MATERNAL AND PERINATAL OUTCOME IN PATIENTS WITH ECLAMPSIA AT KENYATTA NATIONAL HOSPITAL

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PRINCIPAL INVESTIGATOR:

DR. SOLOMON T. SAMBU, MBChB

M.**MED STUDENT DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY**

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF NAIROBI.

DECLARATION

This is to certify that this study is my original work and has not been presented for a degree course in any other university. I further certify that my study has been supervised by senior members in the department of Obstetrics and gynecology, University of Nairobi.

DR SAMBU SOLOMON MICHAEL TYAA,

Signature…….. Date…….

This is to certify that the commentary in this dissertation was researched upon by DR. Sambu Solomon Michael under my guidance and supervision and the dissertation is submitted with my approval

DR. ALICE K MUTUNGI,

MBCHB; MMED OBS&GYN; MSC REPROD BIOL;MPHL
SENIOR LECTURER,
UNIVERSITY OF NAIROBI

Signature…….. Date……

DR GATHARI NDIRANGU,

MBCHB, MMED OBS&GYN
HONORARY LECTURER,
UNIVERSITY OF NAIROBI

Signature…….. Date…….

CERTIFICATE OF AUTHENTICITY

This is to certify that this dissertation is the original work of Dr Solomon T.Sambu Master of Medicine student in the Department of Obstetrics and Gynecology, registration number H58/70887/2007, University of Nairobi (2007-2011). The research was carried out in the department of Obstetrics and Gynecology, School of Medicine, College of Health Sciences. It has not been presented in any other university for the award of a degree.

Signature.....

Date.....

Prof. Koigi Kamau,

Associate Professor of Obstetrics and Gynecology,

Consultant Obstetrics and Gynecology,

Chairman,

Department of Obstetrics and Gynecology,

University of Nairobi.

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LIST OF ABREVIATIONS

ANC	Ante-Natal Clinic
ARF	Acute Renal Failure
BP	Blood Pressure
C/S	Caesarean Section
EEG	Electroencephalogram
FSB	Fresh still birth
HIV	Human immunodefiency virus
MSB	Macerated still birth
ND	Neonatal death
PET	Pre-eclampsia
PPH	Post Partum Hemorrhage
HELLP	Haemolysis, Elevated Liver enzymes and Low Platelets
KNH	Kenyatta National Hospital
NHIF	National hospital insurance fund

DEDICATION

This book is dedicated to my best friend Wacuka Ngari, my parents Mr. and Mrs. Leonard T. Sambu. Your love and support has been my strength and I sincerely want to thank you.

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DEFINATION OF TERMS

1. Pre-eclampsia

Pre-eclampsia refers to hypertension with protenuria and edema. This usually develops after 20 weeks gestation.

2. Eclampsia

Eclampsia is pre-eclampsia with convulsions that cannot be attributed to other medical causes.

3. Protenuria

This is the presence of protein in urine.

4. Antenatal care

This is the care given to pregnant women at a clinic to prepare them for delivery.

5. SVD

This refers to delivery of a baby vaginally. The presenting part is the vertex.

6. C/S

This is a surgical procedure that involves delivery of a baby through an incision made in the lower abdomen and on the uterus.

ABSTRACT

Background: Eclampsia is defined as pre-eclampsia complicated with convulsions and/or coma. The incidence of eclampsia is 0.2%-0.5% of all deliveries globally [2]. It is a common obstetric emergency in Kenya and it is associated with adverse maternal and neonatal outcomes. Some of the documented complications are pulmonary edema, cerebral hemorrhage, acute renal failure and placental abruptio.

Facilities for intensive care are scarce in low resource settings. Identifying determinants of maternal and perinatal outcome among eclamptics will provide insight as to which group of mothers at risk would benefit from earlier referral.

Objective: To study the determinants of maternal and perinatal outcome among patients with eclampsia at Kenyatta National Hospital.

Design: This was a Cross-sectional descriptive study.

Methodology: All mothers with eclampsia admitted in labor ward, ante-natal wards and those reviewed in the postnatal clinic were interviewed and information collected with respect to age, parity, ANC attendance, duration of gestation, place of first fit, BP and degree of protenuria at admission, fit –delivery interval, clinical management, mode of delivery, perinatal outcome, maternal mortality and duration of hospital stay was recorded in a questionnaire. Additional was obtained from patient records.

Setting: The study was conducted at Kenyatta National Hospital labor ward, antenatal wards and post natal clinic. KNH is Kenya's largest referral hospital.

Data collection analysis: Data collected was entered into a a database. This data was then analyzed electronically using SPSS widows statistical software. The chi square test was used to identify factors that were related to development of complications.

Outcome measures: The study variables include age, parity, booking status, gestational age, location at time of first seizure, number of fits, seizure to delivery interval, maternal complications and the clinical management.

Results: During the study 135 patients who developed eclampsia and who met the inclusion criteria were interviewed. The predictors of outcome were age, parity, booking status, gestational age, location at time of first seizure, number of seizures and seizure interval and delivery. There was no significant relationship between socio-demographic characteristics and development of complications($p > 0.05$). The majority of the patients who had not attended ANC (61.9%) developed complications. The relationship between the attendance of ANC and non-attendance and the occurrence of complications was statistically significant. ($p=0.0001$)

There was a statistically significant relationship between the diastolic BP and development of complications ($p=.001$).The commonest complications were pulmonary oedema (17.7%), acute renal failure (22.6%) ,sepsis (14.5%), postpartum hemorrhage, (11.3%) and abruptio placenta (11.3%). Development of complications significantly affected maternal mortality ($p=0.031$).The incidence of perinatal mortality was 2.8/1000 deliveries. The case fatality rate was 5.1%.

Conclusion: Development of complications in eclampsia was significantly influenced by ANC attendance and the diastolic blood pressure on admission.

Recommendations: From the study findings it is important for health care workers to review the management of eclampsia to address the rising case fatality rate. There is also need for increased vigilance of patients who have had no antenatal care.

INTRODUCTION

Hypertension in pregnancy is a common obstetric complication. The identification and effective management of eclampsia plays a significant role in ensuring a good maternal and perinatal outcome of pregnancy [1].

Hypertensive disorders complicating pregnancy have been classified into;

1. Pre-existing hypertension
2. Pre-eclampsia
3. Eclampsia
4. Pre-eclampsia in addition to pre-existing chronic hypertension

Pre-existing hypertension is defined as a systolic blood pressure of 140 mmHg or greater, and/or a diastolic blood pressure of 90 mmHg or more, either pre-pregnancy or before 20 weeks.

Pre-eclampsia is defined as a systolic blood pressure of 140 mmHg or greater, and/or a diastolic blood pressure of 90mmHg or more ,developing after 20 weeks gestation accompanied by protenuria with or without edema.

The minimum criterion for diagnosis of pre-eclampsia is;

1. BP greater or equal to 140/90 mmHg, after 20 weeks gestation. An increase of 30 mmhg for systolic blood pressure and 15 mmhg for diastolic blood pressure above the ANC booking blood pressure is significant.
2. Protenuria greater or equal to 300mg per 24hrs.

Eclampsia is defined as the occurrence of seizures that cannot be attributed to other causes in a woman with pre-Eclampsia [2].

Once eclampsia occurs, the risk to the mother and fetus is appreciable.

HELLP syndrome is one of the documented maternal complications, with a reported incidence of 2.8% at KNH[3.]

Pulmonary edema was documented in 2.9% of patients with pregnancy induced hypertension at KNH [3].Sibai and colleagues found an incidence of 2.9 % of pulmonary edema in patients with pregnancy induced hypertension[3].

Cerebral hemorrhages ranging from petechiae to gross bleeding in the brains of women with eclampsia examined soon after death have been documented[4.]

Other complications include placental abruptio, neurological deficits , pulmonary edema, cardiopulmonary arrest, acute renal failure and maternal death [5].

Eclampsia is most common in the last trimester and becomes increasingly more frequent as term approaches. Depending on whether convulsions appear before, during or after labor, eclampsia is designated as ante-partum, intra-partum or postpartum respectively. Treatment consists of anticonvulsant therapy to control convulsions and control of BP, followed by delivery. Once the patient is stable delivery is planned. Patients with a favorable Bishop score and without any contraindications to vaginal delivery are delivered vaginally.Those with a poor bishop score or any obstetric indications for a Caesarian section are delivered surgically[2].

CHAPTER 1: LITERATURE REVIEW, JUSTIFICATION AND OBJECTIVES

1.1 LITERATURE REVIEW

Burden of eclampsia

Eclampsia is a common obstetric emergency. It is a common cause of maternal and perinatal morbidity and mortality. The incidence of eclampsia is 2-5/1000 for all deliveries[2].High incidences have been reported in Kenyan hospital based studies. At KNH the incidence of eclampsia was reported to be 1.8/1000 deliveries by Mati while Machoki reported an incidence of 1.9/1000 deliveries [7, 8]. Bansal at pumwani maternity hospital reported an incidence of 1.04/1000 deliveries[9].

Pathophysiology

The pathogenesis of eclamptic seizures is poorly understood. Seizures have been attributed to platelet thrombi, localized vasoconstriction and foci of hemorrhage in the brain cortex. There is evidence from autopsies that the problem is ischemia secondary to intensive vasoconstriction [10].

Naidu in his study using CT –scan single photon emission and transcranial sonography concluded that the patho-physiology of eclampsia is primarily cerebral vasospasm with resultant ischemia and cerebral edema involving the main watershed areas and the parieto-occipital areas of the brain. Vasoconstriction is a protective reflex in response to extremes of arterial pressure to ensure that cerebral perfusion remains constant .Specific EEG abnormalities can usually be demonstrated for sometime after a seizure. Most of these abnormalities subside within three months[11].

Clinical presentation

Almost without exception pre-eclampsia precedes the onset of eclamptic convulsions. Depending on whether convulsions occur before, during or after labor eclampsia is designated ante-partum, intra-partum or post-partum.

Patients present with tonic-clonic convulsions then coma ensues. Unless treated the first convulsion is usually the fore-runner of others which may vary in number from one or two in mild cases or even continuous convulsions, a condition known as status epilepticus[2].The woman does not remember the convulsion or, in all probability, events immediately before. Over time this memory returns. The duration of coma after a convulsion is variable. When the convulsions are infrequent the woman usually recovers some degree of consciousness after each attack. Protenuria is almost always present and frequently pronounced. Urine output is likely diminished appreciably and occasionally anuria develops. Haemmoglobunuria is common, but haemmoglobinaemia is rarely observed[10].

Complications

Matter and Sibai described the hazard in 399 consecutive women with eclampsia delivered between 1977and1998 in their centre in Memphis. Major complications included: Placental abruption (10%), neurological deficits (7%), aspiration pneumonia (7%), pulmonary edema (7%), cardiopulmonary arrest (4%), ARF (4%), maternal death (1%).Wasiche reported maternal complications in 67% of a patients with eclampsia in KNH.

The commonest complications were sepsis 40.4%, pulmonary edema 25.3%, acute renal failure 10.4%, and cerebral hemorrhage 10.4%. The maternal mortality was 0.48/1000 deliveries [12].

From literature review the main complications are;

a)Neurological deficits

In about 10% of women with eclampsia some degree of blindness follows a seizure. The causes of blindness or impaired vision are varying degrees of retinal detachment and occipital lobe ischemia or edema. In both instances the prognosis for return to normal is good and is complete within a week[13].

About 5% of women have substantively altered consciousness including persistent coma following a seizure. This is due to cerebral edema and transtentorial herniation[14].Headaches and visual symptoms are common with severe pre-eclampsia and associated convulsions define eclampsia. Principal postmortem brain lesions are hyperemia, ischemia, thrombosis, edema and haemmorrage.In an older series Govan reported that cerebral hemorrhage was the cause of death in 39 out of 110 fatal cases of eclpmpsia[15]. Sheehan found hemorrhages ranging from petechiae to gross bleeding in 56% of 48 females with eclampsia he examined soon after death[5].

Headaches and visual symptoms are common with pre- eclampsia and associated convulsions define eclampsia. The principal postmortem lesions are edema, hyperemia, ischemia, thrombosis and haemmorrage[5,10].

b) HELLP syndrome

This is an acronym for haemolysis [H], elevated liver enzymes [EL], and low platelets [LP].The incidence of the syndrome varies. In one large study it was identified in almost 20% of women with severe pre-eclampsia or eclampsia[16]. In a multicenter study, Haddad and colleagues described 183 women with the syndrome, adverse effects occurred in 40% of cases and 2 women died[17] .

c) Renal

Renal tubular lesions are common in women with eclampsia. Acute Renal failure from acute tubular necrosis may develop. Such kidney failure is characterized by oliguria and anuria and rapidly developing azootemia. Drakely and co-workers described 72 women with eclampsia and renal failure, half of whom had HELLP syndrome and a third of whom had placental abruption[18] .

Haddad and colleagues reported that 5% of 183 women with HELLP syndrome developed renal failure. Half of these also had placental abruption and most had Post partum hemorrhage. Irreversible renal cortical necrosis was uncommon in the study population[17].

d) Maternal death

The prognosis for eclampsia is always bad; it is one of the most dangerous conditions in pregnancy. Eastman and Hellmann reported a maternal mortality rate of between 10 and 15% of patients with ecampsia[19]. Berg and co-workers reported a rate of 6% for the period 1991-1997[20].

e) Fetal effects

Because of maternal hypoxemia and lactic academia caused by convulsions, it is not unusual for fetal bradycardia to follow a seizure. This usually recovers within 3 to 5 minutes. If it persists for more than ten minutes, another cause such as placental abruption or imminent delivery should be considered [10]. The perinatal mortality is very high to the extent of 30-40%. The causes are prematurity, intra-uterine asphyxia arising out of infarction, retro- placental hemorrhage and spasm of the utero-placental vasculature. Effects of drugs used to control the convulsions and trauma during operative delivery also contribute to the high perinatal mortality rate[1.]

Clinical management

Pritchard and associates initiated a standardized treatment regimen for eclampsia. The results of this regimen employed 245 women with eclampsia. The treatment consists of a loading dose of magnesium sulphate of 4g slowly over 10 minutes, followed by a maintenance dose of 1g per hour.

Magnesium sulphate is discontinued 24 hours after delivery or 24 hours after the last convulsion whichever comes first. BP control is by an infusion of hydrallazine[21] .Studies have also been done to compare the efficacy of magnesium sulphate to other anticonvulsants (phenytoin and valium).

The multi-national Eclampsia Trial Collaborative Group studied the efficacy of magnesium therapy . This study involved 1687 women. In one study 453 women were randomly given magnesium sulphate and compared with 452 given diazepam. Another 388 eclamptic women were randomly given magnesium sulphate and compared with 387 women given phenytoin. The death rate was 3.8% in the 453 women randomly allocated magnesium sulphate compared with 5.1% in the 452 women given diazepam. The mortality rate in the group given phenytoin was 5.2%
Maternal mortality was lower in the magnesium group compared with that in the phenytoin group (3.8%vs5.2%)[22].

