Maternal and perinatal outcomes among primigravid and multigravid patients with severe pre-eclampsia/eclampsia delivering at Muhimbili National Hospital: a comparative study

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MATERNAL AND PERINATAL OUTCOMES AMONG PRIMIGRAVID AND MULTIGRAVID PATIENTS WITH SEVERE PRE-ECLAMPSIA/ECLAMPSIA DELIVERING AT MUHIMBILI NATIONAL HOSPITAL: A COMPARATIVE STUDY

By

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A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Master Medicine in Obstetrics and Gynaecology of

Muhimbili University of Health and Allied Sciences
October, 2018

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance of dissertation entitled Maternal and Perinatal Outcomes among Primigravida and Multigravida patients with Severe Pre-eclampsia/Eclampsia delivering at Muhimbili National Hospital: A Comparative Study in partial fulfilment of the requirements for the degree of Master of Medicine in Obstetrics and Gynaecology of Muhimbili University of Health and Allied Sciences.

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Date_____

DECLARATION AND COPYRIGHT

I, **Dr Idrissa O Kabanda,** declare that this **dissertation** is my own original work and that has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature_____Date _____

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My special thanks go to the research assistants and all women who willingly participated in this study.

Lastly, I would like to extend my thanks to all the health care providers and the authorities that participated to make the study possible.

DEDICATION

I would like to dedicate this thesis to my amazing parents Dr Omari S Kabanda and Mrs Salama A Kabanda for their tireless and unconditional support love and encouragement. Without them this would not be possible. I would also like to dedicate this thesis to my brothers, sisters and my family. You are special to me in unspeakable ways.

ABSTRACT

Introduction: Severe pre-eclampsia/eclampsia is one of the top ten causes of maternal and fetal morbidity and mortality worldwide. These conditions are seen to have more impact on the low income countries. Parity is also another health issue seen in low income countries where high parity is observed for most women. Understanding the relationship between parity and what impact it has on the outcome on the mother and fetus is very important.

Objective: The aim of the study was to compare the maternal and perinatal outcomes among primigravid and multigravid patients with severe pre-eclampsia/eclampsia delivering at Muhimbili National Hospital in Dar es salaam, Tanzania.

Methodology: This was a hospital based cross-sectional study which took six months from 1st August 2017 to 30th January 2018. The study included all pregnant women with singleton pregnancy delivering at MNH admitted with the diagnosis of severe pre-eclampsia/eclampsia. Data were collected using a check list that included clinical parameters such as presence of headache, visual disturbance, epigastric pain, proteinuria, oliguria, blood pressure and laboratory parameters such as hemoglobin level, platelets count, hematocrit, creatinine, urea, uric acid, aspartate aminotransferase and alanine transferase which were analyzed using Statistic Package for the Social Science (SPSS) version 23. Descriptive statistics were done and the results were presented as frequencies, means, and standard deviations. Pearson's Chi-square and Fischers exact test was used to compare categorical variables. P-value <0.05 was considered statistically significant. The results of the analysis were presented in odds ratio and 95% confidence interval. Crude odds ratio was calculated to understand the effect of the gravidity as an independent factor on the outcomes seen.

Results: Multigravid women showed to have a higher of proportion (73.2%) of delivering preterm babies compared to the primigravid women (61.1%). There was evidence of statistical significance with the p value = 0.002 (COR=1.7; 95% CI, 1.2, 2.5). Higher proportion was seen in most outcomes among the multigravid women with AKI (10.4%), HELLP syndrome (16.4%), DIC (3.0%), abruption placenta (3.0%), and NICU admission (52.3%) compared to the primigravid women who had occurrence of the outcomes at a lower proportion AKI (9.7%), HELLP syndrome (11.4%), DIC (1.3%), abruption placenta (2.0%), and NICU admission 45.0%).

Conclusion: Mutigravid women had a higher proportion of preterm labour as compared to primigravid women. There is no difference in other poor maternal and perinatal outcomes among the two groups. The lack of statistical significant differences in the other outcomes of interest in the study suggests that the outcomes of the disease are not affected by gravidity and that both primigravid and multigravid women should be screened and managed under similar protocols.

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LIST OF ABBREVIATIONS

AKI	Acute Kidney Injury
ALT	Alanine Transferase
ANC	Antenatal Care
aPTT	Activated Partial Thromboplastin Time
AST	Aspartate Aminotransferase
DBP	Diastolic Blood Pressure
DIC	Disseminated Intravascular Coagulopathy
HDU	High Dependency Unit
HELLP	Hemolysis, Elevated Liver enzymes, Low platelets
ICU	Intensive Care Unit
MUHAS	Muhimbili University of Health and Allied Sciences
MNH	Muhimbili National Hospital
NICU	Neonatal Intensive Care Unit
PT	Prothrombin Time
SBP	Systolic Blood Pressure
WHO	World Health Organization

OPERATIONAL TERMS

1. Primigravid – Carrying pregnancy for the first time.
2. Multigravid – Pregnant woman who has experienced one or more pregnancies prior to the index pregnancy. i.e including abortions.
3. Pre-eclampsia – Rise in maternal blood pressure to 140/90 mmHg or above with proteinuria of 300mg/24hours or +1 urine dipstick reading after the gestation age of 20 weeks.
4. Severe pre-eclampsia – Rise in maternal blood pressure to 160/110 mmHg or above with proteinuria of 500mg/24hours or +3 urine dipstick reading after the gestation age of 20 weeks. It can also be diagnosed when pre-eclampsia presents with severe symptoms like severe headache, blurred vision, epigastric pain and other features of end organ damage such as acute kidney injury, elevated liver enzymes, thrombocytopenia, stroke or coma.
5. Eclampsia – When pre-eclampsia or severe pre-eclampsia is complicated with tonic clonic seizure that cannot be attributed to any other cause.
6. Preterm delivery – Delivery of a live fetus between gestational age of 28 weeks and completed 36 weeks.
7. Still birth – Delivery of a fetus with no signs of life from the gestational age of 28 weeks and beyond.
8. Early neonatal death – death of a neonate within 7 days after birth.
9. Acute kidney injury - the rapid impairment of renal function over hours to days. In this study the criteria for diagnosis of acute kidney injury was regarded as the rise in creatinine level above the highest reading of the normal creatinine (97mmol/l) as the normal range at Muhimbili National Hospital is (53-97mmol/l) combined with oliguria of <0.5ml/kg/h for >12 hours.
10. HELLP syndrome – Refers to a syndrome of having hemolysis with low platelets count < 100,000 uL and elevated liver enzymes. Serum Transaminase levels twice the normal value at MNH which is 35u/L was used as the criteria of diagnosis with regards to elevated liver enzymes. This was the criteria used to diagnosed HELLP syndrome in this study.

11. Disseminated Intravascular Coagulopathy – is a systemic process where the process of coagulation and fibrinolysis become abnormally activated within the vasculature leading to thrombosis and haemorrhage. In this study the criteria used to diagnose disseminated intravascular coagulopathy was in a woman who presented with oozing at multiple puncture sites or incision site or other signs of prolonged bleeding accompanied with thrombocytopenia of less than 50,000 uL, prolonged Prothrombin Time (PT) o more than 13 seconds and Activated Partial Thromboplastin Time (aPTT) of more than 35 seconds as well as prolonged bed side clotting time of more than 8 minutes.
12. Pulmonary Edema – Refers to accumulation of fluid into the alveoli which results into difficulty in breathing and exchange of oxygen for tissue perfusion. In this study pulmonary edema was diagnosed clinically by the presence of difficulty in breathing accompanied with clinical evidence on auscultation of chest for alveoli fluid accumulation (basal crepitations).
13. Poor Maternal outcomes – HELLP syndrome, acute kidney injury, DIC, pulmonary edema.
14. Poor Fetal outcomes - Preterm birth, Still birth, early neonatal death and neonatal ICU admissions

1. INTRODUCTION

1.1 Background

Hypertensive disorders in pregnancy are among the commonly encountered conditions in obstetrics field. They affect pregnancy in various ways depending on the category and severity. The classification of hypertensive disorders classifies them into four categories; gestational hypertension, pre-eclampsia/eclampsia, chronic hypertension and pre-eclampsia/eclampsia superimposed on chronic hypertension (1).

