, preeclampsia still contributes greatly to maternal morbidity and mortality. Several factors have been cited to increase the risk of preeclampsia among which are obesity, extreme age, Nulliparity, change in pregnancy paternity, and obesity among others. Lack of knowledge or awareness concerning preeclampsia has also been cited as contributing adversely in terms of the overall outcome. A study on preeclampsia and the various sociodemographic, modifiable variables would come in handy in informing interventional measures. This study aims to achieve just that. Assessing the determinants of preeclampsia among pregnant women at a gestational age of 20 weeks and above attending ANC at FPRRH. A descriptive checklist- and questionnaire-based cross-sectional study design was used which also involved a review of 214 patient records was employed. Maternal age, Nulliparity, rural residence, obesity and lack of awareness concerning preeclampsia were significantly associated with preeclampsia, among women diagnosed with preeclampsia at FPRRH, age (less than 18 or above 35 years), Nulliparity, change in the male partner (paternity change) among the multiparas, low socioeconomic status with mostly rural residence, and obesity was found to be statistically significant in predicting pre-eclampsia. It was also noted that awareness concerning preeclampsia was so low demanding interventional measures to correct it since adequate knowledge and awareness positively impact prognosis and general outcome.

Keywords: Preeclampsia, Nulliparity, Pregnant women, FPRRH, Maternal age.

INTRODUCTION

Preeclampsia is a sustained blood pressure elevation of ≥ 140/90mmHg in pregnancy after 20 weeks of gestation in the absence of preexisting hypertension and sometimes with proteinuria on dipstick 1-2+ or≥300mg on a 24hr urine output [1-5]. It is a multi-system, progressive disorder characterized by new onset of hypertension and proteinuria or hypertension and end-organ dysfunction with or without proteinuria in the last half of pregnancy progressing from mild to severe and may be gradual or rapid [4- 9]. A number of theories have been put up to try to explain this for example; the failure of the trophoblast to completely invade and thereby destroy the spiral arteries by 20-24 weeks of pregnancy [7-12]. The abnormally implanted placenta is believed to result in poor uterine and placental perfusion, which results in a state of hypoxia and increased oxidative stress and the release of anti-angiogenic proteins into the maternal plasma along with inflammatory mediators [13-15].Various noxious placental factors released by ischemic changes and toxic radicals generated by oxidative stress cause activation and dysfunction of vascular endothelium. Intact endothelium decreases the responsiveness of vascular smooth muscles to agonists by release of nitric oxide and it also has anticoagulant properties [16-20]. Damage or activated endothelium secretes substances that promote coagulation and increased sensitivity to vasopressors. Increased circulating fibronectin, factor VIII antigen

and thrombomodulin, all markers of endothelial dysfunction are reported in pregnancy-induced hypertension/preeclampsia [21-30]. A key focus of routine prenatal care is monitoring pregnancies for signs and symptoms of preeclampsia. If the diagnosis is made, the definitive treatment is delivery to prevent the development of maternal or fetal complications from disease progression: Delivery results in the resolution of the disease. Timing of delivery is based upon a combination of factors, including disease severity, maternal and fetal condition, and gestational age [31-38]. Pregnancy is a normal physiological process that is supposed to be an enjoyable time for mothers and their families. Despite of this, pregnancy can be associated with risk for both her and the baby, and even death. According to the World Health Organization (WHO), about 514,000 women die every year of pregnancy related causes, 99% of these deaths occur in developing countries [39-35]. Death of a mother is a catastrophe indeed. More than 80% of maternal deaths worldwide are due to five direct causes: hemorrhage, sepsis,

unsafe abortion, and pulmonary embolism and hypertensive diseases of pregnancy [36-42]. Most of these deaths are seen in developing countries, including Africa [43-44]. Delays in seeking health care in African societies contribute to the high burden of maternal mortality [43-47]. Delayed responses at the household level to obstetric emergencies often arise as a result of inadequate information on when to seek help and sometimes on where to seek help [47-50]. The World Health Organization estimates that 14 % of all maternal deaths result from the hypertensive disorders of pregnancy (HDP) especially preeclampsia; it is also associated with a high risk of newborn death [19-24]]. Values are much higher in developing countries especially Africa. For instance, In Mulago hospital, Uganda, in 2011, preeclampsia contributed to 17.6% Maternal morbidity and 21.4% maternal Mortality [22-35]. Given the high levels of pregnancy induced hypertension (PIH) in Uganda, the researcher proposed to conduct a study on the determinants of preeclampsia among pregnant women attending ANC at FPRRH.