Maternal and perinatal outcome

There are few studies that have been done to look at determinants of maternal outcome in patients with eclampsia in developing countries. Majoki and colleagues evaluated 25 425 deliveries over an 18 month period at Harare maternity hospital. Of these deliveries 151 women had eclampsia. The case fatality ratio was 26.5% and 67.5% of the seizures occurred ante-partum. The majority of the fatal cases involved women above 35 (25.8%vs22.3%) .Deficiencies in clinical management were more common in the women who died (39.5%vs20.9%) [23]. Shanaz and colleagues evaluated 2200 deliveries at the postgraduate teaching hospital Peshawar, Pakistan. Fifty of the admitted women were eclamptic. The ante-partum/intra-partum and post-partum incidences of eclampsia in the 50 admissions with eclampsia were 72% and 28% respectively . All patients were unbooked and belonged to a low socio-economic status. A total of 4 deaths were due to eclampsia[24].Wasiche in 1999 reported an incidence of eclampsia of 10/1000 deliveries compared with 1.8/1000 and 1.9/1000 deliveries by Mati and Machoki respectively [7, 8.]

Innocent O. George and Israel Jeremiah conducted a prospective cross-sectional study on 88 mothers presenting with eclampsia at University of Port Harcourt Teaching Hospital in Nigeria.

There aim was to asses the perinatal outcome in these mothers. They looked at the socio-demographic characteristics, mode of delivery, perinatal complications and outcome. Unbooked patients who had received inadequate or no antenatal care comprised 90.9% of the women who presented with eclampsia.The mean gestational age at presentation was 35.04 ± 4.21 weeks with a range of 24 weeks - 43 weeks and 57.1% of them presenting preterm . Caesarean delivery was the commonest mode of delivery 49 (55.7%).The total number of births was 90, which included 86 singleton births and 2 sets of twins with a mean birth weight of 2.44 ± 8.18 Kg and a range 0.7 Kg-4.0 Kg. Fifty four babies (61.4%) were admitted into the special Care Baby Unit. The indications for admission were; prematurity (n=23), low birth weight (n=10), severe birth asphyxia (n=12), neonatal jaundice (n=4) and neonatal sepsis (n=5).There were 37 perinatal deaths, giving a perinatal mortality rate of 411.1 per 1000 live births of babies born to eclamptic mothers. These included 19 still births (51.4%) and 18 early neonatal deaths (48.6%). Birth asphyxia (33.3%), respiratory distress syndrome (22.2%) and prematurity (22.2%) were the commonest causes of neonatal deaths. Babies of unbooked mothers accounted for 66.7% of the perinatal deaths. This was significantly higher than the perinatal deaths among babies of booked mothers[25].Mwinyoglee J and colleagues studied the epidemiology of eclampsia and the maternal and fetal outcome at Ga-Rankuwa hospital in South Africa in the period 1st January 1994 to December 1995.Out of 18145 women delivered, 66 had eclampsia (3.6/1000). Of the 36 maternal deaths in the same period, 14 (38.9%) were caused by eclampsia. The case fatality rate was 21.2%. Maternal mortality was significantly higher in the unbooked population, women aged 30 years

and above, and those with multiple fit. The mean (SD) maternal age was 22.3 (6.8) years and fits occurred in the presence of high diastolic blood pressure (mean 113.7 +/- 15.6 mmHg).

The majority of fits (90.1%) occurred at home and in 70.3% of patients, this happened before 37 weeks (mean gestational age 33.2 (3.9) weeks). In 77.3%, eclampsia was ante-partum while it occurred postpartum in 4.5% of cases. The caesarean section rate was 66.7% . The perinatal mortality rate was 47.7% and maternal complications were varied and severe. They concluded that health care providers failed to act on warning signs in 14 (46.7%) of the 30 booked patients that were evident long before they developed fits[26].

Chaudhary P carried out a hospital based retrospective study to determine the incidence, clinical profile of eclamptic patients and the effect of current intervention strategy for eclampsia on maternal and perinatal outcome at Kathmandu maternity hospital.

He analyzed the case of records of all eclampsia cases from mid-April, 2000 to mid-April, 2001.

The Incidence of eclampsia was found to be 2.9 per 1000 deliveries. Eclampsia was primarily a disease of young women (97.22%) and nulliparas (80.85%). Approximately half of eclamptic patients had some ante-natal care (55.31%) and majority of them had fits before the onset of labor (70.21%). Most eclamptic patients presented with fits at term pregnancy (72.34%). About three fourth of them started fitting at home (74.46%) but one fourth had the first fit while already admitted in the hospital (25.53%).

Caesarean section was the common mode of delivery (55.31%).

There was no maternal death. The majority of patients stopped fitting upon intervention (80.85%) and went home within three weeks (95.73%). One fifth of babies died [stillbirths (14%), neonatal deaths (6%)] [27].

Studies have also been carried out in the developed world to establish factors that result in poor maternal and fetal outcome.

Dr H.Sawhney and colleagues carried out a retrospective analysis of 69 maternal deaths due to (eclampsia-61:severe pre-eclampsia-8) during a period of 17 years (1982-1998).Maternal condition on admission, associated complications and principal cause of death were analyzed in each case. They found that the mean time interval between hospitalization and maternal death was 49.56 + 62.01 hrs (1–240 hrs).Twenty (28.9%) women died undelivered. Twenty-three (37.7%) women were in grade IV coma and 52.4% of eclampsia patients had recurrent convulsions (> 10) prior to admission. Associated complications in form of hemorrhage, cerebrovascular accidents, acute renal failure, jaundice, aspiration pneumonia and pulmonary oedema were 30.4, 31.8, 34.8, 18.8, 17.8, and 5.8%, respectively. Maternal mortality in eclampsia was significantly low in time period B (4.1%) when magnesium sulphate was used as an anticonvulsant. They concluded that maternal condition on admission and associated complications are the major determinant of maternal outcome. Use of magnesium sulphate is associated with a significant reduction of maternal mortality[28].

Mackay A. and colleagues examined the role of pre-eclampsia and eclampsia in pregnancy related mortality They used data from the Centers' for Disease Control and Prevention's Pregnancy Mortality Surveillance System to examine pregnancy-related deaths from pre-eclampsia and eclampsia from 1979 to 1992. The pregnancy-related mortality ratio for pre-eclampsia and eclampsia was defined as the number of deaths from pre-eclampsia and eclampsia per 100,000 live births. Case-fatality rates for 1988-1992 were calculated for pre-eclampsia and eclampsia deaths per 10,000 cases during the delivery hospitalization, using the National Hospital Discharge Survey.

They found that of the 4024 pregnancy-related deaths at 20 weeks' or more gestation in 1979-1992, 790 were due to pre-eclampsia or eclampsia (1.5 deaths/100,000 live births). Mortality from pre-eclampsia and eclampsia increased with increasing age. The highest risk of death was at gestational age 20-28 weeks and after the first live birth. Black women were 3.1 times more likely to die from pre-eclampsia or eclampsia as white women. Women who had received no prenatal care had a higher risk of death from pre-eclampsia or eclampsia than women who had received any level of prenatal care. The overall pre-eclampsia-eclampsia case-fatality rate was 6.4 per 10,000 cases at delivery, and was twice as high for black women as for white women.

They concluded that the continuing racial disparity in mortality from pre-eclampsia and eclampsia emphasizes the need to identify
those differences that contribute to excess mortality among black women, and to develop specific interventions to reduce mortality from pre-eclampsia and eclampsia among all women [29].

Prognosis

Eclampsia remains one of the most dangerous conditions in pregnancy. Between 1991 and 1997, approximately 6% of maternal deaths in the United States were related to eclampsia.The study indicates that eclampsia should be considered as a major threat to maternal life [21].

Prevention

Early detection and treatment of pre-eclampsia may prevent eclampsia. Generally all ante-natal mothers less than 25 years of age and having their first baby should be monitored closely as they are at risk of developing pre-eclampsia than the rest of the population [8, 9].

The roll-over test done in mid trimester is positive if there is a rise of diastolic blood pressure of 20 mmHg or more.

Onuoga in his study on 46 primigravida at 28-32 weeks found of the 13 patients who developed pre-eclampsia 11 of them had a positive roll-over test[30]. The mean arterial pressure can also be used as a predictive test, where a value of 105mmHg or more is significant [31].

Alpha feto-protein (AFP) is found elevated in open neural tube defects, congenital nephrosis, multiple pregnancy and intra- uterine fetal death (IUFD). These conditions can be diagnosed by ultra sound.

For patients with unexplained elevation of alpha feto- protein some have been found to develop pre-eclampsia later in pregnancy[32].

Assay of cholesterol in the first trimester may also be useful in predicting the development of pre-eclampsia.

Van der Elzen in a study on pregnant women 36 years and over in the first trimester found that total cholesterol level was associated with development of pre-eclampsia especially for levels greater than 6mmol//[33].

For patients who develop severe pre-eclampsia magnesium sulphate has been used to prevent the development of eclampsia[34].Michael A. Belfort and colleagues carried out a study to compare the efficacy of magnesium sulphate and nimodipine for the prevention of eclampsia.The conducted an unblinded, multicenter trial in which 1650 women with severe pre-eclampsia were randomly assigned to receive either nimodipine (60 mg orally every 4 hours) or intravenous magnesium sulfate (given according to the institutional protocol) from enrollment until 24 hours post partum. High blood pressure was controlled with intravenous hydrallazine as needed. The primary outcome measure was the development of eclampsia, as defined by a witnessed tonic–clonic seizure. Demographic and clinical characteristics were similar in the two groups.

The women who received nimodipine were more likely to have a seizure than those who received magnesium sulfate (21 of 819 [2.6 percent] vs. 7 of 831 [0.8 percent].

The adjusted risk ratio for eclampsia associated with nimodipine, as compared with magnesium sulfate, was 3.2 (95 percent confidence interval, 1.1 to 9.1). The ante-partum seizure rates did not differ significantly between the groups, but the nimodipine group had a higher rate of postpartum seizures (9 of 819 [1.1 percent] vs. 0 of 831, P=0.01). There were no significant differences in neonatal outcome between the two groups. More women in the magnesium sulfate group than in the nimodipine group needed hydrallazine to control blood pressure (54.3 percent vs. 45.7 percent)[35].

1.2 RESEARCH QUESTION

What are the determinants of maternal and perinatal complications in women admitted with eclampsia at Kenyatta National Hospital?

1.3 RATIONALE AND JUSTIFICATION

Eclampsia is a common obstetric emergency and a common cause of maternal and perinatal morbidity and mortality.

The maternal mortality rate ranges between 1-20% while the perinatal mortality rate ranges between 130-300/1000 deliveries[14].Maternal complications may occur in eclampsia and they include pulmonary oedema, acute renal failure, cerebrovascular hemorrhage, and cerebral oedema. There are few studies that give statistics on prevalence of maternal complication and the determinants of outcome at KNH.

Undertaking this study this was justified because of several reasons. One, facilities for intensive care are scarce in low resource settings. Identifying determinants of maternal and perinatal outcome will provide insight as to which group of mothers at risk would benefit from increased vigilance. Secondly, from literature review, eclampsia is still responsible for considerable morbidity and mortality for the mother and the baby. HEELP syndrome, acute renal failure, DIC and pulmonary oedema are its serious complications and preventing them is a challenge. This challenge will be met if there is willingness to carry out studies to determine the mothers at risk of developing eclampsia in facilities across the country.

Thirdly there is very little data on the determinants of maternal and perinatal outcome in eclampsia in our country that can be used during investment in maternal health. This study is aimed at identifying the causes of poor maternal and perinatal outcomes and applying the findings to improve maternal and perinatal outcomes.

1.4 OBJECTIVES

Broad objective

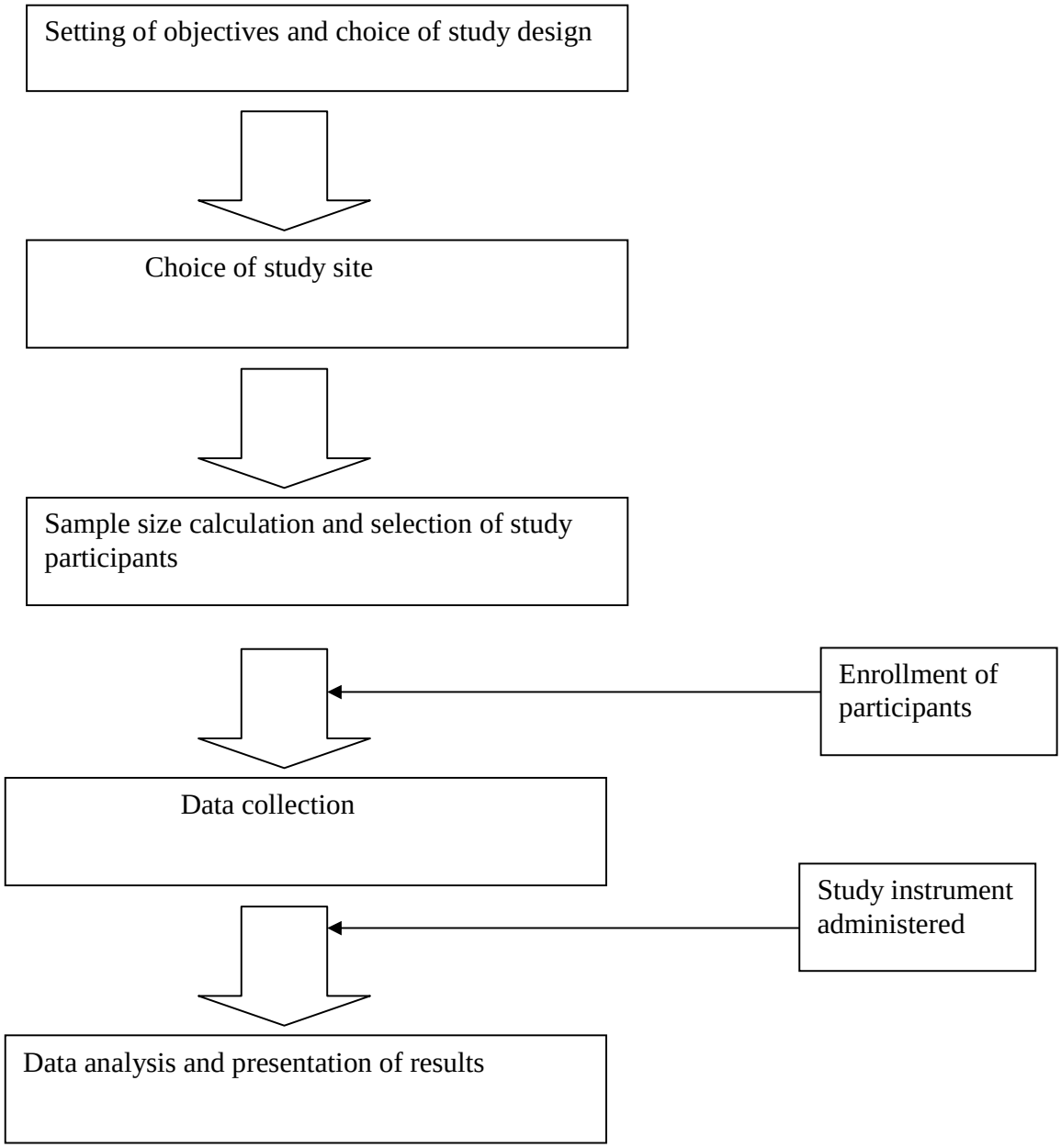
- To establish the factors that determine maternal and newborn outcome in patients with eclampsia.