Hypertensive disorders in pregnancy continue to be a major problem worldwide. They also remain to be among the most significant challenges in the obstetric field. They complicate about 10% of all pregnancies around the world and contribute to 10%-15% of direct maternal deaths (2). The prevalence of pre-eclampsia/eclampsia related maternal death is highest in Africa at 1.4% and lowest in Latin America at 0.1%. The highest severe pre-eclampsia/eclampsia related maternal mortality prevalence in Africa is in Democratic Republic of Congo at 4% and the lowest is observed in Algeria at 0.5% (3).

At Muhimbili National Hospital (MNH), hypertensive disorders have continued to be the leading causes of both maternal and perinatal mortality and morbidity. Severe pre-eclampsia and eclampsia are responsible for 19.9% of the maternal mortality at the hospital (4). Severe pre-eclampsia and eclampsia account for 5% of case fatality rate for the women who deliver at MNH (5).

The incidence of hypertensive disorders of pregnancy varies across the world. The incidence of pre-eclampsia/eclampsia varies from 2% to 10% of all pregnancies worldwide (6). Depending on the regions, pre-eclampsia ranges from 0.8% in developed countries to 2.8% in developing countries (7). The overall incidence of hypertensive disorders in the United States being 5.9% (8). The incidence of pre-eclampsia in Africa being 1.6%, South America being 3.9%, Middle East being 1.4%. The incidence of pre-eclampsia in the East African region also varies. The incidence in Kenya at 1.9% and Uganda at 0.9% (9).

Severe pre-eclampsia and eclampsia are among the top causes of morbidity and near miss maternal complications. The complications caused are well documented and known. They include acute renal failure, pulmonary edema, cardiopulmonary arrest, HELLP syndrome,

thrombocytopenia and central nervous system dysfunction. There is limited data on the occurrence of these complications in East Africa. Less than a quarter of maternal complications are due to pre-eclampsia and eclampsia. But they constitute of the majority of cases compared to other causes of complications (10,11). Women with pre-eclampsia were found to be eight times more likely to have a maternal near miss incidences (9).

Hypertensive disorders are also known to have an effect on the fetus. The severe forms increase the risk of perinatal death by 3-fold and 5-fold in women with pre-eclampsia and eclampsia respectively (12). The prevalence of perinatal death in Africa varies being 11% in Algeria and Uganda, and 22% in the Democratic Republic of Congo. In Tanzania, severe pre-eclampsia contributes to 23% of the perinatal death (13).

Neonates born from severely pre-eclamptic women are known to suffer adverse neonatal outcomes. Preterm delivery is the most significant outcome because the management of these patients is delivery of the fetus irrespective of the gestation age. The highest prevalence of preterm birth was seen in Angola at 76% (3). Other adverse outcomes known are intrauterine growth restriction (IUGR), low apgar score, low birth weight and perinatal death (3,13).

The etiology of pre-eclampsia is still elusive and the pathophysiology of the disorder is unclear. Many theories have been put forward trying to explain the condition. It is believed that the placenta plays a major part in the pathophysiology of the disorder. The other theories to explain the conditions include endothelial dysfunction and incomplete or absent of trophoblast invasion to the uterine spiral arteries. This results in reduced uteroplacental blood flow and placental ischemia. These challenges result in difficulties to develop effective preventive and treatment strategies for the conditions (14). Management depends on early detection, antihypertensive treatment, seizure prophylaxis and rapid delivery.

Factors that increase the risk of developing pre-eclampsia in a woman include prior history of pre eclampsia, chronic hypertension, primigravidity, chronic kidney disease, pre-gestational diabetes, multiple gestations, obesity and maternal age above 40 years. Primigravidity is a significant risk factor for development of pre eclampsia (14). It is a disease of the first-time pregnant woman. Three quarter of the patients with preeclampsia are primigravid(15). Primigravid women are six to eight times more susceptible of getting pre-eclampsia than multigravid women (16). Even though primigravidity has been found to be a major risk factor for developing pre-eclampsia, its mechanism has not yet been understood clearly. It has been postulated that maternal immune maladaptation is a possible cause for the increased risk of pre-eclampsia in primigravid women (16). Multiparity is also a risk factor for developing pre-eclampsia if there is change of paternity (17).

The need to understand more about the disease and its relation to specific risk factors is still very much relevant. This may help in finding some of the answers to some of the questions on the etiology and pathophysiology of the condition. It may also assist in providing clues to initiate more studies about effects of the hypertensive conditions into different subgroups with more than one risk factor existing at the same time. This study aims at exploring parity as a risk factor for developing pre-eclampsia/eclampsia and what role it plays in determining the outcome of the pregnancy on both the mother and the fetus when the disease proceeds to severe pre-eclampsia/eclampsia.

Some of the early studies showed differences in the pathophysiology of the disease in the two groups of women and suggested a more severe form of the syndrome in the primigravid women compared to the multigravid women. The persistent elevation of the systolic blood pressure and aspartate aminotransferase activity observed in primigravid women may be of interest in determining the outcome. The persistence of higher white cell counts in the preeclamptic/eclamptic primigravids reflects the difference in immune responses in the two groups(18). To date, there are very few studies and data comparing pregnancy outcomes in women who are primigravid experiencing severe preeclampsia/eclampsia with women who are multigravid suffering from severe preeclampsia/eclampsia. The presence of this information may be crucial in facilitating more understanding of the disease.

1.2 Literature review

Severe pre-eclampsia and eclampsia are multi system disorders with impairments of central nervous system, cardiopulmonary, renal, hepatic and coagulatory function, and also characterized by endothelial dysfunction. Studies on outcomes of women with severe pre-eclampsia/eclampsia between primigravid and multigravid are very few that have been done. Most of the studies showed outcomes in general. Comparison of the primigravid and multigravid may seem challenging.

The renal system is one of the commonly affected systems in severe preeclamptic/eclamptic patients. Most patients suffer an abrupt loss of kidney function resulting in retention of urea and other nitrogenous waste products. Acute kidney injury has shown to have no significance difference in occurrence in primigravid and multigravid women affected with the disease. Plasma creatinine and proteinuria measures indicate similar extent of effect on the two groups and that acute kidney injury is independent of parity (16,18).

More severe hepatic dysfunction with significantly raised levels of alanine transferase (AST) has been observed in the primigravid women suffering from pre-eclampsia/eclampsia (18,19). This finding is however in contrast to the findings by Badria et al in a study conducted in North Jordan, where there was no significant difference seen between the primigravid and multigravid women (16).

Platelets level is an important parameter in the diagnosis of severe pre-eclampsia/eclampsia. When they drop below < 100,000 uL in a patient with pre-eclampsia/eclampsia, it is considered that the disease has progressed into the severe form. This is also used in diagnosis of HELLP syndrome which is one of the complications of severe pre-eclampsia/eclampsia. Studies show no significant difference in the platelets counts consumption between the two groups (16,18).

Abruptio placentae may occur as a complication encountered by women with severe pre-eclampsia/eclampsia. This complication endangers the life of the mother by severe loss of blood. Also endangers the life of the fetus by lack of placental circulation. Studies show varying results of this complication in relation to parity. Hnat et al found that abruption placentae was more prevalent in multigravid women(20). Other study found no difference in

the occurrence of abruption placentae among primigravid and multigravid women with pre-eclampsia/eclampsia (16,21).