Statement of Problem

Pre-eclampsia accounts for more than 50000 maternal deaths worldwide each year most of which are seen in developing countries [15].Most of these deaths are mainly associated with late presentation of mothers at the health facilities [15].This has resulted in a high maternal morbidity and mortality in the country which is rated at 454 per 100,000 live births [23]. Lack of information on danger signs during pregnancy is one of the factors that contribute to delay in seeking care and hence sluggish decrease in maternal mortality [15]. Preeclampsia remains one of the major contributors to maternal morbidity and mortality in Uganda [24, 25].The Ugandan Ministry of Health has put up a number of interventions aimed at minimizing preeclampsia and its associated complications which include; public sensitization, establishment of treatment guidelines and supply of treatment and equipment, training and

recruitment of medical staff into health facilities [26, 27].

In FPRRH, most pre-eclampsia cases are referrals from lower level health facilities, where they had been attending ANC and the different contributing variables are largely unassessed. Preeclampsia associated complications could be due to sociodemographic factors, obesity or individual's lack of knowledge on the condition or due to other unidentified risk factors! The study was therefore aimed at establishing the level of individual knowledge on preeclampsia among pregnant mothers attending antenatal care at FPRRH, assess obesity (BMI of 30 & above) as a factor influencing the prevalence of preeclampsia and to identify the socio-demographic factors associated with the prevalence of preeclampsia all aimed at reduction of maternal morbidity and mortality and as well fetal complications.

Aim of the Study

Assessing the determinants of preeclampsia among pregnant women at gestational age of 20weeks and above attending ANC at FPRRH.

Specific Objectives of the Study

- To assess the sociodemographic factors associated with preeclampsia among pregnant women at gestational age of 20 weeks and above attending ANC at FPRRH.
- To assess the individual knowledge of preeclampsia among pregnant women at gestational age of 20 weeks and above attending ANC at FPRRH.
- To correlate obesity (BMI of 30 & above) with preeclampsia among pregnant women at gestational age of 20 weeks and above attending ANC at FPRRH.

Research Questions

- What are the sociodemographic factors influencing preeclampsia among pregnant women at gestational age of 20 weeks and above attending ANC at FPRRH?
- What is the individual knowledge affecting the prevalence of preeclampsia among pregnant women at gestational age of 20 weeks and above attending ANC at FPRRH?
- What is the association of obesity (BMI of 30 & above) and preeclampsia among pregnant women at gestational age of 20 weeks and above attending ANC at FPRRH?

Justification of the Study

This research is important because it is clear that maternal morbidity and mortality associated with preeclampsia among pregnant women remain high despite the interventions put in place. Obesity as single factor plus other sociodemographic factors have been associated with preeclampsia. The study therefore, seeks to find out whether the level of individual knowledge about Preeclampsia, obesity and sociodemographic factors are contributory factors to the preeclampsia burden in FPRRH in particular such that appropriate interventions can be put in place such as education on risk factors and how to control them in order to minimize the development of complications. It would also aid the hospital to recognize other risk factors to the disease and thus identify the necessary interventions needed in terms of prevention, diagnostics and management facilities in future. The findings of this research will also form a benchmark for further research once we have been able to establish the weight of the problem and contribute to the general knowledge pool for those who would want to explore more about the problem [28].