Specific objectives

1. To determine the socio-demographic and obstetric characteristics of patients who present with eclampsia at Kenyatta National Hospital.
2. To describe the clinical management instituted in patients with eclampsia.
3. To describe the maternal and new born complications and outcomes and their prevalence.
4. To determine the predictors of maternal and new born complications.

1.5 CONCEPTUAL FRAMEWORK

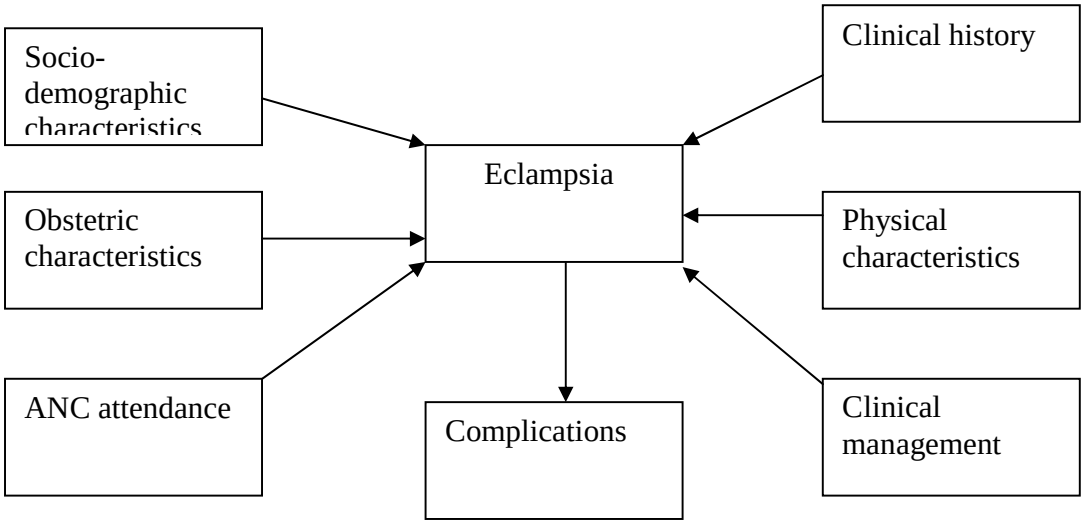
Figure 1: Summary of the study



The study began with a recognition of the fact that eclampsia is a common obstetric emergency that is life threatening to both the mother and the child. A research question was formulated to determine the maternal and perinatal

outcome in eclampsia. Objectives for the study were set and the study design chosen, (Crossectional descriptive). Kenyatta National hospital was selected as the study site due to its size and suitability. A suitable sample size was calculated and study participants enrolled, figure 1.

Figure 2: conceptual framework



The variables studied were the socio-demographic characteristics, obstetric characteristics, ANC attendance, clinical history, physical characteristics and clinical management, figure 2.

CHAPTER 2: STUDY DESIGN AND METHODOLOGY

2.1 Study design

This was a cross-sectional descriptive study. Patients with eclampsia were interviewed at labor ward, postnatal wards and post natal clinic. This was able to capture all patients admitted with eclampsia at KNH.

2.2 Study site

The study was done at Kenyatta National Hospital (KNH) which is located in Nairobi, the capital city of Kenya

Kenyatta National Hospital is one of the two level six referral hospitals in Kenya. The obstetric unit has 3 antenatal wards, one labor ward and 2 maternity theatres. Labor ward has a bed capacity of 20 beds. Pregnant mothers report to the labor ward where a team comprising a resident in obstetrics and gynecology and midwives manage the patients. A specialist on call is usually ready to offer guidance and assistance. There is an acute room with 3 beds for managing very sick mothers including those with eclampsia.

On average 40 mothers are attended to every day. There is a standard protocol for the management of eclampsia. In the protocol, once a mother is diagnosed with eclampsia convulsions are controlled with an initial loading dose of 4g of 20% magnesium sulphate given intravenously slowly over 5 minutes. This is followed with 1ntramuscular injection of 10g of 50% magnesium sulphate. Five grams is injected into each buttock. Blood pressure control is with 5mg of hydrallazine intravenously every 15 minutes till the diastolic blood pressure is less than 110mmgh. The vital signs, patellar reflexes and urine output are monitored.

2.3 Study population

This comprised of women admitted with eclampsia at labor ward and those on follow up in the postnatal clinic in KNH. Information about the diagnosis was obtained from the patients clinical records.

Inclusion criteria

Mothers admitted with eclampsia at KNH labor ward, antenatal ward and those on follow up in the postnatal clinic who consented.

Exclusion criteria

- Mothers with other obstetric complications unrelated to eclampsia.
- Mothers with other underlying chronic illnesses.
- Mothers under 18 years of age with no next of kin.

2.4 SAMPLE SIZE CALCULATION AND SAMPLING PROCEDURE

2.4.1Sample size calculation

From literature review the prevalence of complications was 8.6% [25].
For purposes of calculation the prevalence of complications (8.6%) was used to determine the sample size.
The following formula was used for sample size determination.

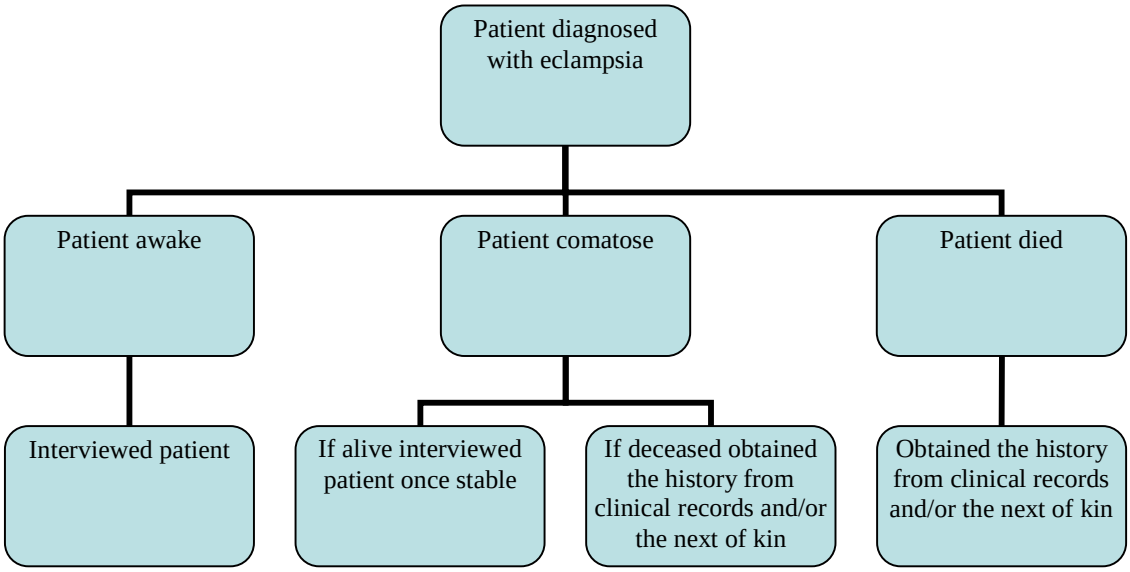
$$n = \frac{N \times Z^2 \times P(1-P)}{d^2 \times (N-1) + Z^2 \times P(1-P)}$$

Where
n = minimal sample size.
N=Number of deliveries in KNH in a year (average 1800).
Z=standard error from the mean corresponding to 95% confidence interval
Taken as 1.96
P=prevalence of maternal complications in eclampsia taken as 8.6%%.
D=precision/reliability with which to determine p taken as 0.05.
The minimum calculated sample size was 135.
The aim of the study was to estimate the frequency of complications with an error margin of 5%.

2.4.2 Sampling procedure

Consecutive women diagnosed with eclampsia and being managed in labor ward, antenatal ward and post natal clinic who consented were recruited into the participate in the study. This procedure of recruitment was applied till the sample size was obtained. Patients who were comatose were interviewed once they were stabilized and able to consent.(figure 3)

Figure 3: Summary of the interview process



Consenting process

The process of getting consent was private. The patient her next of kin was again briefed on the nature of the study and its justification. Then the patient was given the consent form to read. If there were any questions, these were answered by the interviewer. When the patient was satisfied she signed the consent form. For patients who could neither read nor write the interviewer read the consent form in Kiswahili and if the patient agreed to participate her right thumbprint was taken. Members' of staff on duty assisted if communication was a hindrance. For mothers' under 18 years of age the consent was obtained from the next of kin.

2.4.3Data collection procedure

The study was conducted at KNH labor ward, postnatal wards and postnatal clinic.

Recruitment and training of research assistants

Two midwives from KNH labor ward whom I recruited and trained assisted in data collection. Recruitment was based on merit and these midwives' past experience in data collection. The midwives were trained on the study design and objective.

Pre-testing of the data collection instrument

The pre-testing of the data collection instrument (questionnaire) was done by the research team before the actual study begun .The main aim of this exercise was to establish the suitability, practicability and reliability of the study questions. Pre-testing took place at KNH labor ward. Ten questionnaires were used during this exercise. Information obtained was used to update the questionnaire and make changes accordingly.

Data coding and quality control

The following data coding procedures were used;

1. Exhaustive: a unique code was created for each category, for example marital status (single, married, divorced or widowed)
2. Mutually exclusive: information being coded was assigned to one category, for example was the BP high (yes or no)
3. Residual other: provided for the participant to provide information that is not anticipated, for example any documented medical condition (none, diabetes mellitus, Cardiac disease, epilepsy, other).

Data collection

Mothers admitted with eclampsia were interviewed on admission if conscious. Mothers were also interviewed in the antenatal ward and in the postnatal clinics.
Very sick mothers were clinically stabilized first before conducting the Interview.
Mothers eligible for the study were identified from the clinical history. Those who met the inclusion criteria were briefed on the nature of the study and its justification. In cases where the mother did not understand English or Kiswahili, help was sought from any member of staff on duty who understood the patients' language.
This was carried out by two research assistants and myself when available. The research assistants were midwives who have worked in labor ward for more than 10 years.
Patients admitted at night when none of us were there were interviewed the following day.

Those who consented were randomly allocated numbers ranging from 1 to 135. These numbers were contained in unmarked envelopes. This was for the purposes of avoiding any bias.

The process of data collection was through face to face interviews and was conducted in private.

The interviewer made the patient comfortable then proceeded to ask questions from the questionnare.The interviewer stuck to the questions on the questionnaire.

Some information on the questionnaire, for example renal function was obtained from the clinical records because the patient did not have access to this information.

Data collection was uniform. A black pen was used during the exercise and a tick was inserted in the box after the question.

Once the interviewer completed the interview he/she went through the questionnaire to check for errors or any omissions made during the interview process. The questionnaire was then filed to avoid data loss. Once the study was complete the data was entered into frequency tables through tallying.

For patients who died before the interview information was obtained from the next of kin and the patients clinical records.

2.5DATA MANAGEMENT AND STATISTICAL ANALYSIS

2.5.1 Data management

All participants' data did not bear the names of the participant but rather a serial number. Data forms were kept in a secure lockable cabinet only accessible by the principal investigator and the statistician. Data was entered into a password protected Ms Access database prepared by the statistician. The investigator upon completion of data entry checked all the entered data against the hard copy forms.

2.5.2 Statistical analysis

Data analysis was performed using Statistical Package for Social Scientists. Descriptive statistics were determined during the analysis. The chi square and Mann -Whitney u test were applied to identify factors were related to development of complications in the patients who presented with eclampsia.

2.6 ETHICAL CONSIDERATIONS

Confidentiality of the results was paramount and was maintained.

This study was approved by the Kenyatta National Hospital Ethics and Research Committee. Informed consent was obtained from the client before being recruited. This involved signing a consent form after an explanation by the investigator about the details of the study. This included the facts and basis of the study, the risks and benefits anticipated as well as confidentiality and voluntary nature of the study.

The contact address of the investigator was given to the client in case she may have required further details about the study or may have wished to withdraw from the study. The information was communicated both verbally and in writing (appendices 1 and 2). Refusal to participate in the study did not deny the patient the appropriate management. The client did not bear any cost. The next of kin for very ill patients were also briefed on the nature of the study and those who agreed to be interviewed and consented on the patients behalf were included in the study.

2.7 STUDY LIMITATIONS

The constraints encountered included;

- Some patients were unconscious and unaccompanied making data collection difficult.
- Some patients recall was not absolute when they were asked what was already in the past.

For the patients who were unconscious interviews were conducted once they regained consciousness. Relatives were contacted during visiting hours to collaborate the history when need arose. These constraints did not impact on the interpretation of the final findings

CHAPTER 3.RESULTS

The study was conducted over a period of five months between January 2011 and May 2011. Patients with eclampsia were interviewed

Table 1: Socio-demographic characteristics (n=135)

Variable		Count	%
Age	14-18 years	14	10.4%
	19-23 years	45	33.3%
	24-29 years	52	38.5%
	29-33 years	18	13.3%
	>33	6	4.4%
	Total	**135**	100
Education	None	9	6.7%
	Primary	88	65.2%
	Secondary	37	27.4%
	Tertiary	1	.7%
	Total	**135**	100.0%
Residence	Urban	123	91.7%
	Rural	11	8.3%
	Total	**135**	100.0%
Marital Status	Single	20	15.0%
	Married	114	84.2%
	Divorced	0	.0%
	Widowed	1	.8%
	Total	**135**	100.0%

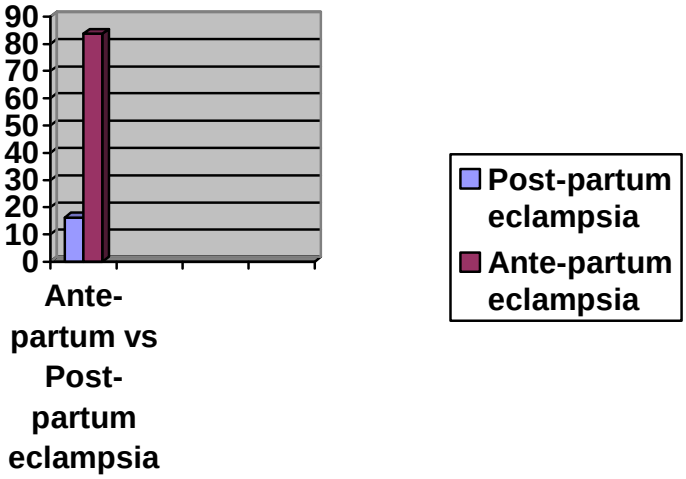
The age ranged from 17 to 36 years with a mean of 22 years (SD.5.4).Most of the patients were (82.2%) below 29 years and 84.2% were married.

