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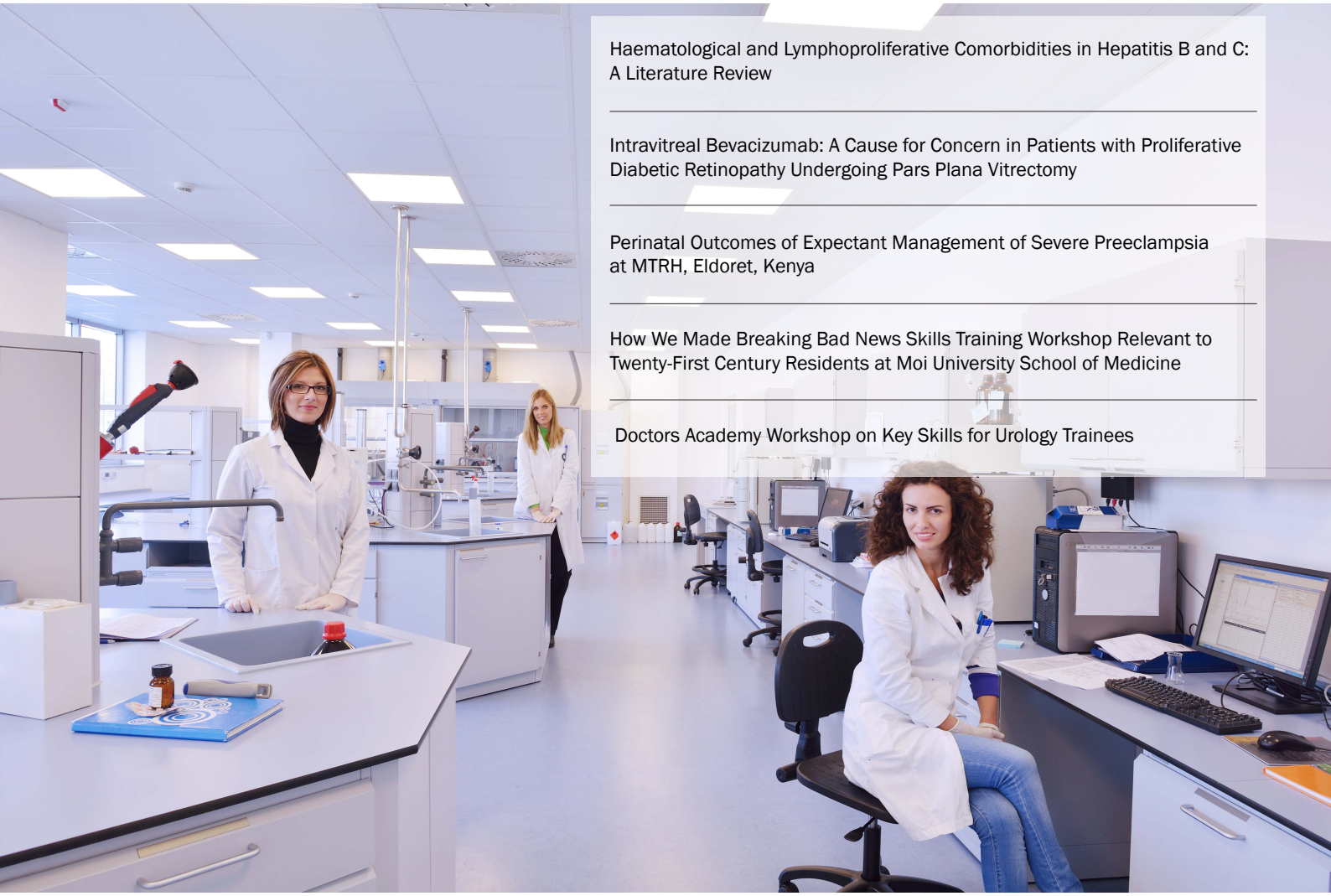
World Journal of Medical Education and Research

An Official Publication of the Education and Research Division of Doctors Academy



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ISSN 2052-1715

World Journal of Medical Education and Research:
An Official Publication of the Education and Research Division of Doctors Academy

Clinical Research
DAUIN 20180141

Perinatal Outcomes of Expectant Management of Severe Preeclampsia at MTRH, Eldoret, Kenya

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WJMER, Vol 18: Issue 1, 2018

Abstract

Background: Early severe preeclampsia accounts for 25% of all cases of preeclampsia and is the leading cause of maternal and perinatal morbidity and mortality. The definitive treatment for preeclampsia is delivery. Yet, an early preterm delivery increases the risk for adverse neonatal outcomes.