METHODOLOGY

Area of Study

Fort Portal Regional Referral Hospital from which the research was done is located in Western part of Uganda. The coordinates of the town are 0°39'16.0"N, 30°16'28.0"E (Latitude:0.654444; Longitude:30.274444). The town is situated at an average elevation of 1,523 metres (4,997 ft) above sea level, the hospital serves the entire Ruwenzori region consisting of seven Ugandan districts (Bundibugyo, Kabarole, Kyenjojo, Kasese, Kamwenge, Kyegegwa and Ntoroko) and part of eastern Democratic Republic of Congo. The hospital houses the Department of Surgery, Medicine, Obstetrics and Gynecology, Pediatric, Psychiatry, Ophthalmology, HAART clinic, OPD and casualty. In 2002, the district, as configured after August 2014, the national population census put the population at

54,275. The population growth rate in the district was estimated at 5.2%. It is estimated that the population of the district in 2017 was approximately of about 300,937 people of which 150,837 are males and 149,100 are females. On a monthly basis, about 1,000 women register for antenatal care and about 100 women attend the immunization clinic. The Obstetrics and Gynecology Department has its clinic days from Monday through Friday every week from 9 am. Anecdotal evidence shows an average daily attendance by pregnant women at this clinic is more than 50 patients per day.

Study Design

A cross sectional study design approach was used to obtain the data needed for this study. And a systematic random sampling technique was applied in selecting 200 consenting respondents using the Kish& Leslie formula from the antenatal clinic of the hospital. Deductions will be made on pregnant mothers attending antenatal clinic at FPRRH during the study period.

Study Population

The study population was all pregnant mothers with gestational age more than 20weeks attending ANC at FPRRH at the time of the study.

Inclusion Criteria

All pregnant women diagnosed with preeclampsia at 20 weeks and above within the study period and who offered consent to take part in the study were included in the study.

Exclusion criteria

All pregnant women diagnosed with preeclampsia before the stated gestation age, or those who had been diagnosed at the gestation age under study but refused or could not offer consent were exempted from the study.

Sample Size Determination

Using the Kish Leslie formula, the sample size was estimated to be 200 women. Where
P =26%
Z= 1.96
D= 5%

Kish Leslie formula = Z^2pq/d^2
$(1.96^2 \times 0.26 \times 0.5)/0.05^2 = 200$
Hence the estimated sample size that was used for the study was 200 women also reviewing files and medical records during the time frame of study.

Sampling Technique

Purposive sampling technique was used whereby among the pregnant women, the researcher recruited those with a gestational age of 20 weeks and above by use of self-reported last normal menstrual period (LNMP) or ultrasound scan. From this sample, all who consented were recruited to take part in the study.

Data Collection Method

Data was collected by face to face interview technique using a researcher-administered questionnaire with both closed- and open-ended questions, structured and also by reviewing medical records.

Data Collection Procedure

The procedure was carried out on pregnant women who had consented and were included in the inclusion criteria. The questionnaire was prepared in English. Four midwives and one supervisor were involved in the data collection process. Medical records were also reviewed for some clinical and laboratory results including proteinuria. Data collectors and supervisor underwent two days training on interviewing technique, the objective of the study, and the different sections of the questionnaire, the participants were allowed to take a rest for ten minutes before the blood pressure was measured. Blood pressure readings were taken while the woman was seated in the upright position using a mercury sphygmomanometer apparatus which covered two-thirds of the upper arm. The measurement was taken from participant's right hand. The cuff was inflated at a rate of 2–3 mmHg per second. Systolic blood pressure (SBP) was taken up on hearing the

first sound, and diastolic blood pressure (DBP) was taken up on 4th (muffled) Korotk off sound. Those pregnant women with abnormal findings were checked again and again and then underwent another BP measurement after 4–6 hours in order to confirm the diagnosis. For the sake of ensuring whether the BP apparatus was functioning correctly, the data collector checked it by measuring the blood pressure of other data collectors. However, when a pregnant woman was found to have severe preeclampsia (BP of 160/110 mmHg), she was sent for immediate re-checkup and medical advice. Data regarding proteinuria and other clinical data was accessed from the women's medical records. Proteinuria was assessed using urine dipstick method and urinalysis which was part of the routine investigation for all pregnant women.

Quality Control

Data collectors and supervisor were given training on how to approach the participants and perform measurements. The performance of the instruments was checked and measurement tools monitoring done. Pretest of the questionnaires was carried out to check if the questions were well understood. Participants were asked to remove tight outer-wearing and shoes. Blood pressure measurement was taken by one nurse so as to avoid the inter-observer bias. The supervisor and the principal investigator checked the checklist and questionnaire on daily basis for inconsistencies and omissions.