Majority of patients (65.2%) had attained primary level of education and were urban dwellers (91.7%) This is in keeping with the socio-demographic characteristics of patients who seek services in KNH. (Table 1)

Table 2: Ante partum Vs Postpartum eclampsia

Delivery	**Yes**	22	16.3%
	No	113	83.7%
	Total	**135**	**100.0%**

Figure 4 :Ante-partum vs. post partum eclampsia



One hundred and thirteen patients (83.7) fitted before delivery and 22 (16.3%) fitted after delivery. This is in keeping with the observation in various studies where eclampsia is most common as term approaches, (Table 2) (Figure 4)

Table 3: Gestational age for the patients with ante-partum eclampsia (n=113)

Gestation (weeks)	Count	%
≤ 28	2	1.7
29-32	12	10.6
33-36	98	86.7
≥ 37	1	1
Total	**113**	**100**

Gestation ranged from 24-40 weeks with a mean of 33 (SD5.1 weeks) Majority of patients were between 33-36 weeks (86.7%) This was in keeping with the fact that eclampsia is most common in the third trimester of pregnancy. (Table3)

Table 4: Antenatal Clinic Attendance

ANC	Yes	82	60.7%
	No	53	39.3%
	Total	**135**	**100.0%**
ANC Place	Rural health center	7	8.8%
	City council	61	73.8%
	Private clinic	8	10.0%
	Public hospital	6	7.5%
	Total	**82**	**100.0%**
Gestation at first visit	Less than 20 weeks	2	2.4%
	21-28 weeks	67	81.7%
	29-36 weeks	12	14.6%
	>36 weeks	1	1.2%
	Total	**82**	**100.0%**

Most of the patients (60.7%) had started ANC attendance with the majority attending city council clinics (73.8%). Most of the patients started ANC attendance between 21-28 weeks (81.7).This is in keeping with ANC attendance in the city of Nairobi. (Table 4)

Table 5: Complications during ANC visits (n=82)

High BP noted	**No**	72	88.1%
	Yes	10	11.9%
	Total	**82**	100.0%
Protein noted	**No**	78	96.3%
	Yes	4	3.7%
	Total	**82**	100.0%
Swelling of Legs noted	**No**	7	13.3%
	Yes	75	86.7%
	Total	82	100.0%

Most of the patients did not have an elevated BP (88.1) or protenuria (96.5%) noted during ANC.

In this study 86.7% reported the presence of oedema in pregnancy. (Table 5)

Table 6: Past Obstetric history (n=135)

History		Count	%
Parity	0	77	57.0%
	1	29	21.5%
	2	18	13.3%
	3	9	6.7%
	5	1	.7%
	10	1	.7%
	Total	**135**	**100.0%**
Eclampsia	No	135	100.0%
	Total	**135**	**100.0%**

Majority of the patients who developed eclampsia were primigravida (57%) and none of the patients had any prior history of eclampsia. (Table 6)

Table 7: Physical signs at admission (n=135)

Sign	Count	%
Condition at admission		
Alert	2	1.5
Sedated	90	66.7
Unconscious	43	31.9
Total	**135**	**100**
Systolic BP(mmHg)		
100-140	32	23.7
141-180	75	55.6
181-220	20	14.8
> 220	8	5.9
Total	**135**	**100**
Diastolic BP (mmHg)		
<90	18	13.3
90-100	42	31.1
101-110	26	19.3
>110	49	36.3
Total	**135**	**100**
Presence of oedema		
Yes	117	86.7
No	18	33.3
Total	**135**	**100**
Protenuria		
1+	2	2.3
2+	44	33.1
≥ 3+	89	64.6
Total	**135**	**100**

Majority of the patients (66.7%) were sedated. This was due to the treatment initiated in casualty or at the referring hospital. Systolic BP ranged from 130-220 with a mean of 172. Diastolic BP ranged from 90-130 with a mean of 109.All patients had protenuria with 64.6% having a protein level of 3+ and above. (Table 7)

Table 8: Interval between first fit and admission to KNH for post partum eclampsia (n=22)

Interval (hours)	Count	Percentage
<12	15	68
12-24	5	23
>24	2	9
Total	**22**	**100**

In most cases patients were seen at KNH within 12 hours after the first fit for post partum eclampsia (68%) meaning eclampsia was most likely to occur during this period. The interval between delivery and admission to KNH ranged from 4 to 96 hours with a mean of 21 hours. (Table 8)

Table 9: Interval between admission to KNH and delivery for ante-partum eclampsia (n=113)

Interval (hours)	Count	Percentage
<6	64	57
6-12	39	35
>12	11	8
Total	**113**	100

The time interval between admission and delivery was 2-48 hours with a mean of 7 hours. Majority of the patients (57%) delivered within 6 hours. (Table 9)

Table 10: Mode of delivery and reason for caesarean section (n=113)

Mode of delivery	SVD	35	25.2
	C/S	100	74.8
	Total	**135**	**100**
Indication for C/S	Poor Bishop score	78	78
	Fetal distress	10	10
	Poor progress	6	6
	Abruptio placenta	6	6
	Total	**100**	**100**

The commonest mode of delivery was caesarian section (74.8%) with SVD accounting for 25.2% .The commonest indication for caesarian section was a poor bishop score (78%).(Table 10)

Table 11: Birth weight (n=135)

Weight(grams)	**Number**	**Percentage**
≤ 1000	12	9
1001-1500	14	10.4
1501-2000	36	26.7
2001-2500	41	30.4
2501-3000	17	13
3001-3500	14	10.4
>3500	1	0.1
Total	**135**	**100**

The birth weight ranged from 900g to 4kg with a mean of 2kg (SD1).The majority of babies (30.4%) weighed between 2 kg and 2.5kg .(Table 11)

Table 12: Neonatal outcome of delivery (n=135)

Outcome	Count	%
Live	101	75.4
FSB	15	11.2
Neonatal death	14	3.0
MSB	5	10.4
Total	135	100

There were 34 perinatal deaths (24.6%). The perinatal mortality rate was 2.8/1000 deliveries,(Table 12) .The maternal mortality rate was 0.58/1000 deliveries.

Table 13: Interval between admission and delivery vs. Outcome of delivery

Neonatal outcome	Interval							
	<6 hours		6-12 hours		> 12 hours		Total	
	Count	%	Count	%	Count	%	Count	%
Live	47	73.4	30	81.5	9	100	75	73.5
FSB	8	12.5	3	8.1	0	0.0	11	10.8
MSB	1	1.6	2	5.4	0	0.0	3	2.9
Neonatal death	8	12.5	5	13.5	0	0.0	13	12.7
Total	**64**	**100**	**37**	**100**	**9**	**100**	**113**	**100**

Most of the patients delivering within 12 hours had a favorable outcome 73.4% for those delivering within 6 hours and 81.5% for those delivering in 6-12 hours. (Table 13)

Table 14: Birth weight vs. Outcome of delivery (n=135)

Birth wt (g)	Outcome					
	Live	%	Death	%	Total	%
≤ 1000	0	0	12	100	12	100
1001-1500	2	14.3	9	85.7	14	100
1501-2000	24	66.7	12	33.3	36	100
2001-2500	41	100	0	0.0	41	100
2500-3000	17	100	0	0.0	17	100
3001-3500	14	100	0	0.0	14	100
>3500	1	100	0	0.0	1	100

There were more perinatal deaths in those less than 1000g (100%) and those between 1001-1500g (81.6%) This was more likely due to the early gestational age at the time of delivery. (Table 14)

Table 15: Types of maternal complications (n=62)

Complication	Count	%
Pulmonary oedema	11	17.7
Sepsis	9	14.5
Acute renal failure	14	22.6
Cerebral hemorrhage	2	3.2
Abruptio placenta	7	11.3
Laryngeal oedema	2	3.2
Postpartum hemorrhage	7	11.3
Anemia	3	4.8
Visual disturbance	4	6.5
Deep Venous thrombosis	3	4.8

During the study 62 patients (45.9%) developed complications. The commonest complications seen were acute renal failure (22.6), abruptio-placenta (11.3%) and post-partum hemorrhage (11.3%). (Table 15)

Table 16: Duration of stay in ICU (n=16)

		Count	%
ICU stay (days)	1-2 days	2	15
	3-4 days	4	8.8
	5-6 days	9	69.2
	>=7 days	1	7

Of the patients admitted in ICU the majority stayed for 5-6 days. (Table 16)

Table 17: Causes of maternal death (n=7)

Cause of death	Cerebral hemorrhage	3	43%
	Pulmonary edema	3	43%
	Poor reversal from anesthetic	1	14%

There were 7 maternal deaths giving a maternal mortality rate of (5.1%) of all patients in the study and 0.58/1000 deliveries. The causes of maternal mortality were cerebral hemorrhage (3 Patients), pulmonary edema (3 patients) and poor reversal from anesthesia (1 patient). (Table 17)

Table 18: Socio-demographic characteristics vs. development of complications

		Yes		No			
Characteristic		**Count**	**%**	**Count**	**%**	**X^2**	**P value**
Age groups	14-18 years	7	50.0%	7	50.0%	4.97	0.290
	19-23 years	19	42.2%	26	57.8%		
	24-29 years	25	48.1%	27	51.9%		
	29-33 years	6	33.3%	12	66.7%		
	>33	5	83.3%	1	16.7%		
Marital Status	Single	9	45.0%	11	55.0%	0.92	0.632
	Married	53	47.3%	59	52.7%		
	Divorced	0	.0%	0	.0%		
	Widowed	0	.0%	1	100.0%		
Education	None	3	33.3%	6	66.7%	2.49	0.477
	Primary	43	48.9%	45	51.1%		
	Secondary	15	40.5%	22	59.5%		
	Tertiary	1	100.0%	0	.0%		

There was no significant relationship between the socio-demographic characteristics and the development of eclampsia ($p>0.05$). (Table 18)

Table 19: Antenatal Clinical Attendance vs. Complications

Attended	Complications	%	None	%	X^2	P value
Yes	24	38.1	58	80.6	21.17	<0.0001
No	39	61.9	14	19.4		
Total	**63**	**100**	**72**	**100**		

The majority of patients who did not attend ante-natal clinic (61.9%) developed complications. Among the patients who attended ANC, 38.1 % developed complications. This relationship was statistically significant (p=0.0001). (Table19)

Table 20: physical signs at admission vs. Complications (n=135)

Sign		Complication	%	None	%	X^2	P value
Diastolic BP(mmhg) on admission	<90	0	0.0	2	2.7	13.47	0.004
	90-100	10	16.4	27	37		
	101-110	23	37.7	29	39.7		
	>110	29	45.9	15	20.5		
	Total	**62**	**100**	**73**	**100**		
Oedema	Yes	59	95.2	69	94.5	0.06	0.56
	No	3	4.8	4	5.5		
	Total	**62**		**73**	**100**		
Protenuria at admission	None	0	0.0	0	0.0	2.41	0.3
	1+	2	3.2	1	1.1		
	2+	16	25.8	28	38.6		
	3+ and above	44	71	44	60.3		
	Total	**62**	**100**	**73**	**100**		

There was a significant relationship between development of complications and diastolic BP. (P= 0.004). There was no significant relationship between edema (p =0.56) and protenuria (P= 0.3). (Table 20)

Table 21: Maternal death versus complications

Mortality	**Complications**	**%**	**None**	**%**	**X^2**	**P value**
Yes	7	11.2	0	0.0	4.66	0.031
No	55	88.2	73	100		
Total	**62**	**100**	**74**	**100**		

All the patients who died had developed complications. The relationship between development of complications and maternal death was statistically significant (p=0.031). (Table 21)

Table 22: comparison of those who developed complications with those who did not against the other various parameters

	Maternal Complications	N	Mean	Std. Deviation	P value
Age	**Yes**	62	24.68	5.175	0.382
	No	73	23.96	4.351	
Parity	**Yes**	62	85	1.535	0.607
	No	73	74	1.041	
Gestation first attendance	**Yes**	26	2.15	.368	0.918
	No	56	2.14	.483	
Time interval(hours)	**Yes**	48	7.38	8.178	0.716
	No	54	6.76	8.769	
Diastolic blood pressure at admission (mmHg)	**Yes**	61	113.05	10.282	<0.001
	No	73	104.70	15.597	
Duration after delivery (hours)	**Yes**	6	15.00	2.828	0.439
	No	7	25.43	31.506	

The relationship between diastolic BP on admission was statistically significant (P=0.001). The other parameters were not statistically significant age(p=0.382),parity(0.607), gestation of first attendance(0.918),time interval from onset of first fit(0.716) and duration after delivery (0.439).(Table22)

CHAPTER 4: DISCUSSION

In this study 135 patients with eclampsia were interviewed and evaluated. During this period there were 12000 deliveries. The incidence of eclampsia was 11/1000 deliveries. This incidence is much higher than similar studies at the same hospital. Mati found an incidence of 1.8/1000 deliveries while Machoki found an incidence of 1.9/1000 deliveries [6, 7].Wasiche found an incidence of 10/1000 deliveries[12].

The high incidence could be due to an increase in the population of gravid women.

Most of the mothers in this study 59% were below 23 years. This compares to other studies that eclampsia is likely in the younger population [4].

The majority of patients were nulliparas (57%). Other studies have also reported this high incidence among primigravida [7, 8].

In this study 82(60.7%) of the patients had attended clinic while 53 (39.3%) had not. Machoki found that 30.2% had not attended ante-natal clinic [7]. Wasiche found that 51.1% 0f the patients who developed eclampsia had attended ANC.

The majority of patients were delivered through caesarian section (74.8%) while those who delivered vaginally were (25.2%). The main indication for Caesarian section was a poor bishop score (83%).Innocent O George and colleagues found a caesarian rate of 55.7% among the patients admitted with eclampsia[25].Mwinyoglee reported a caesarean section rate of 66.7% [26].Wasiche found a caesarian rate of 73%. These findings were similar. The high rate was unavoidable since the commonest indication was unfavorable cervix.

In this study, 45.9% of the patients developed complications following eclampsia. This rate is similar to that found by Wasiche who did a retrospective study on maternal complications [12].

The commonest complications were acute renal failure (22.6%), pulmonary edema (17.7%), sepsis (14.5%), abruptio-placenta (11.3%) Post-partum hemorrhage (11.3%), visual disturbances (6.5%), anemia (4.8%), deep venous thrombosis (4.8%) and cerebral hemorrhage (3.2%)

Other studies have a slightly different prevalence for the various complications. Wasiche found the major complications to be sepsis (40.3%), acute renal failure (10.4%), cerebral hemorrhage (10.4%) abruptio placenta (9%), laryngeal edema (7.5%), post-partum hemorrhage (4.5%) and visual disturbances (3%) [12]. Machoki found that the infection rate was slightly higher in eclamptics than in other patients[4].The slight decrease in the incidence of sepsis could be due to the widespread use of antibiotics before and after surgery.

Of the patients who developed complications, 22.5% had to be admitted in ICU. These patients were admitted in ICU because of the need for ventilatory support because of complications such as pulmonary oedema and poor reversal from anesthesia.

There were seven maternal deaths in this study. The case fatality rate was 5.1%. Wasiche in a previous study found a case fatality rate of 5%[12].This two findings are similar. Other studies in Africa have reported higher case fatality rates Mwinyoglee reported a case fatality rate of 21.2%[26]. Douglas found a rate of 1.8% in the United Kingdom[11].

The causes of maternal mortality were pulmonary oedema (3 patients), cerebrovascular hemorrhage (3 patients) and poor reversal (1 patient). The

causes of maternal mortality are similar to the previous study by Wasiche with only minor variations [12].

The perinatal mortality rate was 2.8/1000 deliveries. Wasiche reported a rate of 3.3/1000 deliveries[12].Earlier studies reported higher perinatal mortality rates at the same center. Mati found a perinatal mortality rate of 82.2/1000 deliveries while Machoki reported a rate of 225.8/1000 deliveries [6, 7].

The study was carried out to establish the determinants of maternal and perinatal outcome in eclampsia. There was no significant relationship between development of complications and socio-demographic characteristics, age (p= 0.29), marital status (p0.632)
and level of education (p=0.471).This is similar to the findings of a similar study on complications carried out by Wasiche [12].