Objective: To investigate the perinatal outcomes of severe preeclampsia among women managed conservatively at the Moi Teaching and Referral Hospital in Eldoret, Kenya (MTRH).

Methods: This prospective study was conducted in MTRH. A total of 72 women from 28 to 34 weeks gestation with severe preeclampsia were followed up till seven days post-delivery with outcomes evaluated. Expectant management was given whenever there was no indication for immediate delivery as per the hospital severe preeclampsia treatment protocol. The perinatal outcome was recorded and statistical analysis done. Relevant data was collected using structured questionnaires and analyzed using SPSS version 22. Descriptive data was presented using tables and graphs. Inferential statistics were presented using odd ratios and tabulated showing their P values ($p < 0.05$).
Outcomes of interest included pregnancy prolongation, intrauterine fetal death, Apgar score at five minutes, newborn unit admission, and newborn status on day seven.

Results: The mean age was 27.9+/- 6.6 years (range 16-43 years).The median pregnancy prolongation was up to seven days. There were 24 (33.3%) perinatal deaths. Apgar score <7 occurred in eight (11.1%). More than half of newborns. Thirty seven (51.4%) were admitted to the newborn unit. More than two-thirds of babies 48 (66.7%) were alive on day seven.

Conclusion: Following conservative management there was a median pregnancy prolongation of up to a week. There were 59 (81.9%) live births. Forty-four (47.2%) women stayed longer than a week before delivery and their newborns had a better five minute Apgar score, were less likely to be admitted to the newborn unit and were more likely to survive for at least a week post-delivery compared to those who stayed a week and less before delivery. However this was not statistically significant.

Recommendations: More studies are recommended in the area of early severe preeclampsia since the disease contributes to high mortality and morbidity in our setup.
Pediatric follow-up of newborns to document long term effect, if any, after expectant management of early severe PET.

Key Words
Preeclampsia; Perinatal; Paediatrics

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Background

Every tenth pregnancy is affected by hypertension, one of the most common complications and leading causes of maternal death worldwide[1]. Hypertensive disorders in pregnancy include preexisting chronic hypertension, pregnancy-induced hypertension and pre-eclampsia (PE). Preeclampsia is a multisystem pregnancy disorder characterized by de novo hypertension (>140/90 mmHg) and proteinuria at ≥ 20 weeks gestational age (i.e. the second half of pregnancy) in a previously normotensive woman[2,3]. It is characterized by marked vascular, metabolic and inflammatory changes leading to generalized endothelial dysfunction and end-organ damage[4]. In some cases, it manifests symptoms including intrauterine growth restriction, or reduced amniotic fluid volume[1].

Preeclampsia remains a potentially life-threatening disease for both the mother and baby[5]. The World Health Organization (WHO) estimate that about 1.4 million women (about 5-10%) are affected by

the preeclampsia each year, resulting in an annual mortality of 65,000 women worldwide[6, 7] but may be higher in resource-limited settings or areas of the world which reflects inequities in access to health services. Although extensive research efforts have been aimed at unraveling its pathogenesis, the etiology of preeclampsia remains to be elucidated. Most likely, preeclampsia is a result of interplay between maternal constitution, placental factors and inappropriate adaptive changes to pregnancy predominantly involving the cardiovascular and inflammatory system[4].