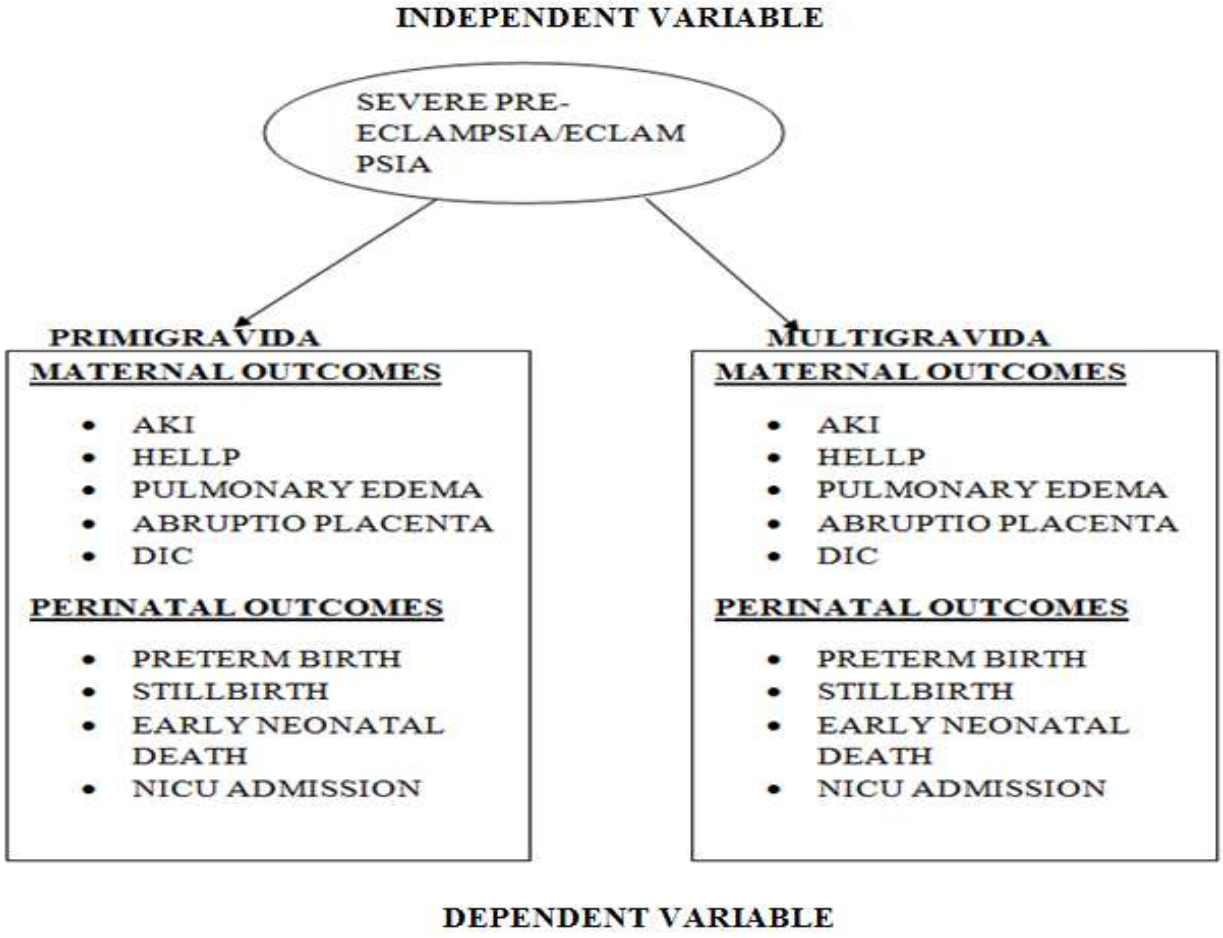
Most neonates born to mothers with severe pre-eclampsia/eclampsia may suffer poor outcomes due to early delivery before term. This is because the ultimate management plan is delivery. Different measures are used to counteract this effect of prematurity to increase more favorable neonatal outcomes. Steroids are used for fetal lung maturity to reduce the risk of developing respiratory distress syndrome. Contradictory results have been seen in different studies. No difference in prevalence of preterm deliveries was seen by Badria et al (16). Higher proportion of preterm deliveries were observed in multigravid women (20). The same higher proportion of preterm deliveries were observed in primigravid women in another study (22). These findings are in contrast to each other.

Stillbirth is another fetal outcome that affects women with severe pre-eclampsia/eclampsia. Higher rates of stillbirth has been associated with multigravid women with severe pre-eclampsia/eclampsia (20). However Badria et al found no statistical difference in stillbirth as an outcome (16).

Perinatal mortality is the most severe fetal outcome observed in patients with severe pre-eclampsia/eclampsia. Most newborns from women suffering from severe preeclampsia/eclampsia require neonatal intensive care unit admission. In comparison of this outcome between the two groups, contradictory results have been seen in different studies. No significant difference was seen in one study (21) while another study had shown more perinatal mortality in primigravid women (22). Women with recurrent pre-eclampsia/eclampsia have higher rates of perinatal mortality compared to primigravid patients of severe pre-eclampsia/eclampsia (20)..

1.3 Conceptual framework

Severe pre-eclampsia/eclampsia is associated with adverse maternal and fetal outcomes. In this study severe pre-eclampsia/eclampsia among primigravid and multigravid women will be studied to show occurring differences of adverse maternal outcomes which are acute kidney injury, HELLP syndrome and maternal mortality. Fetal outcomes which will be in the study are still birth, preterm birth and perinatal death. The scheme shows the relationship between independent variable and dependent variables. Severe pre-eclampsia/eclampsia and parity are independent variables whereas adverse maternal and fetal outcome are dependent variables. The independent variable is expected to influence occurrence of adverse maternal and fetal outcome.



1.4 Problem statement

Severe pre-eclampsia/eclampsia is known to be associated with poor pregnancy outcomes. The disease affects about 10% of all pregnancies worldwide causing minor and major adverse effects on the outcomes (2). It contributes to 10%-15% of the total maternal deaths directly and about 28.9% of early neonatal deaths (2,23). This problem is unacceptably high in low resource countries (2). In Tanzania, severe pre-eclampsia/eclampsia is responsible for 19.9% of the maternal mortality (4). Both primigravid and multigravid women are affected by the disease. Primigravid women are six to eight times more susceptible to be affected by the disease than multigravid women (16). However the maternal and fetal outcomes of the disease between the two groups have not been differentiated. There is inadequate number of studies showing findings demonstrating the differences in terms of adverse pregnancy outcomes between the two groups.

1.5 Rationale

The difference in outcomes of the disease between the primigravid and multigravid remain unclear, whether if one group is more affected than the other. The aim of this study is to investigate the outcomes between the two groups by comparison. This study will help to know and understand if there are identifiable differences in the outcomes between the primigravid and multigravid women suffering from severe pre-eclampsia/eclampsia. The results will help to set policies, protocols and individualization of patient management basing on the differences at the institution level as well as the national level.

1.6 Null hypothesis

There is no difference in the poor maternal and perinatal outcomes among primigravid and multigravid with severe pre-eclampsia/eclampsia.

1.7 Objectives

1.7.1 Broad objective

To compare poor maternal and perinatal outcomes among Primigravid and Multigravid women with severe pre-eclampsia/eclampsia delivering at MNH from August 2017 to January 2018.