Most of the patients (60.7%) who developed eclampsia complications had not attended ANC and this relationship was statistically significant (p=0.0001).This can be explained by the fact that warning signs were not detected in this group. Innocent George and colleagues found that 90.9% of the patients who developed eclampsia had not attended ANC at the University of Port Harcourt in Nigeria [25].

A high diastolic blood pressure was associated with development of complications. This relationship was statistically significant (p=0.001). The mean diastolic pressure for those who developed complications was 113 mmHg while for those who did not was 104.5mmHg. This differed from an earlier study by Wasiche who found no statistically significant finding among the two groups [12].It is possible that some of the patients she studied had been given anti-hypertensive drugs at the referring hospital. The level of protenuria was not statistically significant (p=0.3)

The mean interval between admission was longer for those who developed complications (mean 7.38 hours) compared to those who did not (mean 6.76). The relationship was not statistically significant (p=0.716)

Patients who died had developed complications. There was a statistically significant relationship between development of complications and maternal death (p=0.031).

CONCLUSION

The study shows an increasing incidence of eclampsia at KNH of almost five fold.

The key findings from the study are that there is a high caesarean rate among patients with eclampsia. It was also established that ANC non attendance was associated with an increase in complications. Very high diastolic blood pressure levels are also associated with adverse outcomes.

The complications seen in eclampsia are similar to those reported in other studies though the incidence of sepsis was slightly lower while that of ARF and pulmonary oedema were slightly higher.

Eclampsia was also associated with case fatality rates

RECOMMANDATIONS

The following recommendations have been made from the study

1. Health educations for pregnant women to sensitize them on dangers of pregnancy induced hypertension and attendant complications such as eclampsia. This should be done at the booking visit.

2. Improve and equip level 5 and level 6 hospitals. This will ensure management of eclampsia in the periphery to avoid unnecessary delays in the referral system.

3. Active management of patients with eclampsia and timely referrals if facilities for their care are not available.

4. Review the management of eclampsia at KNH to address rising case fatality rates.

5. Increased vigilance of patients who have had no antenatal care.

BUDGET

The expenditure during the study was:

Stationery	**35,000 kshs.**
Statistician	**35,000 kshs.**
Research assistants	**20,000 kshs.**
Miscellaneous	**5,000 kshs.**

Total **95,000 kshs**

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APPEDIX 1

DATA COLLECTION TOOL

1. Patients study number ☐ ☐ ☐
2. Age (completed years) ☐ ☐
3. Level of education

a)None ☐ b) Primary ☐

c)Secondary ☐ d) University/college ☐

4. Residence

a) Urban ☐ b) Rural ☐

5.Marital status (put X or tick)

a) Single ☐ b) Married ☐

c) Divorced/separated ☐ d) Widowed ☐

PAST OBSTETRIC HISTORY

6. Parity ☐ + ☐

7. Delivered before,

a) Yes ☐ b) No ☐

8. If delivered before, eclampsia in previous pregnancy

a) Yes ☐ b) No ☐

Pregnancy	Year
1st	☐☐☐☐
2nd	☐☐☐☐
3rd	☐☐☐☐

INDEX PREGNANCY

	Day	month	year
9. Last menstrual period	☐	☐	☐

10. ANC attended (insert X or tick)

a) Yes ☐

b) No ☐

If NO go to question 13.

11. ANC attendance (insert X or tick)

a) Rural health centre ☐

b) City council ☐

c) Private clinic/hospital ☐

d) Public hospital ☐

12. Gestation at first ANC attendance

a) less than 20weeks ☐

b) 21-28 weeks ☐

c) 29-36 weeks ☐

d) More than 36 weeks ☐

13. Any of the following noted in pregnancy

a) High blood pressure ☐

b) Protein in urine ☐

c) Swelling of the legs ☐

If none of the above go to question 19

14. If the blood pressure was high medication given?

15. If the blood pressure was high any referral to another hospital?

a) Yes ☐

b) No ☐

If no to question 15 go to 17

16. The blood pressure on referral?

Systolic ☐mmHg Diastolic ☐ mmHg

17. If no to question 15 did the blood pressure improve in Subsequent visits

a) Yes ☐

b) No ☐

If yes to question 17 go to 19

18. If no to question 17, management?

a) Admitted ☐

b) Referred to another facility ☐

c) Other (specify)

19. Documented medical conditions?

a) None ☐

b) Diabetes ☐

c) Cardiac disease ☐

d) Epilepsy ☐

e) Other (specify) ☐

AT ADMISSION

20. Date and time of first convulsion

Date Time (am/pm)

21. Date seen at KNH Time (am/pm)

22. Number of convulsions at the time of admission

23. Condition at admission

a) Alert ☐

b) Sedated ☐

c) Unconscious ☐

24. Blood pressure at admission

Systolic ☐ mmhg Diastolic ☐ mmhg

25. Level of protenuria at admission

a) None ☐

b) 1+ ☐

c) 2+ ☐

d) 3+ and more

26. Delivery before admission

a) Yes ☐

b) No ☐

If no to question 26 go to 28

27. If yes, duration after delivery

28. Time interval between admission to KNH and delivery (hours)

29. Mode of delivery

a) SVD ☐

b) Vacuum extraction ☐

c) C/S ☐

30. If C/S was done what was the indication

a) Poor bishop score ☐

b) Poor progress ☐

c) Abruptio placenta ☐

d) Fetal distress ☐

e) 0ther (specify)

31. Newborn outcome

a) Live ☐

b) FSB ☐

c) MSB ☐

d) Neonatal death ☐

32. Birth weight of baby (kgs) ☐

MATERNAL COMPLICATIONS

33. Any complications?

a) Yes ☐
b) No ☐

If no go to question 41

34. If yes to question 33, what were the complications (reference to the file for clinical diagnosis and laboratory tests such as renal function)

a) Acute renal failure ☐
b) Pulmonary edema ☐
c) Cerebral hemorrhage ☐
d) Abruptio placenta ☐
e) DIC ☐
f) Sepsis ☐
g Other (specify)

35. Admission to ICU

a) Yes ☐
b) No ☐

If no to question 35 go to 41

36. If yes to question 35, reason for admission?

a) Pulmonary edema ☐
b) Cerebral hemorrhage ☐
c) Difficult reversal from anesthesia ☐
d) Other (specify)

37. Length of stay in ICU (days)

38. If ARF, was dialysis done?

a) Dialysis ☐

b) Conservative ☐

39. Maternal death

a) Yes ☐

b) No ☐

If no go to question 39 go to 41

40. If yes to question 39, what was the cause of death?

a) ARF ☐

b) Cerebral hemorrhage ☐

c) Pulmonary edema ☐

d) DIC ☐

e) Sepsis ☐

f) Cardiopulmonary failure ☐

g) Other specify

41.I f no to 39, length of stay in hospital (days)

42. Any permanent disabilities attributed to eclampsia?

a) Yes ☐

b) No ☐

43. If yes to question 42 which are the disabilities?

APPENDIX 2

CONSENT FORM

I Dr Sambu Solomon Tyaa and my research assistants are caring out a study on the determinants of maternal and perinatal outcome in patients with eclampsia

This involves collecting data of all the patients admitted with eclampsia at KNH labor ward.

We will be asking questions regarding your pregnancy as well as personal details. The information obtained will be confidential.

The information gained from the study will help detect mothers at risk of complications which could harm the baby and yourself

The care given to you will not change and there will be no added cost.

Refusing to participate will not change the care given to you.

Consent

***I*……**

Have agreed to participate in the study and was not coerced.

NAME :
SIGNATURE:
DATE :

MATERNAL AND PERINATAL OUTCOME IN PATIENTS WITH ECLAMPSIA AT KENYATTA NATIONAL HOSPITAL

RESEARCH DISSERTATION SUBMITTED AS PARTIAL

FULFILMENT FOR MMED IN OBSTETRICS AND

GYNAECOLOGY, UNIVERSITY OF NAIROBI

PRINCIPAL INVESTIGATOR:

DR. SOLOMON T. SAMBU, MBChB

M.**MED STUDENT DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY**

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF NAIROBI.

DECLARATION

This is to certify that this study is my original work and has not been presented for a degree course in any other university. I further certify that my study has been supervised by senior members in the department of Obstetrics and gynecology, University of Nairobi.

DR SAMBU SOLOMON MICHAEL TYAA,

Signature…….. Date…….

This is to certify that the commentary in this dissertation was researched upon by DR. Sambu Solomon Michael under my guidance and supervision and the dissertation is submitted with my approval

DR. ALICE K MUTUNGI,

MBCHB; MMED OBS&GYN; MSC REPROD BIOL;MPHL
SENIOR LECTURER,
UNIVERSITY OF NAIROBI

Signature…….. Date……

DR GATHARI NDIRANGU,

MBCHB, MMED OBS&GYN
HONORARY LECTURER,
UNIVERSITY OF NAIROBI

Signature…….. Date…….

CERTIFICATE OF AUTHENTICITY

This is to certify that this dissertation is the original work of Dr Solomon T.Sambu Master of Medicine student in the Department of Obstetrics and Gynecology, registration number H58/70887/2007, University of Nairobi (2007-2011). The research was carried out in the department of Obstetrics and Gynecology, School of Medicine, College of Health Sciences. It has not been presented in any other university for the award of a degree.

Signature.....

Date.....

Prof. Koigi Kamau,

Associate Professor of Obstetrics and Gynecology,

Consultant Obstetrics and Gynecology,

Chairman,

Department of Obstetrics and Gynecology,

University of Nairobi.

TABLE OF CONTENTS

LIST OF ABREVIATIONS

ANC	Ante-Natal Clinic
ARF	Acute Renal Failure
BP	Blood Pressure
C/S	Caesarean Section
EEG	Electroencephalogram
FSB	Fresh still birth
HIV	Human immunodefiency virus
MSB	Macerated still birth
ND	Neonatal death
PET	Pre-eclampsia
PPH	Post Partum Hemorrhage
HELLP	Haemolysis, Elevated Liver enzymes and Low Platelets
KNH	Kenyatta National Hospital
NHIF	National hospital insurance fund

DEDICATION

This book is dedicated to my best friend Wacuka Ngari, my parents Mr. and Mrs. Leonard T. Sambu. Your love and support has been my strength and I sincerely want to thank you.

ACKNOWLEDGEMENT

I wish to thank the Government of Kenya for sponsoring my training at the University of Nairobi.

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DEFINATION OF TERMS

1. Pre-eclampsia

Pre-eclampsia refers to hypertension with protenuria and edema. This usually develops after 20 weeks gestation.

2. Eclampsia

Eclampsia is pre-eclampsia with convulsions that cannot be attributed to other medical causes.

3. Protenuria

This is the presence of protein in urine.

4. Antenatal care

This is the care given to pregnant women at a clinic to prepare them for delivery.

5. SVD

This refers to delivery of a baby vaginally. The presenting part is the vertex.

6. C/S

This is a surgical procedure that involves delivery of a baby through an incision made in the lower abdomen and on the uterus.

ABSTRACT

Background: Eclampsia is defined as pre-eclampsia complicated with convulsions and/or coma. The incidence of eclampsia is 0.2%-0.5% of all deliveries globally [2]. It is a common obstetric emergency in Kenya and it is associated with adverse maternal and neonatal outcomes. Some of the documented complications are pulmonary edema, cerebral hemorrhage, acute renal failure and placental abruptio.

Facilities for intensive care are scarce in low resource settings. Identifying determinants of maternal and perinatal outcome among eclamptics will provide insight as to which group of mothers at risk would benefit from earlier referral.

Objective: To study the determinants of maternal and perinatal outcome among patients with eclampsia at Kenyatta National Hospital.

Design: This was a Cross-sectional descriptive study.

Methodology: All mothers with eclampsia admitted in labor ward, ante-natal wards and those reviewed in the postnatal clinic were interviewed and information collected with respect to age, parity, ANC attendance, duration of gestation, place of first fit, BP and degree of protenuria at admission, fit –delivery interval, clinical management, mode of delivery, perinatal outcome, maternal mortality and duration of hospital stay was recorded in a questionnaire. Additional was obtained from patient records.

Setting: The study was conducted at Kenyatta National Hospital labor ward, antenatal wards and post natal clinic. KNH is Kenya's largest referral hospital.

Data collection analysis: Data collected was entered into a a database. This data was then analyzed electronically using SPSS widows statistical software. The chi square test was used to identify factors that were related to development of complications.

Outcome measures: The study variables include age, parity, booking status, gestational age, location at time of first seizure, number of fits, seizure to delivery interval, maternal complications and the clinical management.

Results: During the study 135 patients who developed eclampsia and who met the inclusion criteria were interviewed. The predictors of outcome were age, parity, booking status, gestational age, location at time of first seizure, number of seizures and seizure interval and delivery. There was no significant relationship between socio-demographic characteristics and development of complications($p > 0.05$). The majority of the patients who had not attended ANC (61.9%) developed complications. The relationship between the attendance of ANC and non-attendance and the occurrence of complications was statistically significant. ($p=0.0001$)

There was a statistically significant relationship between the diastolic BP and development of complications ($p=.001$).The commonest complications were pulmonary oedema (17.7%), acute renal failure (22.6%) ,sepsis (14.5%), postpartum hemorrhage, (11.3%) and abruptio placenta (11.3%). Development of complications significantly affected maternal mortality ($p=0.031$).The incidence of perinatal mortality was 2.8/1000 deliveries. The case fatality rate was 5.1%.

Conclusion: Development of complications in eclampsia was significantly influenced by ANC attendance and the diastolic blood pressure on admission.

Recommendations: From the study findings it is important for health care workers to review the management of eclampsia to address the rising case fatality rate. There is also need for increased vigilance of patients who have had no antenatal care.

INTRODUCTION

Hypertension in pregnancy is a common obstetric complication. The identification and effective management of eclampsia plays a significant role in ensuring a good maternal and perinatal outcome of pregnancy [1].

Hypertensive disorders complicating pregnancy have been classified into;

1. Pre-existing hypertension
2. Pre-eclampsia
3. Eclampsia
4. Pre-eclampsia in addition to pre-existing chronic hypertension

Pre-existing hypertension is defined as a systolic blood pressure of 140 mmHg or greater, and/or a diastolic blood pressure of 90 mmHg or more, either pre-pregnancy or before 20 weeks.

Pre-eclampsia is defined as a systolic blood pressure of 140 mmHg or greater, and/or a diastolic blood pressure of 90mmHg or more ,developing after 20 weeks gestation accompanied by protenuria with or without edema.

The minimum criterion for diagnosis of pre-eclampsia is;

1. BP greater or equal to 140/90 mmHg, after 20 weeks gestation. An increase of 30 mmhg for systolic blood pressure and 15 mmhg for diastolic blood pressure above the ANC booking blood pressure is significant.
2. Protenuria greater or equal to 300mg per 24hrs.

Eclampsia is defined as the occurrence of seizures that cannot be attributed to other causes in a woman with pre-Eclampsia [2].

Once eclampsia occurs, the risk to the mother and fetus is appreciable.

HELLP syndrome is one of the documented maternal complications, with a reported incidence of 2.8% at KNH[3.]

Pulmonary edema was documented in 2.9% of patients with pregnancy induced hypertension at KNH [3].Sibai and colleagues found an incidence of 2.9 % of pulmonary edema in patients with pregnancy induced hypertension[3].