There is wide variation in the cases of preeclampsia between the developed and developing countries. WHO estimates the incidence of preeclampsia to be seven times higher in developing countries (2.8% of live births) than in developed countries (0.4%). The incidence of preeclampsia in the developed countries of North America and Europe is similar and estimated to be about five to seven cases per 10,000 deliveries[8]. On the other hand, incidence of eclampsia in developing nations such as in Africa varies widely, ranging from one case per 100 pregnancies to one case per 1700 pregnancies[9]. The incidence is high in developing countries due to malnutrition, hypoproteinemia, and poor obstetric facilities. Severe forms of preeclampsia are more common, ranging from a low of 1.8% of all deliveries to as high as 18% in parts of Africa. Rates from African countries such as South Africa, Egypt, Tanzania, Nigeria, Kenya and Ethiopia vary from 1.8% to 7.1%. Typically, preeclampsia is classified by its severity into mild and severe types based on the woman's blood pressure and proteinuria. Distinguishing between mild and severe preeclampsia is important because the management strategies are very different. Preeclampsia is classified as mild preeclampsia when the systolic blood pressure of >140 mmHg or a diastolic blood pressure >90 mmHg in combination with 300 mg of protein collected in urine over 24 hours. Severe preeclampsia (SPE) is a more serious problem and is diagnosed if there are more severe elevations of blood pressure or evidence of other end-organ dysfunction. Diagnosis of severe preeclampsia requires the basic features of mild preeclampsia as well as some indication of additional problems with either the mother or the baby. According to ACOG Committee on Practice Bulletins - Obstetrics, (2002), one of the following findings is also necessary for a diagnosis of severe preeclampsia: signs of central nervous system problems (severe headache, blurry vision, altered mental status); signs of liver problems (nausea and/or vomiting with abdominal pain; elevated transaminases); at least twice the production of some liver enzymes on blood test; very high blood pressure (>160 systolic or 110 diastolic); thrombocytopenia; >500 mg of protein in a 24-hour urine sample; very low urine output (<500 ml in 24 hours); signs of respiratory problems (pulmonary edema, bluish tint to the skin); decreased glomerular filtration rate which may progress to Oliguria and acute renal failure and severe fetal growth restriction. Severe preeclampsia causes multisystem deterioration that may be gradual or fulminant. Obstetric complications include IUGR, abruption, and fetal and maternal demise.

In clinical practice, there is lack of uniformity in preeclampsia diagnosis due to late manifestation of symptoms[10] . A clinical diagnosis of preeclampsia can be made when hypertension arises after twenty weeks gestation with the addition of one or more of the following: when blood pressure equal to or exceeding 160 mm Hg systolic or 110 mm Hg diastolic on at least two occasions six hours apart; proteinuria of 5 grams or more in a 24-hour urine specimen or 3+ or greater on two random urine specimen collected at least four hours apart. Furthermore, any of the following signs and symptoms may led to diagnosing preeclampsia: Oliguria less than 500 mls/24 hours, cerebral or visual disturbances, pulmonary edema, epigastric or right upper quadrant pain, impaired liver function, thrombocytopenia and fetal growth restriction.

The risk factors for preeclampsia can be divided into comorbid conditions, maternal demographics, and obstetric history. Women with diabetes, chronic hypertension, autoimmune diseases, antiphospholipid antibody syndrome, chronic renal insufficiency, Angiotensinogen-converting enzyme DD (ACE-DD) polymorphism, protein C deficiency, or protein S deficiency are among those at highest risk for preeclampsia[11]. Nevertheless, demographic factors such as obesity, and extremes of maternal age and obstetric characteristics such as nulliparity, multifetal gestation, prior history of preeclampsia, and hydatidiform mole also increase risk. Effective management of preeclampsia is important as it will significantly contribute toward achievement of the millennium development goals four and five, as well as number three of the 2015-2030 Sustainable Development Goals which aims at ensuring healthy lives and promote wellbeing for all at all ages . Target 3.1 aimed at reducing global maternal mortality ratio to less than 70 per 100,000 live births while target 3.2 focuses on ending preventable deaths of newborns and under-fives.

