Asian Journal of Medical Sciences 1(3): 104-107, 2009
ISSN: 2040-8773

Submitted Date: October 03, 2009 Accepted Date: October 16, 2009 Published Date: November 25, 2009

Maternal Ethnicity and Severity of Pre-Eclampsia in Northern Nigeria

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Abstract: Pre-eclampsia commonly occurs between 14-20 weeks. It accounts for 40% of maternal deaths, given the tendency toward and culture of early marriage in Northern Nigeria, the majority of those affected by this condition are teenagers. The aim of this is to determine the relationship between maternal ethnicity and severity of pre-eclampsia. Individual chart review was performed for women diagnosed with severe pre-eclampsia; demographic data, Lipid profile, BMI, and Urinalysis were documented. A total of three groups of subjects were selected for the study, with 22 Hausa in Group A – 20 Kanuri in Group B and 19 Fulani in Group C. There is significant difference in the age at marriage of respondents with group C having a mean of 18.93±0.53 the gestation ages shows no significant difference between the three groups, the systolic and diastolic BP is significantly different between the groups with Group B having systolic BP of 178.67±6.3, with the highest value of systolic in Group C 128.23±4.8, the BMI among the three groups shows no significant difference, the edema is higher in group C with 3+ . The Hausa and Kanuri pre-eclamptic women demonstrated elevated values of triglyceride, serum cholesterol; pathological edema, increase in blood pressure and higher values of urine protein but this parameters are more pronounce among the Fulani pre-eclamptic groups this shows that, the pre-eclamptic Fulani women are more likely to progress to eclampsia than the other two tribes.

Key words: Maternal ethnicity and severity of pre-eclampsia

INTRODUCTION

Pre-eclampsia is a complex pregnancy complication associated with increased blood pressure accompanied by proteinuria, edema, or both (Davey and MacGillivray, 1988). This condition seems to be linked to oxidative stress within placenta. Increased production of lipid peroxides, thromboxane and/or cytokines triggered vascular and organic dysfunction observed in pre-eclampsia (Lefèvre *et al*., 1997). Pre-eclampsia (PE) is one of the most common complications of pregnancy; it is a cause of high morbidity for both mother and fetus, especially in developing countries (Vanderjagt *et al*., 2004). Pre-eclampsia is characterized by hypertension, proteinuria, and edema. Without intervention, pre-eclampsia progresses to eclampsia, this is characterized by malignant hypertension and epileptiform convulsions requiring emergency caesarian section (Packer 2005). Pre-eclampsia most commonly occurs during the last trimester of pregnancy but it may start in the early 2nd trimester 14-20 weeks. In northern Nigeria Pre-eclampsia/eclampsia accounts for up to 40 percent of maternal deaths (Population Council, 2009), pre-eclampsia and eclampsia are problems usually associated with a woman's first pregnancy (primigravida) (Population Council, 2009). Given the tendency toward and culture of early marriage in northern Nigeria, the majority of those affected by this condition are teenagers. Other predisposing factors in the Nigerian context include poor access to antenatal care, past history of pregnancy-induced hypertension, multiple pregnancy, molar pregnancy, diabetes mellitus, and renal diseases. Social contributory factors include poverty, poor reproductive health care-seeking behavior, and cultural perception of eclampsia and lack of access to high-quality maternal services, including intrapartum care (Population Council, 2009).

The incidence of pre-eclampsia, the precursor to eclampsia, varies greatly worldwide. WHO estimates the incidence (or number of new cases) of pre-eclampsia to be seven times higher in developing countries (2.8% of live births) than in developed countries (0.4%) which is due to poor health seeking behaviours, availability of health care facilities and personnel (Dolea and AbouZahr, 2003). Reliable statistics about women dying due to eclampsia are difficult to obtain because of the poor quality of vital statistics registration systems and hospital records in many developing countries. In addition, a sizable number of deliveries take place at home, and thus there are no records at all for these births. Therefore, data on women who die from eclampsia are only available from a limited number of countries Nevertheless, it is clear that the case fatality rates for eclampsia vary greatly across countries, with the risk of death from eclampsia being much higher in developing countries than in developed ones (Aaserud *et al*., 2005).

Screening for women at risk of pre-eclampsia is an important part of antenatal care. Routine screening for pre-eclampsia is based on measurement of blood pressure

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and urinalysis for proteinuria. Once women have been identified as been at high risk, they can be targeted for more intensive antenatal surveillance and prophylactic interventions such as early delivery. Most current strategies for risk assessment are based on the obstetric and medical history and clinical examination. Pregnant women are assessed at their first antenatal clinic (prior to 12 weeks if possible) for risk factors for pre-eclampsia including age, nulliparity, long pregnancy interval, prior history of pre-eclampsia, high Body Mass Index (BMI), history of diabetes mellitus and hypertension.