Cerebral hemorrhages ranging from petechiae to gross bleeding in the brains of women with eclampsia examined soon after death have been documented[4.]

Other complications include placental abruptio, neurological deficits , pulmonary edema, cardiopulmonary arrest, acute renal failure and maternal death [5].

Eclampsia is most common in the last trimester and becomes increasingly more frequent as term approaches. Depending on whether convulsions appear before, during or after labor, eclampsia is designated as ante-partum, intra-partum or postpartum respectively. Treatment consists of anticonvulsant therapy to control convulsions and control of BP, followed by delivery. Once the patient is stable delivery is planned. Patients with a favorable Bishop score and without any contraindications to vaginal delivery are delivered vaginally.Those with a poor bishop score or any obstetric indications for a Caesarian section are delivered surgically[2].

CHAPTER 1: LITERATURE REVIEW, JUSTIFICATION AND OBJECTIVES

1.1 LITERATURE REVIEW

Burden of eclampsia

Eclampsia is a common obstetric emergency. It is a common cause of maternal and perinatal morbidity and mortality. The incidence of eclampsia is 2-5/1000 for all deliveries[2].High incidences have been reported in Kenyan hospital based studies. At KNH the incidence of eclampsia was reported to be 1.8/1000 deliveries by Mati while Machoki reported an incidence of 1.9/1000 deliveries [7, 8]. Bansal at pumwani maternity hospital reported an incidence of 1.04/1000 deliveries[9].

Pathophysiology

The pathogenesis of eclamptic seizures is poorly understood. Seizures have been attributed to platelet thrombi, localized vasoconstriction and foci of hemorrhage in the brain cortex. There is evidence from autopsies that the problem is ischemia secondary to intensive vasoconstriction [10].

Naidu in his study using CT –scan single photon emission and transcranial sonography concluded that the patho-physiology of eclampsia is primarily cerebral vasospasm with resultant ischemia and cerebral edema involving the main watershed areas and the parieto-occipital areas of the brain. Vasoconstriction is a protective reflex in response to extremes of arterial pressure to ensure that cerebral perfusion remains constant .Specific EEG abnormalities can usually be demonstrated for sometime after a seizure. Most of these abnormalities subside within three months[11].

Clinical presentation

Almost without exception pre-eclampsia precedes the onset of eclamptic convulsions. Depending on whether convulsions occur before, during or after labor eclampsia is designated ante-partum, intra-partum or post-partum.

Patients present with tonic-clonic convulsions then coma ensues. Unless treated the first convulsion is usually the fore-runner of others which may vary in number from one or two in mild cases or even continuous convulsions, a condition known as status epilepticus[2].The woman does not remember the convulsion or, in all probability, events immediately before. Over time this memory returns. The duration of coma after a convulsion is variable. When the convulsions are infrequent the woman usually recovers some degree of consciousness after each attack. Protenuria is almost always present and frequently pronounced. Urine output is likely diminished appreciably and occasionally anuria develops. Haemmoglobunuria is common, but haemmoglobinaemia is rarely observed[10].

Complications

Matter and Sibai described the hazard in 399 consecutive women with eclampsia delivered between 1977and1998 in their centre in Memphis. Major complications included: Placental abruption (10%), neurological deficits (7%), aspiration pneumonia (7%), pulmonary edema (7%), cardiopulmonary arrest (4%), ARF (4%), maternal death (1%).Wasiche reported maternal complications in 67% of a patients with eclampsia in KNH.

The commonest complications were sepsis 40.4%, pulmonary edema 25.3%, acute renal failure 10.4%, and cerebral hemorrhage 10.4%. The maternal mortality was 0.48/1000 deliveries [12].

From literature review the main complications are;

a)Neurological deficits

In about 10% of women with eclampsia some degree of blindness follows a seizure. The causes of blindness or impaired vision are varying degrees of retinal detachment and occipital lobe ischemia or edema. In both instances the prognosis for return to normal is good and is complete within a week[13].

About 5% of women have substantively altered consciousness including persistent coma following a seizure. This is due to cerebral edema and transtentorial herniation[14].Headaches and visual symptoms are common with severe pre-eclampsia and associated convulsions define eclampsia. Principal postmortem brain lesions are hyperemia, ischemia, thrombosis, edema and haemmorrage.In an older series Govan reported that cerebral hemorrhage was the cause of death in 39 out of 110 fatal cases of eclpmpsia[15]. Sheehan found hemorrhages ranging from petechiae to gross bleeding in 56% of 48 females with eclampsia he examined soon after death[5].

Headaches and visual symptoms are common with pre- eclampsia and associated convulsions define eclampsia. The principal postmortem lesions are edema, hyperemia, ischemia, thrombosis and haemmorrage[5,10].

b) HELLP syndrome

This is an acronym for haemolysis [H], elevated liver enzymes [EL], and low platelets [LP].The incidence of the syndrome varies. In one large study it was identified in almost 20% of women with severe pre-eclampsia or eclampsia[16]. In a multicenter study, Haddad and colleagues described 183 women with the syndrome, adverse effects occurred in 40% of cases and 2 women died[17] .

c) Renal

Renal tubular lesions are common in women with eclampsia. Acute Renal failure from acute tubular necrosis may develop. Such kidney failure is characterized by oliguria and anuria and rapidly developing azootemia. Drakely and co-workers described 72 women with eclampsia and renal failure, half of whom had HELLP syndrome and a third of whom had placental abruption[18] .

Haddad and colleagues reported that 5% of 183 women with HELLP syndrome developed renal failure. Half of these also had placental abruption and most had Post partum hemorrhage. Irreversible renal cortical necrosis was uncommon in the study population[17].

d) Maternal death

The prognosis for eclampsia is always bad; it is one of the most dangerous conditions in pregnancy. Eastman and Hellmann reported a maternal mortality rate of between 10 and 15% of patients with ecampsia[19]. Berg and co-workers reported a rate of 6% for the period 1991-1997[20].

e) Fetal effects

Because of maternal hypoxemia and lactic academia caused by convulsions, it is not unusual for fetal bradycardia to follow a seizure. This usually recovers within 3 to 5 minutes. If it persists for more than ten minutes, another cause such as placental abruption or imminent delivery should be considered [10]. The perinatal mortality is very high to the extent of 30-40%. The causes are prematurity, intra-uterine asphyxia arising out of infarction, retro- placental hemorrhage and spasm of the utero-placental vasculature. Effects of drugs used to control the convulsions and trauma during operative delivery also contribute to the high perinatal mortality rate[1.]

Clinical management

Pritchard and associates initiated a standardized treatment regimen for eclampsia. The results of this regimen employed 245 women with eclampsia. The treatment consists of a loading dose of magnesium sulphate of 4g slowly over 10 minutes, followed by a maintenance dose of 1g per hour.

Magnesium sulphate is discontinued 24 hours after delivery or 24 hours after the last convulsion whichever comes first. BP control is by an infusion of hydrallazine[21] .Studies have also been done to compare the efficacy of magnesium sulphate to other anticonvulsants (phenytoin and valium).

The multi-national Eclampsia Trial Collaborative Group studied the efficacy of magnesium therapy . This study involved 1687 women. In one study 453 women were randomly given magnesium sulphate and compared with 452 given diazepam. Another 388 eclamptic women were randomly given magnesium sulphate and compared with 387 women given phenytoin. The death rate was 3.8% in the 453 women randomly allocated magnesium sulphate compared with 5.1% in the 452 women given diazepam. The mortality rate in the group given phenytoin was 5.2%
Maternal mortality was lower in the magnesium group compared with that in the phenytoin group (3.8%vs5.2%)[22].

Maternal and perinatal outcome

There are few studies that have been done to look at determinants of maternal outcome in patients with eclampsia in developing countries. Majoki and colleagues evaluated 25 425 deliveries over an 18 month period at Harare maternity hospital. Of these deliveries 151 women had eclampsia. The case fatality ratio was 26.5% and 67.5% of the seizures occurred ante-partum. The majority of the fatal cases involved women above 35 (25.8%vs22.3%) .Deficiencies in clinical management were more common in the women who died (39.5%vs20.9%) [23]. Shanaz and colleagues evaluated 2200 deliveries at the postgraduate teaching hospital Peshawar, Pakistan. Fifty of the admitted women were eclamptic. The ante-partum/intra-partum and post-partum incidences of eclampsia in the 50 admissions with eclampsia were 72% and 28% respectively . All patients were unbooked and belonged to a low socio-economic status. A total of 4 deaths were due to eclampsia[24].Wasiche in 1999 reported an incidence of eclampsia of 10/1000 deliveries compared with 1.8/1000 and 1.9/1000 deliveries by Mati and Machoki respectively [7, 8.]

Innocent O. George and Israel Jeremiah conducted a prospective cross-sectional study on 88 mothers presenting with eclampsia at University of Port Harcourt Teaching Hospital in Nigeria.

There aim was to asses the perinatal outcome in these mothers. They looked at the socio-demographic characteristics, mode of delivery, perinatal complications and outcome. Unbooked patients who had received inadequate or no antenatal care comprised 90.9% of the women who presented with eclampsia.The mean gestational age at presentation was 35.04 ± 4.21 weeks with a range of 24 weeks - 43 weeks and 57.1% of them presenting preterm . Caesarean delivery was the commonest mode of delivery 49 (55.7%).The total number of births was 90, which included 86 singleton births and 2 sets of twins with a mean birth weight of 2.44 ± 8.18 Kg and a range 0.7 Kg-4.0 Kg. Fifty four babies (61.4%) were admitted into the special Care Baby Unit. The indications for admission were; prematurity (n=23), low birth weight (n=10), severe birth asphyxia (n=12), neonatal jaundice (n=4) and neonatal sepsis (n=5).There were 37 perinatal deaths, giving a perinatal mortality rate of 411.1 per 1000 live births of babies born to eclamptic mothers. These included 19 still births (51.4%) and 18 early neonatal deaths (48.6%). Birth asphyxia (33.3%), respiratory distress syndrome (22.2%) and prematurity (22.2%) were the commonest causes of neonatal deaths. Babies of unbooked mothers accounted for 66.7% of the perinatal deaths. This was significantly higher than the perinatal deaths among babies of booked mothers[25].Mwinyoglee J and colleagues studied the epidemiology of eclampsia and the maternal and fetal outcome at Ga-Rankuwa hospital in South Africa in the period 1st January 1994 to December 1995.Out of 18145 women delivered, 66 had eclampsia (3.6/1000). Of the 36 maternal deaths in the same period, 14 (38.9%) were caused by eclampsia. The case fatality rate was 21.2%. Maternal mortality was significantly higher in the unbooked population, women aged 30 years

and above, and those with multiple fit. The mean (SD) maternal age was 22.3 (6.8) years and fits occurred in the presence of high diastolic blood pressure (mean 113.7 +/- 15.6 mmHg).

The majority of fits (90.1%) occurred at home and in 70.3% of patients, this happened before 37 weeks (mean gestational age 33.2 (3.9) weeks). In 77.3%, eclampsia was ante-partum while it occurred postpartum in 4.5% of cases. The caesarean section rate was 66.7% . The perinatal mortality rate was 47.7% and maternal complications were varied and severe. They concluded that health care providers failed to act on warning signs in 14 (46.7%) of the 30 booked patients that were evident long before they developed fits[26].

Chaudhary P carried out a hospital based retrospective study to determine the incidence, clinical profile of eclamptic patients and the effect of current intervention strategy for eclampsia on maternal and perinatal outcome at Kathmandu maternity hospital.

He analyzed the case of records of all eclampsia cases from mid-April, 2000 to mid-April, 2001.

The Incidence of eclampsia was found to be 2.9 per 1000 deliveries. Eclampsia was primarily a disease of young women (97.22%) and nulliparas (80.85%). Approximately half of eclamptic patients had some ante-natal care (55.31%) and majority of them had fits before the onset of labor (70.21%). Most eclamptic patients presented with fits at term pregnancy (72.34%). About three fourth of them started fitting at home (74.46%) but one fourth had the first fit while already admitted in the hospital (25.53%).

Caesarean section was the common mode of delivery (55.31%).

There was no maternal death. The majority of patients stopped fitting upon intervention (80.85%) and went home within three weeks (95.73%). One fifth of babies died [stillbirths (14%), neonatal deaths (6%)] [27].

Studies have also been carried out in the developed world to establish factors that result in poor maternal and fetal outcome.

Dr H.Sawhney and colleagues carried out a retrospective analysis of 69 maternal deaths due to (eclampsia-61:severe pre-eclampsia-8) during a period of 17 years (1982-1998).Maternal condition on admission, associated complications and principal cause of death were analyzed in each case. They found that the mean time interval between hospitalization and maternal death was 49.56 + 62.01 hrs (1–240 hrs).Twenty (28.9%) women died undelivered. Twenty-three (37.7%) women were in grade IV coma and 52.4% of eclampsia patients had recurrent convulsions (> 10) prior to admission. Associated complications in form of hemorrhage, cerebrovascular accidents, acute renal failure, jaundice, aspiration pneumonia and pulmonary oedema were 30.4, 31.8, 34.8, 18.8, 17.8, and 5.8%, respectively. Maternal mortality in eclampsia was significantly low in time period B (4.1%) when magnesium sulphate was used as an anticonvulsant. They concluded that maternal condition on admission and associated complications are the major determinant of maternal outcome. Use of magnesium sulphate is associated with a significant reduction of maternal mortality[28].

Mackay A. and colleagues examined the role of pre-eclampsia and eclampsia in pregnancy related mortality They used data from the Centers' for Disease Control and Prevention's Pregnancy Mortality Surveillance System to examine pregnancy-related deaths from pre-eclampsia and eclampsia from 1979 to 1992. The pregnancy-related mortality ratio for pre-eclampsia and eclampsia was defined as the number of deaths from pre-eclampsia and eclampsia per 100,000 live births. Case-fatality rates for 1988-1992 were calculated for pre-eclampsia and eclampsia deaths per 10,000 cases during the delivery hospitalization, using the National Hospital Discharge Survey.

They found that of the 4024 pregnancy-related deaths at 20 weeks' or more gestation in 1979-1992, 790 were due to pre-eclampsia or eclampsia (1.5 deaths/100,000 live births). Mortality from pre-eclampsia and eclampsia increased with increasing age. The highest risk of death was at gestational age 20-28 weeks and after the first live birth. Black women were 3.1 times more likely to die from pre-eclampsia or eclampsia as white women. Women who had received no prenatal care had a higher risk of death from pre-eclampsia or eclampsia than women who had received any level of prenatal care. The overall pre-eclampsia-eclampsia case-fatality rate was 6.4 per 10,000 cases at delivery, and was twice as high for black women as for white women.

They concluded that the continuing racial disparity in mortality from pre-eclampsia and eclampsia emphasizes the need to identify
those differences that contribute to excess mortality among black women, and to develop specific interventions to reduce mortality from pre-eclampsia and eclampsia among all women [29].

Prognosis

Eclampsia remains one of the most dangerous conditions in pregnancy. Between 1991 and 1997, approximately 6% of maternal deaths in the United States were related to eclampsia.The study indicates that eclampsia should be considered as a major threat to maternal life [21].

Prevention

Early detection and treatment of pre-eclampsia may prevent eclampsia. Generally all ante-natal mothers less than 25 years of age and having their first baby should be monitored closely as they are at risk of developing pre-eclampsia than the rest of the population [8, 9].