Since preeclampsia is progressive disease, there is no medical treatment. As yet, management has been largely based on expert opinion with few prospective and retrospective studies that have addressed expectant management remote from term. Traditional management of preeclampsia has

included pre-term delivery aimed at preventing potential end-organ effects. However, this is usually associated with increased perinatal morbidity, mortality and prolonged hospitalization in the neonatal intensive care unit because of prematurity and therefore not in the best interest of the fetus. On the contrary, attempts to prolong pregnancy with expectant management may result in fetal death or asphyxia damage in utero and increased maternal morbidity[12]. Yet expectant management of preeclampsia remote from term has been shown to be beneficial to fetus and safe to the mother at the same time (Vigil-De Gracia et al., 2003; Haddad and Sibai, 2009). This highlights the importance of balancing the risks between maternal and perinatal outcomes.

In Kenya, management of severe forms of preeclampsia at Moi Teaching and Referral Hospital (MTRH) level involves admission of the patient, control and prevention of seizure by giving magnesium sulphate and lowering the blood pressure in order to prevent maternal cerebral hemorrhage by using antihypertensive and expedite delivery based on a decision that takes into account disease severity and fetal maturity. There is however, lack of information on the outcome of such management regimen on preeclampsia. Therefore, this study assessed the maternal and perinatal outcomes of preeclampsia among women managed conservatively remote from term at MTRH maternity unit, Eldoret - Kenya.

Variables	Frequency	Percent
Age		
<21 yrs	6	8.3
21-24 yrs	14	19.4
24.1-28 yrs	20	27.8
28.1-32 yrs	18	25
>32 yrs	14	19.5
Levels of education		
None	2	2.8
Primary	18	25
Secondary	20	27.8
College	32	44.4
Occupation		
Employed	17	23.6
Unemployed	40	55.6
Self employed	15	20.8
Marital status		
Divorced	1	1.4
Married	58	80.6
Single	13	18.1
Residency		
Urban	9	12.5
Rural	63	87.5

Table 1: Socio-demographic characteristics of 72 severe preeclampsia patients admitted and managed at the obstetric ward of Moi Teaching and Referral Hospital

Variables	Number	Percent
Preeclampsia history		
Yes	17	23.6
No	29	40.3
Not applicable	26	36.1
On preeclampsia treatment at admission		
Yes	21	29.2
No	51	70.8
Maternal weight (kg)[#]	76.6 ± 16.0	
Height (m)[#]	1.59 ± 0.06	
Body mass index (BMI)		
<25 kg/m^2	16	22.2
25-30 kg/m^2	30	41.7
31-35 kg/m^2	10	13.9
≥35 kg/m^2	16	22.2
Body mass index category (BMI)		
Normal	24	33.3
Overweight	18	25
Obese	13	18.1
Severely obese	17	23.6
Maternal baseline systolic blood pressure		
<130 mm Hg, n (%)	3	4.2
130-140 mm Hg	1	1.4
≥140 mm Hg	68	94.4
Dipstick proteinuria		
Not done	1	1.4
+	21	29.2
++	50	69.4
HIV		
Not tested	3	4.2
Positive	5	6.9
Negative	64	88.9
VDRL		
Unknown	3	4.2
Positive	1	1.4
Negative	68	94.4
Maternal blood groups		
AB	6	8.3
O	32	44.4
A	19	26.4
B	15	20.8

Table 2: Maternal characteristics of 72 severe preeclampsia patients admitted and managed at the obstetric ward of Moi Teaching and Referral Hospital