Women having history of pre-eclampsia or eclampsia during their first pregnancies are at higher risk of a repeating the disease (Adelusi *et al*., 1986), although the disease generally occurs at a greater gestational age (Sheehan *et al*., 1999). Beyond family history, other maternal cardiovascular risk factors have been found to be associated with increased risk of HDP. Prepregnancy blood pressure has been shown to have a linear, positive correlation with preeclampsia (Magnussen *et al*., 2007). Severity of pre-eclampsia is associated with pathological edema, high level of Triglycerides, serum cholesterol level (Patrizia *et al*., 1999), higher systolic and diastolic BP in excess of 140/90 mm Hg after 20 weeks of gestation (Fisher and Roberts, 1999), gross proteinuria of 300-500 mg g/24 h, high BMI above 25% (Stewart *et al*., 2007) and decrease in Platelets counts (Taylor *et al.,* 1999; Roberts's *et al*., 1989).

Eclampsia is one of major causes of maternal death in North East (Borno) and North West (Kano) (SOG, 2004), 25% of all women in the reproductive age group suffer pregnancy and childbirth-related injuries (WHO, 2004), ignorance and misconception about the disease plays an imperative role in the effect of the diseases on women, like wise accurate, affordable and sufficient routine test to be use clinically to identify the disease in whom it may develop and effective intervention or approaches that help in reducing pre-eclampsia is unclear on unavailable in health centres, in Nigeria approximately 37,000 women die annually because of Pre-eclampsia/eclampsia related complication (WHO, 2004). In northern Nigeria Pre-eclampsia/Eclampsia accounts for up to 40 percent of maternal deaths, the incidence of Pre-eclampsia ranges from 10 to 50 per 1,000 deliveries in developing countries and severe cases of pre-eclampsia and eclampsia are very common in Nigeria. Regional variation exists-the incidence rate is 3-9% in the north and approximately 1-3% in the south (Population Council, 2009).

Hypothesis: The severity of pre-eclampsia differs among maternal ethnicities

The objective of this study is to determine the relationship between maternal ethnicity and severity of pre-eclampsia and to consider variation in the expression of severe pre-eclampsia among the ethnic groups.

MATERIALS AND METHODS

This study was carried out in Primary Health Centers (PHC) in Katsina, Adamawa and Borno States between February and August 2009; individual chart review was performed for women diagnosed with severe pre-eclampsia; demographic data, Lipid profile, BMI, and Urinalysis were documented. A total of three groups of subjects were selected for the study, with 22 Subjects in Group A – 20, Group B -Kanuri and 19 Group C – Fulani

Blood pressure Measurement: Blood pressure was measured in a sitting position with sphygmomanometer after at least 10 min of rest. Systolic blood pressure was recorded at the appearance of sounds, and diastolic blood pressure was recorded at disappearance of fifth-phase (Wichman *et al*., 1984).

Cuff size was usually 12x22cm and measurement was repeated after 30 min for 12 h the average of the measurement was used in the analysis (Duley, 1992).

Body Mass Index: Height was measured by Seca Anthropometer and weight by Omron® weighing scale. Body Mass Index (BMI) was calculated from the formula BMI = weight in Kg divided by square of height in meter.

For determination of serum total cholesterol, triglyceride, high and low density lipoproteins venous blood sample was obtained using 5 ml syringes after over night fasting and stored in non EDTA containers before analyzing for total cholesterol, triglycerides, HDL-C, and LDL-C using HDL and LDL/VDL Cholesterol Quantization Kit according to manufacturer's instructions.

Urinalysis: Urine collection started on the first morning after admission or ANC visit to the PHC and all samples were collected within a period of 24 h prior to the urine collection, all women were carefully instructed regarding the procedure. Between 8-9 am, the urine was collected to determine pH, Nitrites, Bilirubin, Blood, Urobilinogen, hemoglobin, Specific Gravity. In order to increase the accuracy of the test, patients were assisted by a nursing staff for urine collection. The urine was collected separate in a clearly marked containers which have the patient`s name, number on the container and kept in an ice packed box before analysis using Roche URS-345 dipstick urinalysis stripe the color change of reagent pad is then compare with the corresponding color chart on the bottle label.