1.7.2 Specific Objectives:

1. To compare the proportion of women who will develop the poor maternal outcomes among primigravid and multigravid patients with severe pre-eclampsia/eclampsia.
2. To compare the proportion of newborns who will suffer the poor perinatal outcomes among newborns from primigravid and multigravid patients with severe pre-eclampsia/eclampsia

2. METHODOLOGY

2.1 Study Design:

This was a hospital based cross-sectional study.

2.2 Study duration:

This study was done from the 1st August 2017 to 30th January 2018.

2.3 Study area:

This study was conducted at Muhimbili National Hospital (MNH), which is the largest tertiary and teaching hospital in Tanzania. It is located in Dar es salaam city, which is the largest commercial city with a population of 4,364,541 people and annual growth rate of 5.6%(24). It receives patients from the municipal hospitals in the city and from upcountry.

Obstetrics and Gynecology department at MNH has 4 antenatal and postnatal wards, one labor ward and one high dependent unit ward. It has a total capacity of 385 beds where 353 beds are situated in antenatal and postnatal wards, 20 delivery beds are in the labor ward and 12 beds are in the high dependent unit. It has the total of 220 working staffs. 125 nurses, 30 specialized doctors, 76 resident doctors, 2 registered doctors and 63 supporting staffs.

The obstetric department receives more than 8,000 admissions in a year. It has an average of 726 admissions per month. It is also responsible for more than 8,000 deliveries. Most admissions and deliveries are referrals.

Patients with severe pre-eclampsia/eclampsia are admitted in the high dependent unit (HDU) for a closer and effective management. These patients may also be admitted in other antenatal/postnatal wards for care when the beds are occupied in the HDU. The high dependent unit contains 12 beds which are strategically placed for easy observation and monitoring as well as managing patients. It is close to the labor ward for easy transfer of patients and also easy access of means to transfer patients to the operating theatre.

Once a severe pre-eclampsia/eclampsia patient is received, an assessment of the general conditions of the patient is done and diagnosis is made. The vital signs are assessed including the pulse, temperature, respiration, blood pressure and checking for protein in urine is done. If diastolic blood pressure is equal or above 110 mmHg then intravenous hydralazine 10mg is given slowly for 5 minutes.

A patient chart is opened and documentation of all the vital signs and findings is done. Then catheterization is done and an intravenous line is set up and MgSO4 is initiated as per protocol (4g of MgSO4 loading dose and then followed by 1g/hr for 24 hours). Blood samples are collected for random blood glucose, rapid test for malaria parasites, renal functions tests, liver functions tests and a complete blood count. The samples are well labeled and booked in the computer system and taken to the laboratory immediately by the health attendant. The specialist reviews the patient within 2 hours of admission. The investigations were reported through the electronic computer system after being processed in the laboratory. They were always labeled urgent and they were given priority of being processed in the laboratory as these cases were always considered as emergency. These patients were managed in a multidisciplinary approach when it was needed. The medical specialist teams which included the renal team, cardiovascular team, ophthalmology team, neurology team and gastroenterology team were all actively participating in the management of these patients.

From the Obstetric data base, in the year 2015 the high dependent unit had received a total of 1,115 patients with severe preeclampsia/eclampsia per year. The average number of admissions was 92 admissions per month and 3 admissions per day. In the year 2016 the high dependent unit received a total of 1,369 admissions from January to December 2016. The average number of admissions was 114 admissions per month and 4 admissions per day.

2.4 Study population

All pregnant women who were admitted at MNH maternity block.

2.5 Study sample

All pregnant women that were diagnosed with severe pre-eclampsia/eclampsia.

2.6 Inclusion Criteria

All the patients diagnosed with severe preeclampsia/eclampsia who had gestational age >28 weeks, having a singleton pregnancy.

2.7 Exclusion Criteria

All patients who had prior diagnosis of chronic hypertension, diabetes mellitus, renal disease, hepatic disease and cardiovascular conditions documented in the case notes or ANC card.

2.8 Sample size:

Study sample was calculated using the formula to calculate sample size by comparing two proportions (25).

$n = (Z_{\alpha/2]}+Z_{\beta})^2 * P(1-P)) / (p_1-p_2)^2$,

where

Za/2 = Z0.05/2 = Z0.025 = 1.96 (From Z table) at type 1 error of 5%

Zβ = Z0.20 = 0.842 (From Z table) at 80% power

p1−p2 = Difference in proportion of events in two groups

P = Pooled prevalence = [prevalence in group (p1) + prevalence in group (p2)]/2

n is the minimal sample size for each group

The outcome used to calculate sample size was from the study by Badria et al, "Pre-eclampsia: Is it a different disease in primiparous and multiparous women?" Where the outcome of fetal death (stillbirth) gave prevalences of 1.8% in pre-eclamptic primiparous compared to 6.5% in pre-eclamptic multiparous women.

P1 = 1.8% = 0.018

P2 = 6.5% = 0.065

n = (1.96 + 0.842)^2 *(0.083)*(1-0.018)/(0.018-0.065)^2

n = 298 for each group

N = 596 for the two groups in the study

When the prevalances were plugged in the formula, the total sample size was 596 women. Two hundred and ninety eight women were recurited in each group. The patients in the two groups were recruited at a ratio of 1:1.

2.9 Sampling technique:

The participants were recruited consecutively as they were admitted and meeting the inclusion criteria. This was done until the sample size was reached. The primigravid group and multigravid group constituted of 283 women each at the ratio of one to one. The research investigator and assistants approached all the new admissions in their respective admitting wards to recruit the participants. The recruitment process was done daily throughout the whole study period. On admission the patient was received by the medical team on call and was

provided with all the necessary care as per the management protocol at MNH. The research team participated actively in managing the patients.

The women who met the inclusion criteria were given adequate information about the study, aim of the study and then asked for their consent to be included in the study. These patients were recruited within 24 hours after the time of admission. For each primigravid woman that was recruited, a multigravid woman was recruited when admitted. The women admitted while unconscious due to eclampsia were received in the ward and given the appropriate management with the medical team. After stabilization and regaining conscious within the 24 hours, the research team approached them and gave the necessary information about the study and asked to consent. If the next of kin was available then they were consulted for consent of participation by the patient. After recruitment in the study, the patients were followed up until there time of discharge. The neonates were followed up to 7 days after delivery.

2.10 Data collection

The women were asked to participate voluntarily after signing an informed consent form. There were no participants that withdrew from the study during the whole study period. The investigator used a checklist to assess the different variables that were studied. The investigator obtained most details of the patient from the treatment charts (records of vitals and medications given) and other information was observed from the antenatal clinic cards, nursing charts, patient files and computer records (investigation results). Where necessary the investigator asked the patient some questions to either obtain missing information or confirm information that was not clearly documented. This information included the last normal menstrual period, number of children alive and miscarriages that might have occurred. The information was retrieved by using the patients name and registration number. All information was thoroughly studied in response to the checklist that was used. Neonates admitted in the neonatal ward were followed up to know on neonatal intensive care unit (NICU) admission and their progress. The patients' information was collected from the day of recruitment and a daily follow up was done until the patient was discharged.

2.11 Research assistants

Three registered nurses were recruited as research assistants. Two research assistants were nursing officers in the maternal wards. They would do daily rounds in the evening and note down all the new admitted patients diagnosed with hypertensive disorders in the respective admitting wards. They would then screen and recruit those who fit to be included the study. One nurse was stationed in the neonatal ICU ward to do daily follow up on the newborns from the mothers participating in the study. These research assistants were trained for 3 days on what information was to be given to the participants during recruitment and on how to use and fill the research checklist. All the documents that were filled by the research assistants were counter checked by the principal investigator who also passed rounds daily to collect data.