	At admission		At discharge	
Variables	**Counts**	**Percent**	**Counts**	**Percent**
Urine test*				
Not done	1	1.4	27	37.5
Nil	0	0	31	43.1
+	21	29.2	10	13.9
++	50	69.4	3	4.2
+++	-	-	1	1.4
Hb levels (mm Hg) #	12.4 ± 2.4		11.8 ± 2.2	
White blood cell counts#	9.5 ± 3.7		8.2 ± 2.5	
Platelet counts#	222.2 ± 78.4		248.2 ± 86.1	
Liver function#				
ALB	27.8 ± 6.7		32.1 ± 7.1	
AST	28.0 ± 14.5		28.9 ± 1.2	
ACT	14.7 ± 4.2		23.8 ± 8.7	
ALT	14.7 ± 3.2		42.4 ± 6.7	
Electrolyte counts#				
K^+				
Na^+				
Urea counts#	5.59 ± 0.43		4.92 ± 0.21	
Creatinine counts	71.9 ± 23.2		78.2 ± 21.1	

Table 3: Variation in the blood parameters in mothers during gestation before and after management of the preeclampsia at the obstetric ward of Moi Teaching and Referral Hospital

Problem Statement

Approximately 2–7% of pregnancies are complicated by preeclampsia, depending on population and diagnostic criteria. Among these, severe preeclampsia (SPE) is diagnosed in only 0.6% to 1.2%. Thus preeclampsia in both mild and severe form is an important health concern in developing countries where the incidence and rates of adverse outcomes are high against a background of limited medical facilities and resources which put a strain on an already struggling health system. Preeclampsia is associated with increased maternal mortality and morbidity, e.g. pulmonary edema, eclampsia, renal or liver failure and stroke. Moreover, studies suggest an increased risk of cardiovascular disease later in life for women having had pre-eclampsia. Neonatal complications associated with pre-eclampsia include preterm delivery, intrauterine growth restriction, low birth weight and perinatal death. In addition, low birth weight and growth restriction during fetal life are major risk factors for subsequent cardiovascular disease, according to the fetal origins of adult disease hypothesis In established severe diseases there is volume contraction, reduce cardiac output, enhance vascular reactivity, and increase vascular permeability and platelet consumption. Medical treatment of severe hypertension in pregnancy is required .

Several studies have focused on expectant management of severe pre-eclampsia syndrome before 28 weeks. For instance, Bombrys (2008) found eight such studies that included nearly 200 women with severe pre-eclampsia with an onset at less than 26 completed weeks. Maternal complications were common. Owing to there being no neonatal survivors in women presenting before 23 weeks, the Task Force of the American College of Obstetricians and Gynecologists (2013b) recommended pregnancy termination. The decision is less clear for women with slightly more advanced pregnancies. For example, at 23 weeks gestation, the perinatal survival rate was 18%, but long term perinatal morbidity is yet unknown.

Methods

The study was a prospective hospital based study. It involved a follow up of women diagnosed with severe preeclampsia and managed expectantly from between 28 and 34 weeks. The perinatal outcomes were then observed over time until its logical

Variables	Frequency	Percent
Gravida		
Nulligravida	32	44.4
Primigravida	15	20.8
Multigravida	25	34.8
Parity		
Nulliparous (0)	33	45.8
Primiparous (1)	15	20.8
Multiparous (2)	9	12.5
Grand multiparous (≥ 3)	15	20.9
Duration of pregnancy (days)		
1	17	23.6
1.1-5	17	23.6
5.1-10	20	27.8
10.1-20	14	19.4
> 20	4	5.6
Gestational age at admission		
< 30 weeks	12	16.7
30-32 weeks	23	31.9
≥32 weeks	37	51.4
Gestational age at delivery		
28 weeks < date of delivery < 32 weeks	19	26.4
Date of delivery ≥ 32 weeks	53	73.6
Mode of delivery		
Vaginal	43	59.7
Caesarean	29	40.3
Onset of labour		
Spontaneous	12	16.7
Induced	43	59.7
Caesarean	17	23.6
Trimester at first ANC visit		
No prior ANC visit	4	5.6
First trimester	40	55.6
Second trimester	19	26.4
Third trimester	9	12.5

Table 4: Pregnancy characteristics of 72 severe preeclamptic patients admitted and managed at the obstetric ward of Moi Teaching and Referral Hospital