Data Analysis

The filled checklist was checked for completeness, cleaned manually and entered in to EPI INFO version 3.5.3 statistical software and then transferred to SPSS version 24 statistical package for further analyses. Descriptive statistics was used to explore the data in relation to relevant variables. Binary logistic regression was used to assess the association between the dependent variable and independent variables. Then variables with P-value less than or equal to 0.2 were fitted to multiple logistic regression. Finally, variables with P- value less than 0.05 were considered as factors associated with preeclampsia.

Ethical Considerations

Study was conducted upon approval by the supervisor and IREC plus the administration at FPRRH. This was preceded by obtaining a letter of introduction from the office of the Dean faculty of Clinical Medicine and Dentistry which was then presented to the Hospital management upon arrival at the facility, the researcher then sought permission from the department management to be allowed to proceed with the research before embarking on data collection.

RESULTS
Sociodemographic Characteristics of Respondents
Respondents' age, residence, marital status, education and occupation (N=214)

Age (Yrs.)	Frequency (N)	Percentage (%)
Less than 18	84	39.25
18 – 25	22	10.28
26 – 33	16	7.48
34 and above	92	42.99
Residence		
Rural	200	93.46
Urban	14	6.54
Marital Status		
Single	63	29.44
Married	126	58.88
Divorced / Separated	25	11.68
Education		
None	10	4.67
Primary	132	61.68
Secondary	46	21.5
Tertiary	24	11.22
Occupation		
Formally Employed	51	23.83
Business	22	10.28
Peasant / Housewives	141	65.89
Totals	**214**	**100**

Table 1: Respondents' ages, residence, marital status, education level and occupation (N=214)

Majority of the preeclampsia diagnoses were made among women below 18 years (39.25%) and those aged 34 years and above (42.99%) who resided in rural setups (93.46%), were married (58.88%), with mostly primary level of education (61.68%) and who were peasants or housewives (65.89%). This is shown in table 1 above.

Family history of preeclampsia, parity and change of male partner in current pregnancy