2.12 Study Tools

A checklist was used to extract important information from the patient. The tool was pretested before it was used to collect data so as to make sure it captured the intended parameters of the study. A published validated tool was not readily available. The tool was divided into 5 main areas to retrieve the necessary information.

The first part contained details about the socio-demographic information. This included age, marital status, level of education, occupation. The second part was inquiring about the antenatal and previous obstetric performance. The information that was included was parity, booking status, number of visits, antenatal blood pressure, antenatal proteinuria, gestation age on admission, previous pregnancy performance and gestation age of diagnosis of severe pre-eclampsia/eclampsia. The third part of the checklist was about the clinical and laboratory details on admission at MNH. The clinical parameters inquired were presence of headache, visual disturbance, epigastric pain, proteinuria, oliguria during admission.

The highest recorded systolic blood pressure (SBP) and diastolic blood pressure (DBP) on the daily follow up during hospital stay were recorded every day.

The laboratory parameters were obtained from results of investigations taken on admission. This included the hemoglobin level, platelets count, hematocrit, creatinine, urea, uric acid, aspartate aminotransferase and alanine transferase. Follow up was done on subsequent investigations that were taken during the hospital stay. The fourth part of the checklist was inquiring about the maternal and fetal outcome. This part had information about the gestation age at delivery (28-34,35-36,>37), mode of delivery, HELLP syndrome, acute kidney injury,

Apgar score at 1st and 5th minute of life, birth weight, still birth, neonatal ICU admission, early neonatal death.

2.13 Pretesting of the checklist

Pilot survey and pretesting of the structured checklist was done at MNH in order to evaluate if it captures the intended objectives of the study. This was done before the commencement of the research.

2.14 Data entry and analysis

Data was collected, coded and entered in a Statistical Package for the Social Science (SPSS) version 23 computer software program for analysis. Descriptive statistics were presented as frequencies, means, and standard deviations. Pearson's Chi-square test was used for most maternal and perinatal outcomes. Fischer's exact test was used in Pulmonary Edema due to small number of study participants observed in that variable. P-value <0.05 was considered statistically significant. The results of the analysis were presented in odds ratio and 95% confidence interval. Crude odds ratio was calculated to understand the effect of the gravidity state as an independent factor on the outcomes seen.

2.15 Ethical clearance and consideration

Ethical clearance for conducting the study was obtained from the Senate Research and Publications Committee of the Muhimbili University of Health and Allied Science. Permission was requested and granted by the Executive Director of the Muhimbili National Hospital to conduct the study at the hospital. The participants were given adequate information about all aspects that was to be covered in the study and those willing to participate were asked to consent in writing. They were assured that all information that was collected and used in the study was to be kept confidential at all times. They were informed on their rights to withdraw from the study at any time they felt like to do so and that it was not going to affect the quality of medical care provided to them and their pregnancy.

3. RESULTS

A total of 8,962 patients were admitted at Muhimbili Obstetric department during the study period. Five hundred and ninety six participants that were diagnosed with severe preeclampsia/eclampsia and met the inclusion criteria were recruited and analyzed in this study. Seventeen women that were diagnosed with hypertensive disorders were excluded from the study due to having other concurrent diagnosis. Out these 17 women, 8 women had chronic hypertension, 3 women had diabetes mellitus, 3 women had renal disease and 4 women had cardiovascular problems prior to admission.

Figure 1 : Distribution flow chart of the study sample and diagnosis

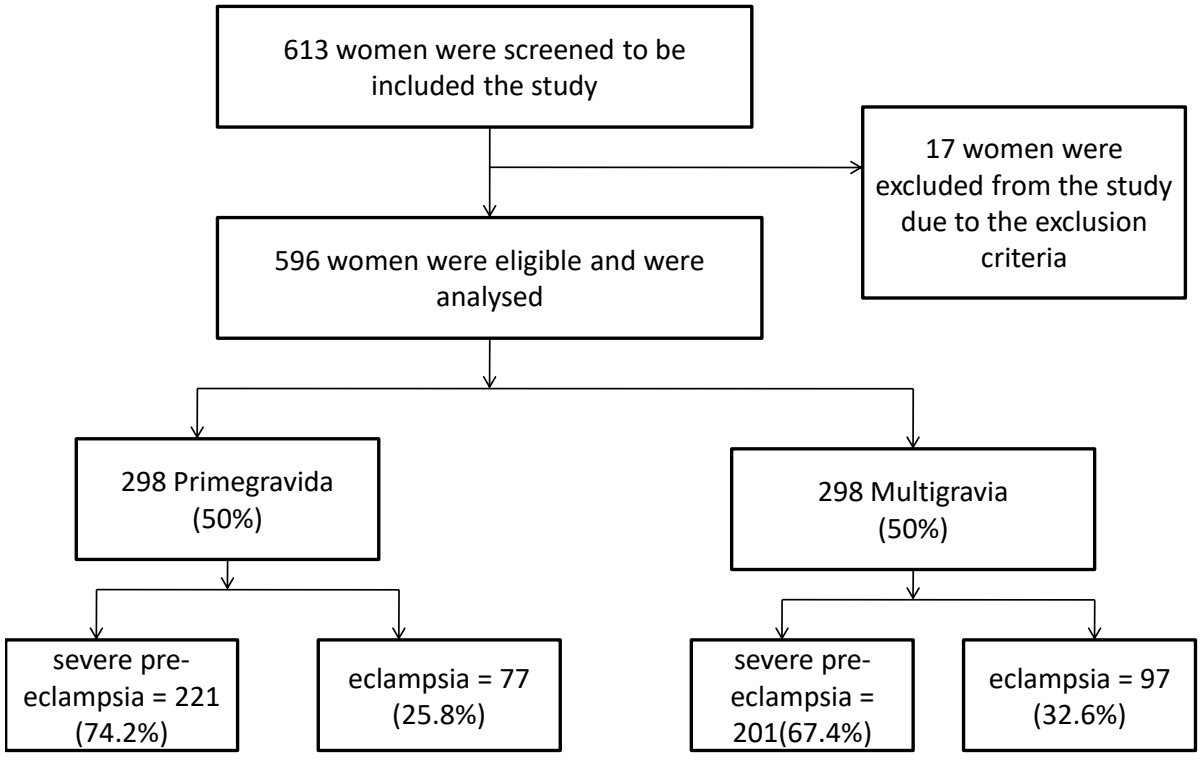


Table 1: Socio-Demographic characteristics of women with severe preeclampsia and eclampsia, N = 596.

	Total	Primigravid n=298	Multigravid n=298
Age (years)			
< 25	166 (27.8)	124 (41.6)	42 (14.1)
25 – 35	346 (58.1)	145 (48.7)	201 (67.4)
> 35	84 (14.1)	29 (9.7)	55 (18.5)
Marital status			
Single	150 (25.2)	110 (36.9)	40 (13.4)
Married	446 (74.8)	188 (63.1)	258 (86.6)
Level of education			
no formal education	41 (6.9)	17 (5.7)	24 (8.1)
primary school	270 (45.3)	142 (47.7)	128 (43.0)
secondary school	214 (35.9)	107 (35.9)	107 (35.8)
college/university	71 (11.9)	32 (10.7)	39 (13.1)
Occupation			
housewife	378 (63.4)	201 (67.4)	177 (59.4)
self employed	146 (24.5)	63 (21.1)	83 (27.8)
employed	72 (12.1)	34 (11.5)	38 (12.8)

No. in brackets (%) = percentages.

The ages of the participants ranged from 15 to 40 years with a mean of 28 years (SD 5.675). Majority were married and had a primary education and above.