Variables	Frequency	Percent
Birth weight		
<2500 g (LBW)	67	93.1
>2500 g (NBW)	5	6.9
Fetal mortality		
Dead	11	15.3
Alive	61	84.7
Preterm birth		
Date of delivery 28 to <32 weeks	16	22.2
Date of delivery ≥ 32 weeks	*56*	*77.8*
5 min Apgar score		
0	13	18.1
1-6	8	11.1
7-10	51	70.8
Neonate condition at birth		
Alive	59	81.9
Still birth	13	18.1
Fetal presentation at delivery		
Cephalic	63	87.5
Breech	9	12.5
Neonate admission to special care		
Yes	37	51.4
No	35	48.6

Table 5: Neonatal outcomes of women admitted and managed at the obstetric ward of Moi Teaching and Referral Hospital after conservative management of the preeclampsia

conclusion. This prospective study was carried out in MTRH in the period between November 2015 to April 2016. Information was to be obtained for variables such as age, parity and weeks of gestation, the presence of symptoms like headache, epigastric pain, blurring of vision, urine output and fetal movement were recorded. The study used a quantitative approach with the goal of creating a better understanding of perinatal outcomes of severe preeclampsia among women managed conservatively at MTRH.

Study Population

The study population was all expectant mothers with a confirmed diagnosis of severe hypertension in pregnancy who met the inclusion criteria. The accessible populations were those available in MTRH Eldoret during the time of study. The hospital recorded daily average of 30 deliveries and approximately 15% of all these had preeclampsia.

All women who gave birth within the study period were considered as source population. Women with preeclampsia were identified from all admissions and deliveries. In order to avoid incomplete information, effort was made to gather

as much information as possible from different sources (operation notes, operation record books, nurses' reports and others). A phone call was made to those discharged home before day seven to determine and record newborn status. A record abstraction tool was prepared and data on demographic information, management of cases and outcome was collected into this tool.

Data Collection

Data was collected by means of descriptive survey using questionnaires, semi-structured interviews, observation and document examination (triangulation approach). Triangulation approach was chosen because it offered the use of different research techniques giving many advantages. A Phone call was made to those discharged home before day seven after delivery to determine newborn status.

Questionnaires were used to assess perinatal outcomes of severe Preeclampsia among women managed conservatively remote from term at MTRH's maternity unit.

A checklist was used to collect the information on the availability of supplies. Supplies included equipments, drugs and guidelines. Equipments in the checklist included BP machine, stethoscopes, uristix, catheters, and patellar hammer. Drugs in the checklist will include methyldopa, nifedipine, oxytocin, magnesium sulphate, diazepam, Hydralazine, calcium Gluconate and misoprostol. The checklist also inquired about availability of guidelines. Records were obtained from the health management information system and registry books designed to keep the records about the patients for the total number of antenatal attendees, deliveries and number of the patients with pre-eclampsia.

Inclusion and exclusion criteria

Inclusion criteria: Informed written consent, a confirmed diagnosis of severe preeclampsia, gestational age of 28 weeks to 33 weeks and six days, reassuring fetal testing, No severe intrauterine growth restriction, No suspected placental abruption, well controlled blood pressures, No multi organ dysfunction.

Exclusion criteria: Persistent severe symptoms, multi organ dysfunction, severe intrauterine growth restriction, suspected placental abruption, none reassuring fetal testing, Thrombocytopenia, HELLP syndrome. The exclusion criteria may have led to bias but the hospital protocol and concern for patient safety prevailed in this decision.

Data management and analysis

The data to collected for the purpose of the study was adopted and coded for completeness and accuracy. Statistical Package for Social Sciences (SPSS) version 22 Software and Microsoft Excel were used for all the data analysis and interpretation. The incidence of confirmed preeclampsia was deduced by dividing the number of preeclampsia cases who met the standard clinical definition for preeclampsia and presented in the inclusion criteria and who delivered within the study period divided by the total number of the cases who gave birth within the study period. The data was analyzed statistically using descriptive analysis techniques encompassing frequency distribution, percentages, mean, median and standard deviation.