Assessment of family history of preeclampsia (in mother or sister) was marred with shortfalls. Most either did not know of any history or recalled of problematic pregnancies in the sister(s) but were not sure if they were similar problems. Of the 214 study participants, 61 (28.51%) were nulliparous while 153 (71.49%) were multiparous. Of the multiparous, 71 (46.41%) had a history of multiple sexual partners or change of male partner just about the time and events surrounding the current pregnancy. This is shown in figures 2 and 3 respectively.
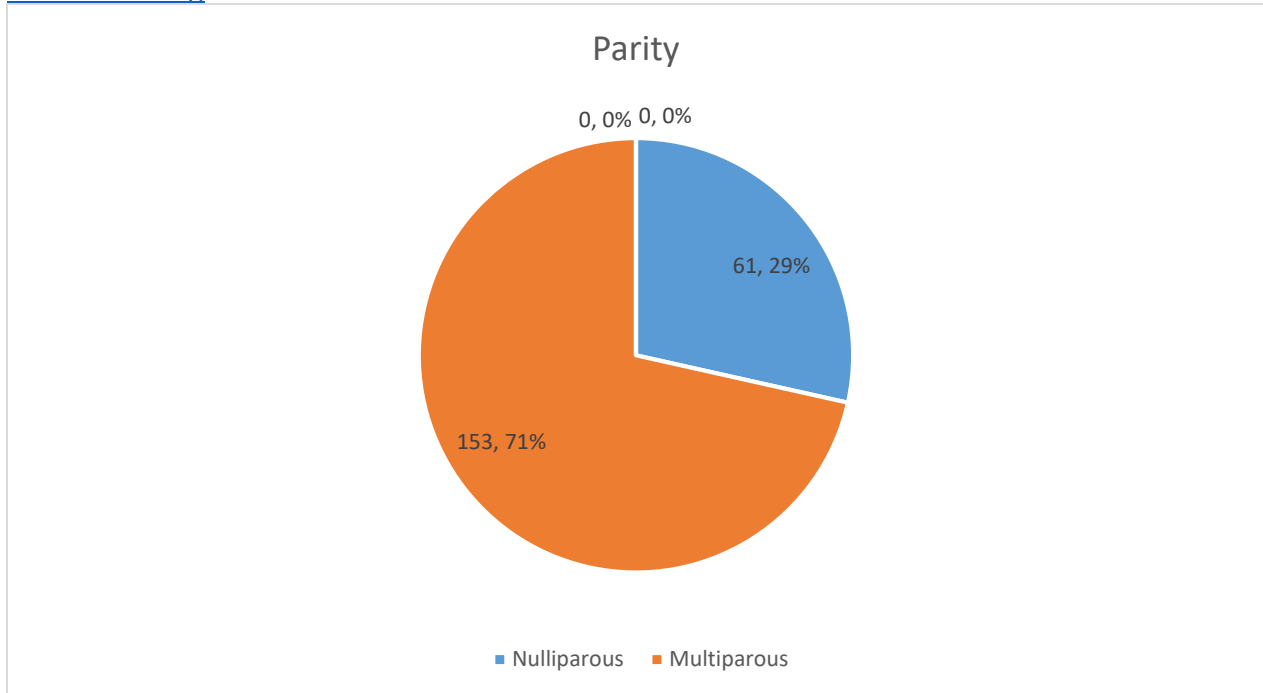
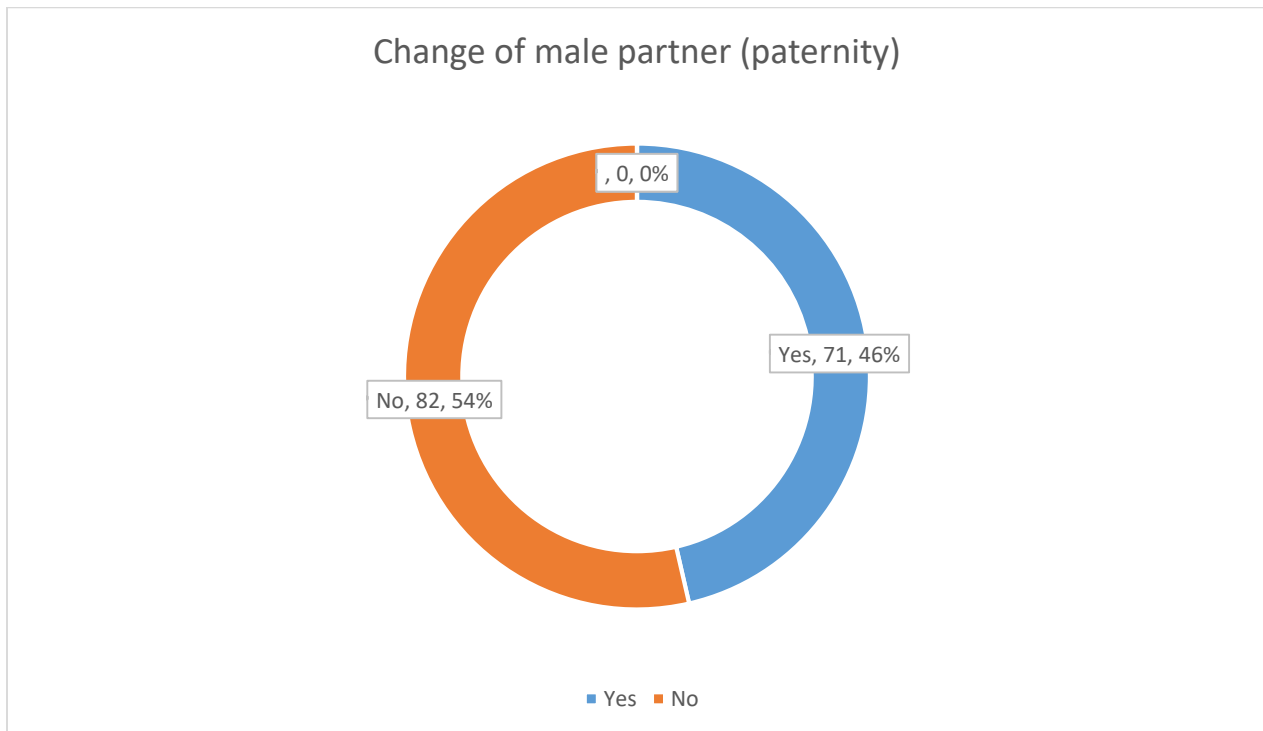**Figure 1: Parity of Respondents (N=214)**