Maternal and perinatal outcomes

The maternal and perinatal poor outcomes from the severe pre-eclampsia/eclamptic women among the primigravid and multigravid were compared in proportion of occurrence during this study period. The overall occurrence of the poor outcomes varied differently across the groups. Though many of the outcomes showed no statistical significance when subjected to bivariate analysis, a few outcomes showed variation and significance among the two groups of women.

Table 2: Bivariate analysis of the maternal outcomes among primigravid and multigravid women with severe pre-eclampsia/eclampsia.

State of gravidity	YES n (%)	NO n (%)	COR (95% CI)	P-value
		AKI		
Primigravid	29 (9.7)	269 (90.3)	1	0.8
Multigravid	31 (10.4)	267 (89.6)	1.1 (0.6, 1.8)	
		HELLP		
Primigravid	34 (11.4)	264 (88.6)	1	0.1
Multigravid	49 (16.4)	249 (83.6)	1.5 (0.9, 2.4)	
		DIC		
Primigravid	4 (1.3)	294 (98.7)	1	0.2
Multigravid	9 (3.0)	289 (97.0)	2.3 (0.7, 7.5)	
		ABRUPTION PLACENTAE		
Primigravid	6 (2.0)	292 (98.0)	1	0.4
Multigravid	9 (3.0)	289 (97.0)	1.5 (0.5, 4.3)	
		PULMONARY EDEMA		
Primigravid	1 (0.3)	297 (99.7)	1	0.5*
Multigravid	2 (0.7)	296 (99.3)	2 (0.2, 22.3)	

*Fischer's test

There was no statically significant association between gravidity and different maternal outcomes

Table 3: Bivariate analysis of the perinatal outcomes among primigravid and multigravid women with severe pre-eclampsia/eclampsia

State of gravidity	YES n (%)	NO n (%)	COR (95% CI)	P-value
		PRETERM DELIVERY		
Primigravid	182 (61.1)	116 (38.9)	**1**	**0.002**
Multigravid	218 (73.2)	80 (26.8)	**1.7 (1.2, 2.5)**	
		STILLBIRTH		
Primigravid	63 (21.1)	235 (78.9)	1	0.1
Multigravid	46 (15.4)	252 (84.6)	0.7 (0.4, 1.0)	
		NICU ADMISSION		
Primigravid	134 (45.0)	164 (55.0)	1	0.1
Multigravid	156 (52.3)	142 (47.7)	1.3 (0.9, 1.9)	
		EARLY NEONATAL DEATH		
Primigravid	77 (25.8)	221 (74.2)	1	0.9
Multigravid	75 (25.2)	223 74.8)	0.9 (0.7, 1.4)	

There was a statistically significant association between gravidity and preterm delivery

4. DISCUSSION

Hypertensive disorders in pregnancy, especially severe pre-eclampsia/eclampsia, are a major contributor to maternal, fetal and neonatal mortality and morbidity. This study attempted to address the question of whether the proportion of occurrence of the outcomes caused by severe preeclampsia/eclampsia is the same or different in women with different gravidity in our population.

In this study preterm delivery was found to be significantly associated with gravidity and the proportion of preterm deliveries was noted to be higher in women who were multigravid as compared to primigravid. This finding is consistent with a multicenter study done by Hnat et al which found the occurrence of preterm deliveries was two times more in multigravida as compared to primigravida (20). In contrast another study done in Netherlands found that primigravida were observed to have a higher proportion of preterm deliveries (26). The finding in the current study could presumably be due to the fact that multigravid women are more likely to get recurrent pre-eclampsia/eclampsia, which in turn results in recurrent changes in blood rheology. These changes may partly be responsible for the clinical consequences of the condition, as even a small change in the local pressure gradient in the microcirculation of these women may impair the dispersal of red blood cells with subsequent impairment in oxygen transfer.

The development of hepatic dysfunction which could lead to conditions like HELLP syndrome and disseminated intravascular coagulopathy was not significantly different between the two groups in our study. This is similar to what was seen by Badria et al (16). These findings could explain that the pathophysiological process occurring in the two groups is similar. However, this is in contrast to the finding of a study by Brown and Buddle (19), which showed a statistical significance with a higher proportion of liver disease in multigravid women. This difference could be explained by the fact that their definition of severe preeclampsia/eclampsia was different in that severe pre-eclampsia was diagnosed when hypertension and evidence of maternal organ dysfunction were present.

The renal system has shown to be affected to similar extent in the two groups of women as the analysis has shown no significant difference. This is possibly due to early diagnosis and aggressive management by the medical team so as to avoid further complications in both groups of women. Even though there was no significant difference, the multigravid women showed to have more odds of developing acute kidney injury than the primigravid women. This could be due to the high parity and old age of the multigravid women thereby affecting their physiological capability of being pregnant in the vasculature of the uterus (27). In other studies as well, acute kidney injury has shown to have no significance difference in occurrence in primigravid and multigravid and this indicates that acute kidney injury is independent of parity (16,18).

There was no significant difference in the proportion of abruption placenta between the two groups. This is similar to the findings by Badria (16). These findings are contrary to what would be expected in view of the older age and higher parity order in the multigravid women. The proportion of abruption placentae is expected to be commoner and significantly high in the multigravid group as seen in the study by Hnat (20). There is considerable evidence to support the concept that the placenta with some aberrations in the trophoblast invasion and vascular remodeling are the major cause for development of these conditions. This could affect the normality of the placenta-uterine attachment with higher parity order (27).

The occurrence of proportion of other maternal outcomes was found to be not significantly different between the two groups of women. This is in consistency with findings from studies by Badria, Rijn and Hnat (16,20,26). This suggests that the pathophysiology of pre-eclampsia/eclampsia and the outcomes of the disease are not affected by gravidity.

The results from our study found no significant difference in the other perinatal outcomes of interest in the study. This is contrary to the findings by Hnat which found that multigravid women had significantly higher rates of adverse perinatal outcomes compared with women who develop pre-eclampsia as primigravid (20).

This study was limited to immediate postpartum events only and during the hospital stay. It did not look into outcomes that may have occurred thereafter as a result of severe preeclampsia/eclampsia.

5. CONCLUSION

In conclusion, multigravid women had a higher proportion of preterm deliveries as compared to Primigravid women. There is no difference in other poor maternal and perinatal outcomes among the two groups. The lack of statistical significant differences in the other outcomes of interest in the study suggests that the outcomes of the disease are not affected by gravidity and that both primigravid and multigravid women should be screened and managed under similar protocols.

6. RECOMMENDATIONS.

More studies and larger scale studies to be conducted and might be necessary to further investigate possible biochemical differences between pre-eclamptic/eclamptic primigravid and multigravid women. Understanding the disease outcomes between the two groups of women while targeting specific risk factors such as parity or new paternity, may improve understanding of the disease and implementation of effective preventive and management measures, as well as provision of quality health services to these hypertensive pregnant women.

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APPENDICES

8.1 Appendix I: Consent form (English version)

Consent to participate in this study

Greetings! My name is Dr Idrissa O. Kabanda. I am working on the research project with the objective to compare maternal and perinatal outcomes among Primigravida and Multigravida patients with severe pre-eclampsia/eclampsia delivering at MNH. I will be assisted by a team of assistants.

Purpose of the study

This study will collect information on 'maternal and perinatal outcomes among Primigravida and Multigravida patients with severe pre-eclampsia/eclampsia delivering at MNH.'

I and my team are kindly requesting you to participate in this study because you are particulars/ information which will be taken and will be used for the purpose of this research and will certainly not bother you or cause any discomfort to you.

What Participation Involves

If you agree to participate in this study the following will occur:

1. Your information will be taken from the file and ANC cards in order to obtain the intended information to improve student welfare in the university.
2. No identifying information will be collected from you during this, except your age, gender, level of education and residence.