Statistical analysis: Data were expressed as ±SEM, descriptive statistics was use to analyse the questionnaire, while Pearson correlation coefficient was use. One way ANOVA and Scheffe Post Hoc Test was conducted to analyse the significant difference between mean values, using Statistical Package Minitab window version 14.0 at $p<0.05$.

Table 1: Demographic and clinical characteristics of the groups

Parameters	Group A (n = 22)	Group B (n = 20)	Group C (n =19)
Age (years)	24.0±0.83	23.5±1.36	20.9±1.21*
Age at Marriage	18.64±0.50	18.93±0.53	16.92±0.67*
Primigravida	13	6	15
Multiparagravida	8	14	3
Gestation age (weeks)	22±3	21±2	20±2
Systolic BP mmHg	181.14±3.4	178.67±6.3*	189.54±4.8
Diastolic BP mmHg	120.00±1.91	118.29±2.21	128.23±4.8*
BMI	27.62±0.94	28.14±1.76	28.05±1.30
Edema	++	+	++
p<0.05			
Note: the values are means of ±SEM F value of ANOVA and Scheffe post hoc test.			

Table 2: Lipid Profiles and Urinalysis of the Respondents

Parameters	Group A (n = 2)	Group B (n = 20)	Group C (n = 19)
HDL-C	1.0132±0.49	0.999±0.64	0.998±0.68
LDL-C	3.025±0.12	3.035±0.12	2.981±0.12
TRIG	3.036±0.12	3.1387±0.19	3.1146±0.19
CHOL	5.1823±0.07	5.0367±0.98	3.1146±0.12*
PH	7.5±0.84	7.3±0.96	7.9±0.13
Specific gravity	1.0606±0.009	1.0810±0.810	1.0630±0.009
Glucose	175.95±4.52	185.33±1.77	182,62±1.54
Protein	380.52±112	280.43±126	415.21±121*
p<0.05			
Note: the values are means of ±SEM F value of ANOVA and Scheffe post hoc test.			

RESULTS

Table 1 above shows demographic and clinical data of the respondents. ANOVA shows there is significant difference in the ages and age at marriage of respondents in group C with group A and B, while Group A has SEM of age at 24.0±0.83 group C has 20.9±1.21, while age at marriage is 18.93±0.53 for group B and 16.92±0.67 for group C, the gestation ages shows no significant difference between the three groups, the systolic and diastolic BP is significantly different between the groups with Group B having systolic BP of 178.67±6.3, with the highest value of systolic in Group C 128.23±4.8, the BMI among the three groups shows no difference, the edema is higher in group C with 3+ as shown in Table 1.

The total cholesterol was statistically different between the three groups high value was observed in group A, and B, while group C has the lowest value of 3.1146±0.12. Also the value of triglyceride, high density lipoprotein among the three the groups shows no difference statistically, the value of HDL to total cholesterol shows significant difference between the three groups. In the urinalysis as shown in Table 2, the PH, specific gravity and glucose shows no significant difference statistically, the only statistical difference in the urinalysis is the protein with group C having a higher value with a mean of 415.21±121 (Table 2).

DISCUSSION

In this study we investigated the relationship between the severity of pre-eclampsia and maternal ethnicity, the study find no significance difference between the Hausa and Kanuri in terms of severity of pre-eclampsia thou they have elevated values of Cholesterol, Triglyceride and low values of High density and Low density lipoprotein, high proteinuria, and blood pressure as shown in Table 1 and 2, respectively, generalized edema, pitting edema of feet, legs, hands have been observed in all the groups and it is grossly noticed this finding is in agreement with the Anonymous (2000). Than Fulani group also demonstrated high proteinuria, high diastolic BP, pathological edema but low cholesterol level and high triglyceride level and minor age of marriage. This finding is similar to what Goodwin and Mercer (2005) found among African American women with severe pre-eclampsia. BMI has been proposed as useful indicators of metabolic aberration; however, in this study we found no significant difference in BMI among the three tribes. There were no difference between the three groups in respect to age, gravid, parity and gestational age this finding was in agreement with other studies (Malik *et al.*, 1995; Prineas *et al.*, 1980).

CONCLUSION

The Hausa and Kanuri pre-eclamptic women demonstrated elevated values of triglyceride, serum cholesterol; pathological edema, increase in blood pressure and higher values of urine protein but this parameters are more pronounce among the Fulani pre-eclamptic groups this shows that, the pre-eclamptic Fulani women are more likely to progress eclampsia than the other two tribes.

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