**Figure 2: Male partner (paternity) change among the multiparous women (N=153)
Knowledge / Awareness Concerning Preeclampsia (N=214)**

The respondents' knowledge / level of awareness pertaining preeclampsia was very low. Only 48 (22.43%) of the total 214 had heard about preeclampsia and its adverse impact on pregnancy outcome. These were adequately aware of the dangers posed to both the mother and unborn child when a diagnosis of

preeclampsia is made. The remaining 77.57% new nothing concerning preeclampsia.

Obesity (BMI of 30 & Above) As an Associated Factor in Preeclampsia (N=214)

Obesity was assessed based on mothers' recall on pre-pregnancy weights, mother's own opinion of having had a problem with controlling her body weight plus actual measurements of weight (in Kilograms) and height (in meters) so as to facilitate BMI calculation. From the methods mentioned above, but with considerable provision for error, high BMIs or problems with weight were reported in 82 (38.32%) of the preeclamptic mothers. This was found as statistically significant despite the afore-mentioned limitations.

DISCUSSION

Sociodemographic Factors Associated with Preeclampsia

As earlier shown, the majority of the preeclampsia diagnoses were made among women below 18 years (39.25%) and those aged 34 years and above (42.99%) who resided in rural setups (93.46%), were married (58.88%), with mostly primary level of education (61.68%) and who were peasants or housewives (65.89%). Nulliparity and partner change among the multiparous women were found to be significantly associated with preeclampsia in the study population. The factors that stood out were extremes of age [29], older maternal age [30], low socioeconomic status (reflected by mostly rural residence, low education and occupation standing with most being peasants or housewives). This rural setup could also imply the use of biofuels such as charcoal and firewood for cooking, exposure to which has been documented to increase the risk of preeclampsia among pregnant women [31]. Even the few that resided in urban setups were not spared either since outdoor pollution by car fumes have also been associated with preeclampsia [32].

Awareness / Knowledge Concerning Preeclampsia

The knowledge base of the respondents concerning preeclampsia leaves a lot to be desired, to say the least. A paltry 22.43% of the respondents had some knowledge about preeclampsia. While the remaining did not even know what it was. This could have a number of implications; either the mothers' ANC attendance history is poor, little or no preeclampsia awareness is created to the pregnant mothers during their ANC visits. In either case, the diagnostic and prognostic repercussions are dire due to non- or late-diagnosis with consequent non- or delayed- interventions. Undiagnosed or preeclampsia caught late increases the chances of it complicating into severe forms such as eclampsia and HELLP syndrome which have a worse prognosis compared to preeclampsia [33]. The respondents did not have a name for preeclampsia in their local language since it was unknown to them as an entity just like it was the case in Ogun State in Nigeria [34]. Most were aware that pregnancy was associated with increases in blood pressure but did not know preeclampsia as one of the causes, agreeing with [28] findings in South Africa.

Obesity (BMI > 30) and Association with Preeclampsia

Among the numerous factors for preeclampsia, an increase in obesity among women of reproductive age is expected to be one of the strongest risk factors underlying the increasing prevalence of preeclampsia. BMIs of 30 and above (obese) were found significant in 38.32% of the preeclamptic mothers. These values could have been higher if limitations borne from problems with recall of pre-pregnancy weights could be eliminated completely. This supports the findings of several other studies that have come out clearly to prove the association between obesity and preeclampsia. In their studies, [35], [36] among many others clearly highlighted the relationship. The disorder overlap seen in obese individuals, metabolic syndrome being a very pertinent example, could explain this correlation between obese individuals and preeclampsia [37].

CONCLUSION

Among women diagnosed with preeclampsia at FPRRH, age (less than 18 or above 35 years), Nulliparity, change in male partner (paternity change) among the multiparas, low socio-economic status with mostly rural residence, and obesity were found to be statistically significant in predicting pre-eclampsia. It was also noted that awareness concerning preeclampsia was so low demanding interventional measures to correct since adequate knowledge and awareness positively impact prognosis and general outcome.

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