The roll-over test done in mid trimester is positive if there is a rise of diastolic blood pressure of 20 mmHg or more.

Onuoga in his study on 46 primigravida at 28-32 weeks found of the 13 patients who developed pre-eclampsia 11 of them had a positive roll-over test[30]. The mean arterial pressure can also be used as a predictive test, where a value of 105mmHg or more is significant [31].

Alpha feto-protein (AFP) is found elevated in open neural tube defects, congenital nephrosis, multiple pregnancy and intra- uterine fetal death (IUFD). These conditions can be diagnosed by ultra sound.

For patients with unexplained elevation of alpha feto- protein some have been found to develop pre-eclampsia later in pregnancy[32].

Assay of cholesterol in the first trimester may also be useful in predicting the development of pre-eclampsia.

Van der Elzen in a study on pregnant women 36 years and over in the first trimester found that total cholesterol level was associated with development of pre-eclampsia especially for levels greater than 6mmol//[33].

For patients who develop severe pre-eclampsia magnesium sulphate has been used to prevent the development of eclampsia[34].Michael A. Belfort and colleagues carried out a study to compare the efficacy of magnesium sulphate and nimodipine for the prevention of eclampsia.The conducted an unblinded, multicenter trial in which 1650 women with severe pre-eclampsia were randomly assigned to receive either nimodipine (60 mg orally every 4 hours) or intravenous magnesium sulfate (given according to the institutional protocol) from enrollment until 24 hours post partum. High blood pressure was controlled with intravenous hydrallazine as needed. The primary outcome measure was the development of eclampsia, as defined by a witnessed tonic–clonic seizure. Demographic and clinical characteristics were similar in the two groups.

The women who received nimodipine were more likely to have a seizure than those who received magnesium sulfate (21 of 819 [2.6 percent] vs. 7 of 831 [0.8 percent].

The adjusted risk ratio for eclampsia associated with nimodipine, as compared with magnesium sulfate, was 3.2 (95 percent confidence interval, 1.1 to 9.1). The ante-partum seizure rates did not differ significantly between the groups, but the nimodipine group had a higher rate of postpartum seizures (9 of 819 [1.1 percent] vs. 0 of 831, P=0.01). There were no significant differences in neonatal outcome between the two groups. More women in the magnesium sulfate group than in the nimodipine group needed hydrallazine to control blood pressure (54.3 percent vs. 45.7 percent)[35].

1.2 RESEARCH QUESTION

What are the determinants of maternal and perinatal complications in women admitted with eclampsia at Kenyatta National Hospital?

1.3 RATIONALE AND JUSTIFICATION

Eclampsia is a common obstetric emergency and a common cause of maternal and perinatal morbidity and mortality.

The maternal mortality rate ranges between 1-20% while the perinatal mortality rate ranges between 130-300/1000 deliveries[14].Maternal complications may occur in eclampsia and they include pulmonary oedema, acute renal failure, cerebrovascular hemorrhage, and cerebral oedema. There are few studies that give statistics on prevalence of maternal complication and the determinants of outcome at KNH.

Undertaking this study this was justified because of several reasons. One, facilities for intensive care are scarce in low resource settings. Identifying determinants of maternal and perinatal outcome will provide insight as to which group of mothers at risk would benefit from increased vigilance. Secondly, from literature review, eclampsia is still responsible for considerable morbidity and mortality for the mother and the baby. HEELP syndrome, acute renal failure, DIC and pulmonary oedema are its serious complications and preventing them is a challenge. This challenge will be met if there is willingness to carry out studies to determine the mothers at risk of developing eclampsia in facilities across the country.

Thirdly there is very little data on the determinants of maternal and perinatal outcome in eclampsia in our country that can be used during investment in maternal health. This study is aimed at identifying the causes of poor maternal and perinatal outcomes and applying the findings to improve maternal and perinatal outcomes.

1.4 OBJECTIVES

Broad objective

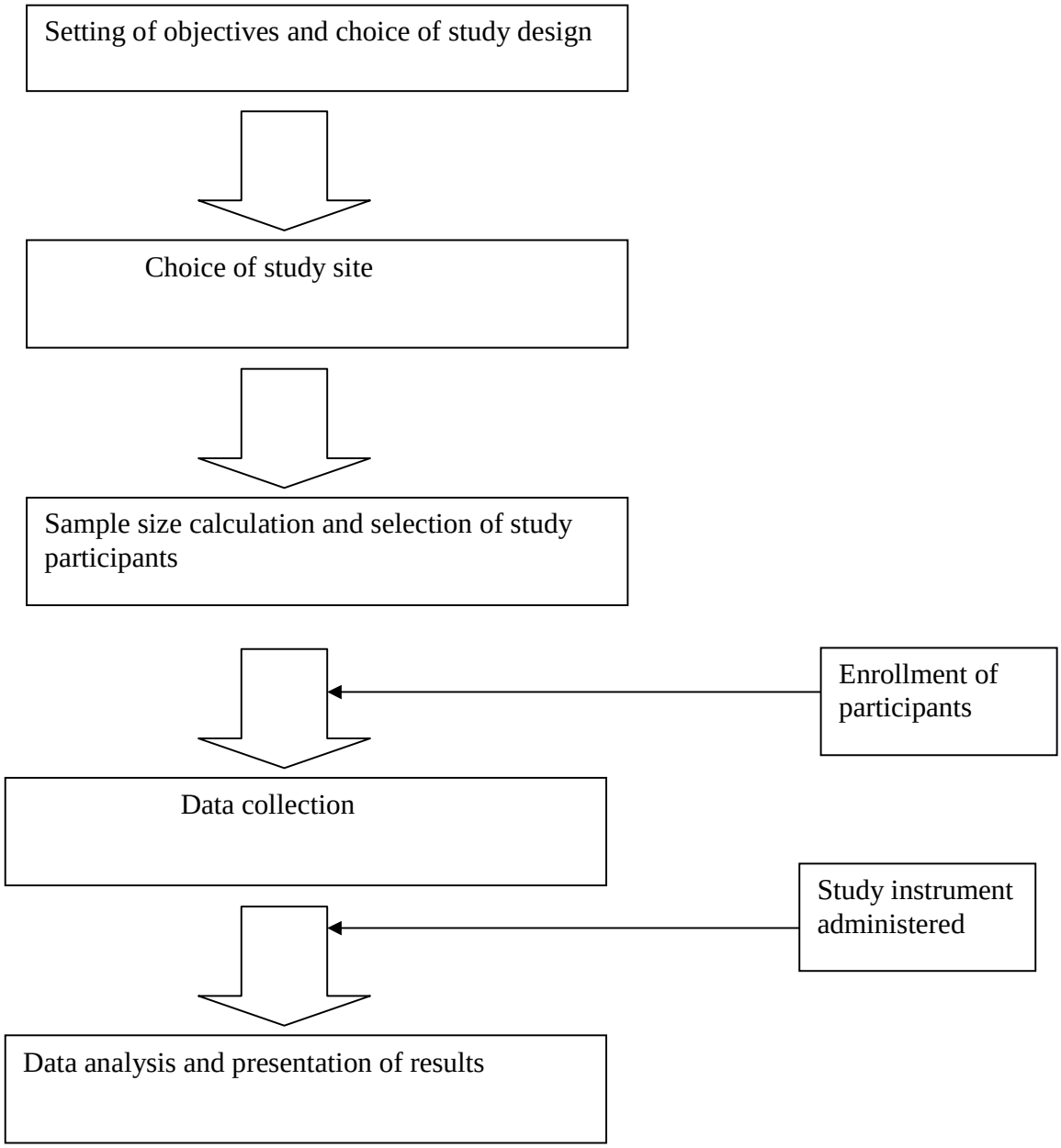
- To establish the factors that determine maternal and newborn outcome in patients with eclampsia.

Specific objectives

1. To determine the socio-demographic and obstetric characteristics of patients who present with eclampsia at Kenyatta National Hospital.
2. To describe the clinical management instituted in patients with eclampsia.
3. To describe the maternal and new born complications and outcomes and their prevalence.
4. To determine the predictors of maternal and new born complications.

1.5 CONCEPTUAL FRAMEWORK

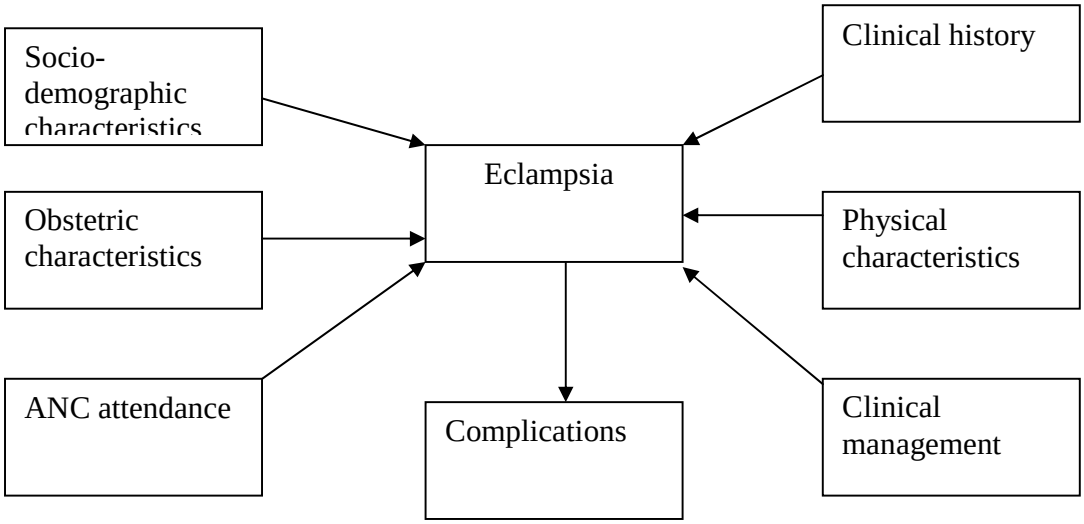
Figure 1: Summary of the study



The study began with a recognition of the fact that eclampsia is a common obstetric emergency that is life threatening to both the mother and the child. A research question was formulated to determine the maternal and perinatal

outcome in eclampsia. Objectives for the study were set and the study design chosen, (Crossectional descriptive). Kenyatta National hospital was selected as the study site due to its size and suitability. A suitable sample size was calculated and study participants enrolled, figure 1.

Figure 2: conceptual framework



The variables studied were the socio-demographic characteristics, obstetric characteristics, ANC attendance, clinical history, physical characteristics and clinical management, figure 2.

CHAPTER 2: STUDY DESIGN AND METHODOLOGY

2.1 Study design

This was a cross-sectional descriptive study. Patients with eclampsia were interviewed at labor ward, postnatal wards and post natal clinic. This was able to capture all patients admitted with eclampsia at KNH.

2.2 Study site

The study was done at Kenyatta National Hospital (KNH) which is located in Nairobi, the capital city of Kenya

Kenyatta National Hospital is one of the two level six referral hospitals in Kenya. The obstetric unit has 3 antenatal wards, one labor ward and 2 maternity theatres. Labor ward has a bed capacity of 20 beds. Pregnant mothers report to the labor ward where a team comprising a resident in obstetrics and gynecology and midwives manage the patients. A specialist on call is usually ready to offer guidance and assistance. There is an acute room with 3 beds for managing very sick mothers including those with eclampsia.

On average 40 mothers are attended to every day. There is a standard protocol for the management of eclampsia. In the protocol, once a mother is diagnosed with eclampsia convulsions are controlled with an initial loading dose of 4g of 20% magnesium sulphate given intravenously slowly over 5 minutes. This is followed with 1ntramuscular injection of 10g of 50% magnesium sulphate. Five grams is injected into each buttock. Blood pressure control is with 5mg of hydrallazine intravenously every 15 minutes till the diastolic blood pressure is less than 110mmgh. The vital signs, patellar reflexes and urine output are monitored.

2.3 Study population

This comprised of women admitted with eclampsia at labor ward and those on follow up in the postnatal clinic in KNH. Information about the diagnosis was obtained from the patients clinical records.

Inclusion criteria

Mothers admitted with eclampsia at KNH labor ward, antenatal ward and those on follow up in the postnatal clinic who consented.

Exclusion criteria

- Mothers with other obstetric complications unrelated to eclampsia.
- Mothers with other underlying chronic illnesses.
- Mothers under 18 years of age with no next of kin.

2.4 SAMPLE SIZE CALCULATION AND SAMPLING PROCEDURE

2.4.1Sample size calculation

From literature review the prevalence of complications was 8.6% [25].
For purposes of calculation the prevalence of complications (8.6%) was used to determine the sample size.
The following formula was used for sample size determination.

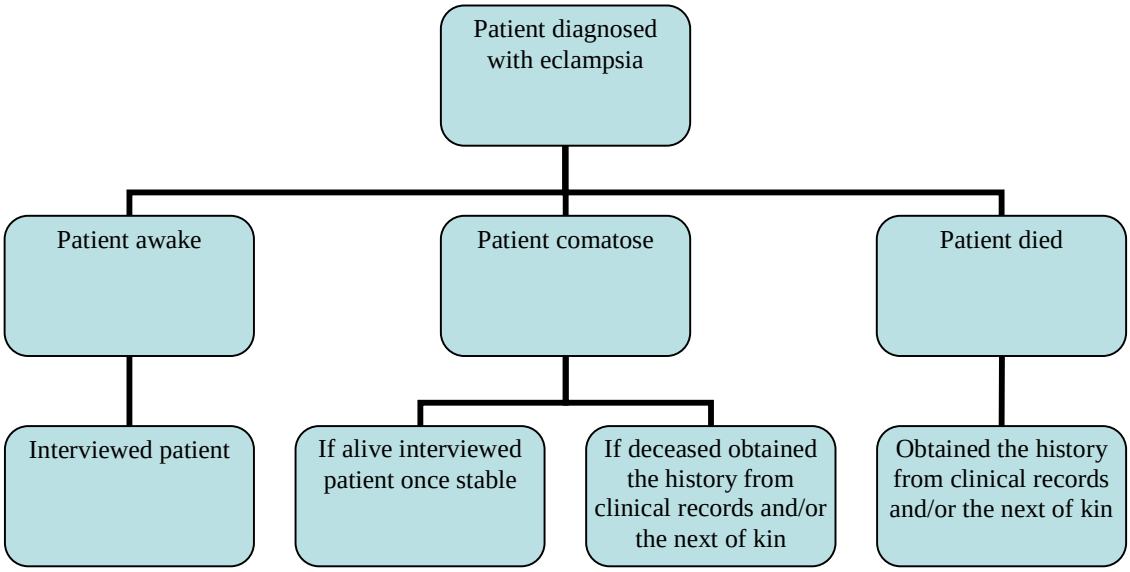
$$n = \frac{N \times Z^2 \times P(1-P)}{d^2 \times (N-1) + Z^2 \times P(1-P)}$$

Where
n = minimal sample size.
N=Number of deliveries in KNH in a year (average 1800).
Z=standard error from the mean corresponding to 95% confidence interval
Taken as 1.96
P=prevalence of maternal complications in eclampsia taken as 8.6%%.
D=precision/reliability with which to determine p taken as 0.05.
The minimum calculated sample size was 135.
The aim of the study was to estimate the frequency of complications with an error margin of 5%.