Confidentiality

I assure you that all the information collected from you will be kept confidential. Only people working in this research study will have access to the information. We will be compiling a report, which will be presented to fellow students. We will not put your name or other identifying information on the records of the information you provide.

Risks

You may be asked questions about your personal information. Some questions could potentially make you feel uncomfortable. You may refuse to answer any particular question and may stop participation at anytime.

Rights to Withdraw and Alternatives

Participating in this study is completely voluntary. If you choose not to participate in the study or if you decide to stop participating in the study you will not get any harm. You can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled in the community.

Benefits

The information you provide will help to increase our understanding on the disease that is of interest in our study.

In Case of Injury

We do not anticipate that any harm will occur to you or your family as a result of participation in this study.

Who to contact

If you ever have questions about this study, you should contact the study Coordinator **Dr Idrissa O. Kabanda,** Muhimbili University of Health and Allied Sciences (MUHAS), P.O. Box 65001, Dar es Salaam (Tel. no. 0787464798).

If you ever have questions about your rights as a participant, you may contact Dr Joyce Masalu, Chairperson of the Senate of Research and Publications Committee, MUHAS, P. O. Box 65001, Dar es Salaam (Tel: 2150302-6).

Signature

Do you agree to participate and for you to answer questions?

Agrees [__]

Disagree [__]

I _____ have read/understood the contents in this form. I agree to participate in this study.

Signature of Participant _____

Signature of witness (if participant cannot read) _____

Signature of research assistant _____

Date of signed consent _____

8.2 Appendix II: Structured Checklist

Maternal and perinatal outcomes among primigravida and multigravida patients with severe pre-eclampsia/eclampsia patients delivering at Muhimbili National Hospital. A comparative study

1. Checklist #.....
2. Diagnosis
    a) Severe Pre eclampsia…….
    b) Eclampsia, indicate number of fits……
    c) If any other (specify)……

Social demographic data

3. Age……
4. Marital status……
    a) Single
    b) Married
    c) Divorse
    d) widow
5. Level of education
    a) No formal education
    b) Primary school education
    c) Secondary school education
    d) College/university
6. Occupation
    a) House wife
    b) Self employed/Employed
    c) Others (specify)…….

Antenatal history

7. Parity…….. Abortion…… Live…….
8. Gestation age at diagnosis……
9. Gestation age at admission……
10. Number of antenatal visits……..
11. Weight at booking……..gestation age at booking……..

12. Blood pressure at booking……..
13. Protein in urine at booking……..
14. Hemoglabin at booking……..
15. History of pre eclampsia/ eclampsia…….(a) yes (b) no
16. If yes, which pregnancy (check >1 if present and indicate respective diagnosis)
    a) First pregnancy……. Diagnosis…….
    b) Second pregnancy……. Diagnosis…….
    c) Third pregnancy…… Diagnosis…….
    d) Fourth pregnancy…….. Diagnosis…….
17. If any history of the following in the previous pregnancies
    a) Preterm delivery……
    b) Still birth delivery…….
    c) Early neonatal death……
18. Check if the mother has been on any medications
    a) Calcium suppliments
    b) Haematenics
    c) anthypertensive
    d) ARV
    e) Others specify…….
19. Check if the mother is suffered from any of the following
    a) DM
    b) Anaemia
    c) Hypertension
    d) Renal disease
    e) Cardivascular disease
    f) Liver disease
    g) HIV
    h) Anterpartum haemorrhage
    i) Others specify……..

Clinical abd laboratory parameters

20. Clinical symptoms present on admission
    a) Headache…….
    b) Epigastric pain……
    c) Visual disturbance……
    d) Lower limb swelling…….
    e) Protein in urine…….. Amount……..
    f) Highest recorded Systolic blood pressure……..
    g) Highest recorded Diastolic blood pressure……..
21. laboratory parameters at the time of admission
    a) Hemoglobin……..
    b) Platelets counts……..
    c) Creatinine……..
    d) Blood Urea Nitrogen (BUN)……..
    e) Uric acid…….
    f) AST……
    g) ALT…….

Maternal outcomes

22. Admission to delivery time(hours)…….
23. Gestation age at delivery……
24. Induction of labour
    a) Yes
    b) No
25. Mode of delivery
    a) SVD
    b) ABD
    c) C/S ……reason……
26. MgSO4
    a) Yes…….dose……..
    b) No

27. Antenatal steroids use
    a) Yes
    b) No
28. Anthypertensive use (prior to delivery)
    a) Yes
    b) No

Post delievery blood pressure

a) Systolic blood pressure……..
b) Diastolic blood pressure……

Developed complications

a) Acute kidney injury……..
b) HELLP syndrome……..
c) Abruptio Placentae……..
d) Pulmonary edema……

Fetal outcomes

29. Baby was born (a) alive……..(b) SBF/SBM
30. If born alive, Apgar score at 1 minute …….at 5 minutes……
31. Sex of the baby
    a) Male
    b) female
32. Birth weight (grams)…….
33. Required neonatal ICU admission ……..YES/NO
34. Primary outcome (neonatal outcome within seven days of life) (a) live……. (b) dead…….
35. She /he died on day …….of life.

8.3 Appendix III: Fomu ya ridhaa (Swahili version)

Ridhaa ya kushiriki katika utafiti huu

Habari! Jina langu naitwa Dk Idrissa O Kabanda. Ninafanya kazi katika mradi huu wa utafiti wenye lengo la kulinganisha matokeo katika mama na mtoto wanaozaliwa na kina mama wenye kuugua shinikizo la damu wakati wajawazito na kifafa cha mimba kati ya waliobeba mimba kwa mara ya kwanza na waliobeba mimba zaidi ya mara moja.

Malengo ya utafiti

Utafiti huu una lengo la kukusanya taarifa na kulinganisha matokeo katika mama na mtoto wanaozaliwa na kina mama wenye kuugua shinikizo la damu wakati wajawazito na kifafa cha mimba kati ya waliobeba mimba kwa mara ya kwanza na waliobeba mimba zaidi ya mara moja wanaojifungua katika hospitali ya Muhimbili.

Unaombwa kushiriki katika utafiti huu kwa sababu ya tasnia yako na uzoefu wako kuhusu maradhi haya. Ushiriki wako hautofanya usumbufu katika ukaaji wako hospitalini.

Ushiriki unahusisha nini?

Ukikubali kushiriki katika utafiti huu yafuatayo yatatokea:

1. msaili/mtafiti aliyepewa mafunzo atachukua taarifa kutoka kwenye jalada lako la matibabu na kadi ya kupimia mimba.
2. Hakuna taarifa zozote za utambulisho tutakazokusanya wakati wa usaili isipokua umri, kiwango cha elimu na kazi yako kwa sasa.

Usiri

Nakuhakikishia kwamba taarifa zote zitakazokusanywa kutoka kwako zitakua ni siri. Watu wanaofanya kazi katika utafiti huu tu ndio wanaweza kuziona taarifa hizi. Tutajumuisha ripoti ambayo itakua na majibu kutoka kwa wadau mbalimbali katika chuo hiki. Hatutaweka jina lako au taarifa yoyote ya utambulisho kwenye kumbukumbu za taarifa utakazotupa.

Madhara

Utaulizwa maswali juu ya taarifa zako. Baadhi ya maswali yanaweza kukufanya usijiskie vizuri. Unaweza kukataa kujibu swali lolote na unaweza kusimamisha usaili wakati wowote.

Haki ya kujitoa na mbadala wowote

Kushiriki katika utafiti huu ni uchaguzi wako, kama utachagua kutokushiriki au utaamua kusimamisha kushiriki hutapata madhara yoyote. Unaweza kusimamisha kushiriki katika tafiti

hii muda wowote hata kama ulisharidhia kushiriki. Kukataa kushiriki au kujitoa katika utafiti hakutaambatana na adhabu yoyote au upotevu wa faida yoyote unayotakiwa kupata.