Frequency and means for age, hospital stay, birth weight, different laboratory investigations for the different stages of preeclampsia were analyzed. The mode of delivery, indications for caesarean section and complication for each diagnostic (severity) group were also analyzed. Risk Ratio and P-value of confidence interval were analyzed to compare across groups of variables (age, parity, address, status, antenatal care, uric acid level).

It also looked into whether the severity of the disease contributed to the high caesarean section rate, or to low vaginal birth rate. Relations between neonatal birth weight or gestational age or caesarean section or the severe preeclampsia to neonatal ICU admission was also analyzed in order to look into the general management and possible financial implications. Inferential statistics were employed to examine the relationships between independent and dependent variables. Correlation coefficient analysis was conducted to determine the relationship between independent variable, and dependent variable.

Ethical considerations

Approval was sought from IREC before the study commenced. Permission to conduct the study was obtained from the management of Moi Teaching and Referral Hospital. All participants were notified about the purpose of the study and requested without any coercion, force or pressure to give a written informed consent before participating. Respect of privacy and confidentiality of the participants was maintained by storing data in key- locked cabinets and use of password coded databases There was no direct financial benefit or compensation for participating in the study. Sound clinical judgment was involved in all stages and aspects of this research.

Results

Social demographic characteristics and preeclampsia
There were a total of 7,763 deliveries during the five months study period. During the study, 21.5 of the patients were noted to have maternal complications. Of the 644 patients with preeclampsia, there were 572 patients who had mild preeclampsia (prevalence of 7.4%) while the remaining 72 had severe preeclampsia (incidence of 0.92%) and therefore the later group met the inclusion criteria for the study and were treated at MTRH. The socio-demographic characteristics of the severe preeclampsia patients admitted and managed at the obstetric ward of MTRH are shown in Table 4.1. The mean age (±SD) of the patients was 27.9 ± 6.6 years (range, 16 – 43 years). In terms of age distribution, majority of the women were aged 24 to 28 years followed by 28 to 32 years and below 21 years were few in the sample. Majority of the women had college level of education (44.4%) followed those with secondary education (27.8%) and primary (25%), while those without educations were few (2.8%). In terms of employment history, 55.6% of the women were unemployed followed by those who were employed (23.6%) and those self-employed were the least at 20.8%. Majority of the respondents were married (80%) while the

Relationship between length of stay before delivery and perinatal outcome.

Length of stay in days	New Born Status At Birth		
	ALIVE	DEAD	% of Total
1 -7	30 (76.9%)	9(23.1%)	53.4
8-14	18(85.7%)	3(14.3)	28.8
≥15	12(92.3%)	1(7.7%)	17.8

Table 6: Length of stay before delivery and newborn status at birth

Length of stay in days	New Born Status on Day 7		% of Total
	ALIVE	DEAD	
1-7	22(73.3%)	8(26.7%)	50
8-14	17(94.4%)	1(5.6%)	30
≥15	9(92.3%)	3(25%)	20

Table 7: Length of stay in days and newborn status on day 7

Duration of stay before delivery in days	5 minute APGAR Score		% of Total
	APGAR< 7	APGAR≥ 7	
1-7	16(53.3%)	14(46.7%)	50
8-14	8(44.4%)	10(55.6%)	30
≥15	8(66.7%)	4(33.3%)	20

Table 8: Duration of stay before delivery and five minute Apgar score

Duration of stay before delivery in days	New born unit admission	% of Total
1-7	20(66.7%)	50
8-14	10(55.6%)	30
≥15	7(58.3%)	20

Table 8: Duration of stay before delivery and Newborn Unit admission

remaining. In terms of areas where the respondents came from, majority of the respondents were from the rural areas (87.5%) while the remaining 12.5% were from the urban areas.

Discussion

Severe preeclampsia is a complex disease with a chronologically unpredictable and progressively deteriorating course. Traditional management has included expedited delivery as the ultimate cure for Severe Preeclampsia, aimed at preventing potential end-organ effects. Serious maternal complications of severe preeclampsia include seizures (eclampsia), placental abruption, disseminated intravascular coagulation, renal failure, hepatic hematoma or rupture, pulmonary edema, acute respiratory distress syndrome, retinal detachment, myocardial infarction, pancreatitis, stroke, and death. Fetal complications include intrauterine growth restriction, hypoxia-acidosis, oligohydramnios, long-term neurologic morbidity, and fetal demise. The current standard of care, therefore, includes prompt delivery of patients with severe preeclampsia if the disease develops at or after 34 weeks gestational age or earlier in case of worsening maternal or fetal status.

To the best of our knowledge, this was the first study of maternal and perinatal outcomes among severe preeclampsia patients undergoing management at the MTRH. There are three main findings from this study that are related to women with severe preeclampsia. First, patients with severe preeclampsia were more likely to extend their pregnancy by up to seven days (one week) on conservative management. Second, in terms of neonatal outcomes, Low birth Weight, Very Low Birth Weight and Extremely Low Birth Weight babies were found more often in the severe preeclampsia group, which may be a result of the fetal indications that were refractory to control of maternal hypertension. This finding was consistent with the occurrence of preterm delivery.

A simple and effective method of screening for pre-eclampsia is to have blood pressure monitoring and proteinuria checked by dipstick in all pregnant women at every antenatal visit. However, information gleaned from patients' antenatal cards show that among all women who developed preeclampsia, only 45.2% had a documented BP and only 24.7% had a documented urine dipstick result, despite a high antenatal attendance rate of 96%.

Failure to screen for such basic but important parameters may reflect the local clinics' lack of access to basic equipment such as sphygmomanometers and urine dipsticks. A study by Urassa et al demonstrated this to be the case in some parts of rural Tanzania[13]. Our study's findings of preeclampsia associated morbidities and their outcomes concur with the findings of several different studies from other parts of the world. Vaginal delivery was the leading mode of delivery at almost 60%, which is comparable to other studies. The presence of preeclampsia alone was not an indication for caesarean delivery, but the decision to perform a caesarean delivery was based on multiple factors which included fetal gestational age, non-reassuring fetal status, the stage of labour and cervical Bishop score.

The perinatal mortality rate in this study was 20.7%, which is almost equivalent to the 21.4% reported in Benin. However, our rate was low compared to 40% at MNH. The higher rate of perinatal deaths in this study and other similar studies and could be explained by the three delays model as explained. Another contributing factor is the limitation in resources for managing extremely preterm infants. This study revealed that the major morbidities contributing to early neonatal deaths were severe birth asphyxia and prematurity. Other studies have reported similar findings. A significant number of low birth weight neonates might have been the result of the high number of preterm deliveries among the preeclamptic patients. Similar findings have been reported in the literature that links the incidence of low birth weight infants with preterm deliveries in preeclamptic patients[14].

Conclusion

This study has demonstrated that the incidence of preeclampsia at MTRH was 1.37% and that the proper management of preeclampsia at our hospital faces similar challenges as those at other hospitals in the developing world. Preeclampsia which was found to cause significant maternal morbidity also contributed significantly to high rates of perinatal morbidity and mortality. The most common contributors of perinatal death were birth asphyxia and prematurity. Patient compliance was not shown to contribute significantly to the delayed management of preeclampsia as demonstrated by the high rates of antenatal clinic attendance. However, many of these women were not screened for preeclampsia during ANC visits and consequently presented late to our hospital, frequently with complications.

Recommendations

While factors such as limited resources and infrastructure are not within the control of the health care practitioner, attention to basic details is possible at antenatal clinics. Early intervention initiated by detection of abnormal values in basic tests such as blood pressure monitoring and urine dipsticks can often change the course of a patient's disease management. Our best chance for reducing maternal and perinatal morbidity and mortality due

to preeclampsia may lie with the promotion of improvements in the quality of basic care provided by our antenatal clinics.

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World Journal of Medical Education and Research

An Official Publication of the Education and Research Division of Doctors Academy

ISBN 978-93-80573-06-9

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