Faida

Taarifa utakayotupatia itasaidia kuongeza zaidi uelewa wetu kuhusu magonjwa ya shinikizo la damu kwa wakina mama wajawazito na kifafa cha mimba pamoja na changamoto zake katika chuo hiki. Faida binafsi ni pamoja na kuwezesha menejimenti na wataalamu kufanya kazi pamoja ili kupunguza hili tatizo katika jamii.

Endapo utadhurika

Hatutegemi madhara yoyote kutokea kwa kushiriki kwako katika tafiti hii.

Watu wa kuwasiliana nao

Kama una maswali katika utafiti huu unaweza kuwasiliana na mratibu mkuu wa mradi, Dkt Idrissa O Kabanda**,** Chuo Kikuu cha Muhimbili, S.L. P 65001, Dar es Salaam (Simu namba 0787464798).

Kama utakua na maswali yoyote kuhusu haki zako kama mshiriki unaweza kupiga simu kwa Dkt Joyce Masalu ambaye ni mwenyekiti wa kamati ya chuo ya utafiti na machapisho, Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, S.L.P 65001, Dar es Salaam (Simu namba: 2150302-6).

Sahihi

Unakubali kushiriki na wewe kujibu maswali ya tafiti hii?

Mhojiwa amekubali [__]

Mhojiwa amekataa [__]

Mimi _____ nimesoma/nimeielewa hii fomu, maswali yangu yamejibiwa. Nakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki _____

Sahihi ya shahidi (kama hawezi kusoma na kuandika) _____

Sahihi ya mtafiti muandamizi _____

Tarehe ya makubaliano _____

8.4 Appendix IV: Dodoso (Swahili version)

Utafiti wa kulinganisha matokeo katika mama na mtoto wanaozaliwa na kina mama wenye kuugua shinikizo la damu wakati wajawazito na kifafa cha mimba kati ya waliobeba mimba kwa mara ya kwanza na waliobeba mimba zaidi ya mara moja wanaojifungua katika hospitali ya Muhimbili.

1. Namba ya dodoso.....
2. Ugonjwa
    d) Shinikizo la damu wakati wajawazito……..
    e) kifafa cha mimba……..amepata mara ngapi……..
    f) magonjwa mengine……..

Taarifa za muhusika

3. Mwaka wa kuzaliwa……
4. Hali ya ndoa……
    e) sijaolewa
    f) nimeolewa
    g) nimeachika
    h) mjane
5. Kiwango cha elimu
    e) sijasoma
    f) elimu ya msingi
    g) elimu ya secondari
    h) chuo
6. Kazi
    d) Mama wa nyumbani
    e) Nimejiajiri
    f) Nimeajiriwa
    g) Nyinginezo …….

Taarifa za mama wakati wa ujauzito

7. Mimba ya ngapi……..
   Mimba zilizoharibika……
   Watoto walio hai…….
8. Umri wa mimba kwa wiki wakati tatizo linagundulika……
9. Umri wa mimba kwa wiki wakati analazwa hospitali……
10. Idadi ya mahudhurio katika kliniki ya wajawazito……..
11. Uzito wakati wa kuanza kliniki……..
    Umri wa mimba wakati wa kuanza kliniki……..
12. Kiwango cha msukumo ya damu wakati wa kuanza kliniki……..
13. Kiwango cha protini kwenye mkojo wakati wa kuanza kliniki……..
14. Kiwango cha wingi wa damu wakati wa kuanza kliniki……..
15. Je kuna historia ya kuugua shinikizo la damu wakati wa ujauzito au kifafa cha mimba kwenye mimba zilizopita…….
    (a) Ndio (b) Hapana
16. Kama jibu ni ndio, ni mimba ya ngapi uliugua maradhi hayo? (unaweza ukajaza zaidi ya sehemu moja na kuandika utambuzi mahala husika)
    e) Mimba ya Kwanza……. Utambuzi…….
    f) Mimba ya pili……. Utambuzi…….
    g) Mimba ya tatu…… Utambuzi…….
    h) Mimba ya nne…….. Utambuzi…….
17. Kama kuna historia ya magonjwa yafuatayo katika mimba zilizopita (jibu kwa kuweka ndio au hapana kwenye sehemu husika)
    d) Kujifungua kabla ya kutimiza wiki 37……
    e) Kujifungua mtoto aliyefariki tumboni…….
    f) Kufariki kwa mtoto ndani ya siku baada ya kuzaliwa hai……
18. Weka alama ya vyema kama alipata matibabu yafuatayo
    f) Dawa za kuongeza kashamu……
    g) Dawa za kuongeza damu (madini ya chuma)…….
    h) Dawa za kutibu/kupunguza shinikizo la damu…….
    i) Dawa za kupunguza makali ya virusi vya ukimwi……
    j) Dawa kwa ajili ya matatizo mengine…….

19. Weka alama ya vyema kaka mama ana matatizo yafuatayo

    j) Kisukari
    k) Upungufu wa damu
    l) Shinikizo la damu
    m) Matatizo ya figo
    n) Magonjwa ya moyo
    o) Magonjwa ya ini
    p) Upungufu wa kinga mwilini
    q) Utokaji wa damu wakati wa ujauzito
    r) Matatizo mengineyo (yataje)……..

Ugunduzi wa kliniki na maabara

20. Dalili za hatari wakati wa kulazwa

    h) Kuumwa kwa kichwa…….
    i) Kuumwa kwa tumbo ……
    j) Matatizo ya kuona vizuri……
    k) Kuvimba miguu…….
    l) Protini kwenye mkojo…….. kiasi……..
    m) Kiwango cha juu cha msukumo wa damu kunakiriwa……..

21. Majibu ya vipimo vya maabara wakati wa kulazwa

    h) Hemoglobin……..
    i) Platelets counts……..
    j) Creatinine……..
    k) Blood Urea Nitrogen (BUN)……..
    l) Uric acid…….
    m) AST……
    n) ALT…….

Matokeo ya mama mjamzito

22. Muda uliochukua toka kulazwa mpaka kujifungua…….
23. Umri wa mimba wakati wa kujifungua……
24. Je uchungu ulianzishwa
    c) Ndio
    d) Hapana
25. Njia ya kujifungua
    d) Kawaida
    e) Kawaida kwa msaada wa njia usaidizi
    f) Upasuaji..…… Sababu……
26. MgSO4
    c) Ndio……. Dozi ngapi……..
    d) Hapana
27. Dawa za kukomaza mapafu ya mtoto
    c) Ndio
    d) Hapana

28. Dawa za kushusha presha (kabla ya kujifungua)
    c) Ndio
    d) Hapana

Kiwango cha msukumo wa damu cha mama baada ya kujifungua

c) Msukumo wa damu Systolic……..
d) Msukumo wa damu Distolic ……

Je amepata matatizo ya

e) Acute kidney injury……..
f) HELLP syndrome……..
g) Abruptio placenta…….
h) Pulmonary edema……..

Matokeo ya mtoto

29. Je mtoto alizaliwa akiwa (a) Hai……..(b) Amefariki
30. Kama alizaliwa akiwa hai, Apgar score ya dakika ya kwanza ……. Na dakika ya tano……
31. Jinsia ya mtoto
    c) Mme
    d) Mke
32. Uzito wa kuzaliwa…….
33. Je aliitaji kulazwa kwenye chumba cha uangalizi wa karibu ……NDIO/HAPANA
34. Je mtoto ni hai ndani ya siku saba (a) ndio (b) hapana
35. Kama hapana alifariki siku ya ngapi …….sababu ya kifo……