2.4.2 Sampling procedure

Consecutive women diagnosed with eclampsia and being managed in labor ward, antenatal ward and post natal clinic who consented were recruited into the participate in the study. This procedure of recruitment was applied till the sample size was obtained. Patients who were comatose were interviewed once they were stabilized and able to consent.(figure 3)

Figure 3: Summary of the interview process



Consenting process

The process of getting consent was private. The patient her next of kin was again briefed on the nature of the study and its justification. Then the patient was given the consent form to read. If there were any questions, these were answered by the interviewer. When the patient was satisfied she signed the consent form. For patients who could neither read nor write the interviewer read the consent form in Kiswahili and if the patient agreed to participate her right thumbprint was taken. Members' of staff on duty assisted if communication was a hindrance. For mothers' under 18 years of age the consent was obtained from the next of kin.

2.4.3Data collection procedure

The study was conducted at KNH labor ward, postnatal wards and postnatal clinic.

Recruitment and training of research assistants

Two midwives from KNH labor ward whom I recruited and trained assisted in data collection. Recruitment was based on merit and these midwives' past experience in data collection. The midwives were trained on the study design and objective.

Pre-testing of the data collection instrument

The pre-testing of the data collection instrument (questionnaire) was done by the research team before the actual study begun .The main aim of this exercise was to establish the suitability, practicability and reliability of the study questions. Pre-testing took place at KNH labor ward. Ten questionnaires were used during this exercise. Information obtained was used to update the questionnaire and make changes accordingly.

Data coding and quality control

The following data coding procedures were used;

1. Exhaustive: a unique code was created for each category, for example marital status (single, married, divorced or widowed)
2. Mutually exclusive: information being coded was assigned to one category, for example was the BP high (yes or no)
3. Residual other: provided for the participant to provide information that is not anticipated, for example any documented medical condition (none, diabetes mellitus, Cardiac disease, epilepsy, other).

Data collection

Mothers admitted with eclampsia were interviewed on admission if conscious. Mothers were also interviewed in the antenatal ward and in the postnatal clinics.
Very sick mothers were clinically stabilized first before conducting the Interview.
Mothers eligible for the study were identified from the clinical history. Those who met the inclusion criteria were briefed on the nature of the study and its justification. In cases where the mother did not understand English or Kiswahili, help was sought from any member of staff on duty who understood the patients' language.
This was carried out by two research assistants and myself when available. The research assistants were midwives who have worked in labor ward for more than 10 years.
Patients admitted at night when none of us were there were interviewed the following day.

Those who consented were randomly allocated numbers ranging from 1 to 135. These numbers were contained in unmarked envelopes. This was for the purposes of avoiding any bias.

The process of data collection was through face to face interviews and was conducted in private.

The interviewer made the patient comfortable then proceeded to ask questions from the questionnare.The interviewer stuck to the questions on the questionnaire.

Some information on the questionnaire, for example renal function was obtained from the clinical records because the patient did not have access to this information.

Data collection was uniform. A black pen was used during the exercise and a tick was inserted in the box after the question.

Once the interviewer completed the interview he/she went through the questionnaire to check for errors or any omissions made during the interview process. The questionnaire was then filed to avoid data loss. Once the study was complete the data was entered into frequency tables through tallying.

For patients who died before the interview information was obtained from the next of kin and the patients clinical records.

2.5DATA MANAGEMENT AND STATISTICAL ANALYSIS

2.5.1 Data management

All participants' data did not bear the names of the participant but rather a serial number. Data forms were kept in a secure lockable cabinet only accessible by the principal investigator and the statistician. Data was entered into a password protected Ms Access database prepared by the statistician. The investigator upon completion of data entry checked all the entered data against the hard copy forms.

2.5.2 Statistical analysis

Data analysis was performed using Statistical Package for Social Scientists. Descriptive statistics were determined during the analysis. The chi square and Mann -Whitney u test were applied to identify factors were related to development of complications in the patients who presented with eclampsia.

2.6 ETHICAL CONSIDERATIONS

Confidentiality of the results was paramount and was maintained.

This study was approved by the Kenyatta National Hospital Ethics and Research Committee. Informed consent was obtained from the client before being recruited. This involved signing a consent form after an explanation by the investigator about the details of the study. This included the facts and basis of the study, the risks and benefits anticipated as well as confidentiality and voluntary nature of the study.

The contact address of the investigator was given to the client in case she may have required further details about the study or may have wished to withdraw from the study. The information was communicated both verbally and in writing (appendices 1 and 2). Refusal to participate in the study did not deny the patient the appropriate management. The client did not bear any cost. The next of kin for very ill patients were also briefed on the nature of the study and those who agreed to be interviewed and consented on the patients behalf were included in the study.

2.7 STUDY LIMITATIONS

The constraints encountered included;

- Some patients were unconscious and unaccompanied making data collection difficult.
- Some patients recall was not absolute when they were asked what was already in the past.

For the patients who were unconscious interviews were conducted once they regained consciousness. Relatives were contacted during visiting hours to collaborate the history when need arose. These constraints did not impact on the interpretation of the final findings

CHAPTER 3.RESULTS

The study was conducted over a period of five months between January 2011 and May 2011. Patients with eclampsia were interviewed

Table 1: Socio-demographic characteristics (n=135)

Variable		Count	%
Age	14-18 years	14	10.4%
	19-23 years	45	33.3%
	24-29 years	52	38.5%
	29-33 years	18	13.3%
	>33	6	4.4%
	Total	**135**	100
Education	None	9	6.7%
	Primary	88	65.2%
	Secondary	37	27.4%
	Tertiary	1	.7%
	Total	**135**	100.0%
Residence	Urban	123	91.7%
	Rural	11	8.3%
	Total	**135**	100.0%
Marital Status	Single	20	15.0%
	Married	114	84.2%
	Divorced	0	.0%
	Widowed	1	.8%
	Total	**135**	100.0%

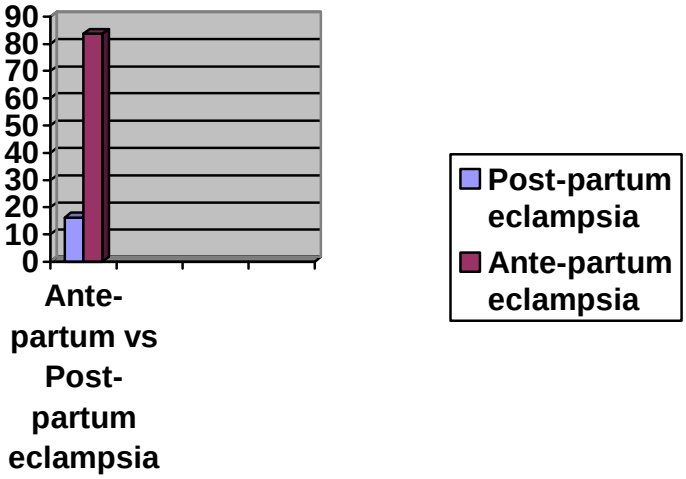
The age ranged from 17 to 36 years with a mean of 22 years (SD.5.4).Most of the patients were (82.2%) below 29 years and 84.2% were married.

Majority of patients (65.2%) had attained primary level of education and were urban dwellers (91.7%) This is in keeping with the socio-demographic characteristics of patients who seek services in KNH. (Table 1)

Table 2: Ante partum Vs Postpartum eclampsia

Delivery	**Yes**	22	16.3%
	No	113	83.7%
	Total	**135**	**100.0%**

Figure 4 :Ante-partum vs. post partum eclampsia



One hundred and thirteen patients (83.7) fitted before delivery and 22 (16.3%) fitted after delivery. This is in keeping with the observation in various studies where eclampsia is most common as term approaches, (Table 2) (Figure 4)

Table 3: Gestational age for the patients with ante-partum eclampsia (n=113)

Gestation (weeks)	Count	%
≤ 28	2	1.7
29-32	12	10.6
33-36	98	86.7
≥ 37	1	1
Total	**113**	**100**

Gestation ranged from 24-40 weeks with a mean of 33 (SD5.1 weeks) Majority of patients were between 33-36 weeks (86.7%) This was in keeping with the fact that eclampsia is most common in the third trimester of pregnancy. (Table3)

Table 4: Antenatal Clinic Attendance

ANC	Yes	82	60.7%
	No	53	39.3%
	Total	**135**	**100.0%**
ANC Place	Rural health center	7	8.8%
	City council	61	73.8%
	Private clinic	8	10.0%
	Public hospital	6	7.5%
	Total	**82**	**100.0%**
Gestation at first visit	Less than 20 weeks	2	2.4%
	21-28 weeks	67	81.7%
	29-36 weeks	12	14.6%
	>36 weeks	1	1.2%
	Total	**82**	**100.0%**

Most of the patients (60.7%) had started ANC attendance with the majority attending city council clinics (73.8%). Most of the patients started ANC attendance between 21-28 weeks (81.7).This is in keeping with ANC attendance in the city of Nairobi. (Table 4)

Table 5: Complications during ANC visits (n=82)

High BP noted	**No**	72	88.1%
	Yes	10	11.9%
	Total	**82**	100.0%
Protein noted	**No**	78	96.3%
	Yes	4	3.7%
	Total	**82**	100.0%
Swelling of Legs noted	**No**	7	13.3%
	Yes	75	86.7%
	Total	82	100.0%

Most of the patients did not have an elevated BP (88.1) or protenuria (96.5%) noted during ANC.

In this study 86.7% reported the presence of oedema in pregnancy. (Table 5)

Table 6: Past Obstetric history (n=135)

History		Count	%
Parity	0	77	57.0%
	1	29	21.5%
	2	18	13.3%
	3	9	6.7%
	5	1	.7%
	10	1	.7%
	Total	**135**	**100.0%**
Eclampsia	No	135	100.0%
	Total	**135**	**100.0%**

Majority of the patients who developed eclampsia were primigravida (57%) and none of the patients had any prior history of eclampsia. (Table 6)

Table 7: Physical signs at admission (n=135)

Sign	Count	%
Condition at admission		
Alert	2	1.5
Sedated	90	66.7
Unconscious	43	31.9
Total	**135**	**100**
Systolic BP(mmHg)		
100-140	32	23.7
141-180	75	55.6
181-220	20	14.8
> 220	8	5.9
Total	**135**	**100**
Diastolic BP (mmHg)		
<90	18	13.3
90-100	42	31.1
101-110	26	19.3
>110	49	36.3
Total	**135**	**100**
Presence of oedema		
Yes	117	86.7
No	18	33.3
Total	**135**	**100**
Protenuria		
1+	2	2.3
2+	44	33.1
≥ 3+	89	64.6
Total	**135**	**100**

Majority of the patients (66.7%) were sedated. This was due to the treatment initiated in casualty or at the referring hospital. Systolic BP ranged from 130-220 with a mean of 172. Diastolic BP ranged from 90-130 with a mean of 109.All patients had protenuria with 64.6% having a protein level of 3+ and above. (Table 7)

Table 8: Interval between first fit and admission to KNH for post partum eclampsia (n=22)

Interval (hours)	Count	Percentage
<12	15	68
12-24	5	23
>24	2	9
Total	**22**	**100**

In most cases patients were seen at KNH within 12 hours after the first fit for post partum eclampsia (68%) meaning eclampsia was most likely to occur during this period. The interval between delivery and admission to KNH ranged from 4 to 96 hours with a mean of 21 hours. (Table 8)

Table 9: Interval between admission to KNH and delivery for ante-partum eclampsia (n=113)

Interval (hours)	Count	Percentage
<6	64	57
6-12	39	35
>12	11	8
Total	**113**	100

The time interval between admission and delivery was 2-48 hours with a mean of 7 hours. Majority of the patients (57%) delivered within 6 hours. (Table 9)

Table 10: Mode of delivery and reason for caesarean section (n=113)

Mode of delivery	SVD	35	25.2
	C/S	100	74.8
	Total	**135**	**100**
Indication for C/S	Poor Bishop score	78	78
	Fetal distress	10	10
	Poor progress	6	6
	Abruptio placenta	6	6
	Total	**100**	**100**

The commonest mode of delivery was caesarian section (74.8%) with SVD accounting for 25.2% .The commonest indication for caesarian section was a poor bishop score (78%).(Table 10)

Table 11: Birth weight (n=135)

Weight(grams)	**Number**	**Percentage**
≤ 1000	12	9
1001-1500	14	10.4
1501-2000	36	26.7
2001-2500	41	30.4
2501-3000	17	13
3001-3500	14	10.4
>3500	1	0.1
Total	**135**	**100**

The birth weight ranged from 900g to 4kg with a mean of 2kg (SD1).The majority of babies (30.4%) weighed between 2 kg and 2.5kg .(Table 11)

Table 12: Neonatal outcome of delivery (n=135)

Outcome	Count	%
Live	101	75.4
FSB	15	11.2
Neonatal death	14	3.0
MSB	5	10.4
Total	135	100

There were 34 perinatal deaths (24.6%). The perinatal mortality rate was 2.8/1000 deliveries,(Table 12) .The maternal mortality rate was 0.58/1000 deliveries.

Table 13: Interval between admission and delivery vs. Outcome of delivery

Neonatal outcome	Interval							
	<6 hours		6-12 hours		> 12 hours		Total	
	Count	%	Count	%	Count	%	Count	%
Live	47	73.4	30	81.5	9	100	75	73.5
FSB	8	12.5	3	8.1	0	0.0	11	10.8
MSB	1	1.6	2	5.4	0	0.0	3	2.9
Neonatal death	8	12.5	5	13.5	0	0.0	13	12.7
Total	**64**	**100**	**37**	**100**	**9**	**100**	**113**	**100**

Most of the patients delivering within 12 hours had a favorable outcome 73.4% for those delivering within 6 hours and 81.5% for those delivering in 6-12 hours. (Table 13)

Table 14: Birth weight vs. Outcome of delivery (n=135)

Birth wt (g)	Outcome					
	Live	%	Death	%	Total	%
≤ 1000	0	0	12	100	12	100
1001-1500	2	14.3	9	85.7	14	100
1501-2000	24	66.7	12	33.3	36	100
2001-2500	41	100	0	0.0	41	100
2500-3000	17	100	0	0.0	17	100
3001-3500	14	100	0	0.0	14	100
>3500	1	100	0	0.0	1	100

There were more perinatal deaths in those less than 1000g (100%) and those between 1001-1500g (81.6%) This was more likely due to the early gestational age at the time of delivery. (Table 14)

Table 15: Types of maternal complications (n=62)

Complication	Count	%
Pulmonary oedema	11	17.7
Sepsis	9	14.5
Acute renal failure	14	22.6
Cerebral hemorrhage	2	3.2
Abruptio placenta	7	11.3
Laryngeal oedema	2	3.2
Postpartum hemorrhage	7	11.3
Anemia	3	4.8
Visual disturbance	4	6.5
Deep Venous thrombosis	3	4.8

During the study 62 patients (45.9%) developed complications. The commonest complications seen were acute renal failure (22.6), abruptio-placenta (11.3%) and post-partum hemorrhage (11.3%). (Table 15)

Table 16: Duration of stay in ICU (n=16)

		Count	%
ICU stay (days)	1-2 days	2	15
	3-4 days	4	8.8
	5-6 days	9	69.2
	>=7 days	1	7

Of the patients admitted in ICU the majority stayed for 5-6 days. (Table 16)

Table 17: Causes of maternal death (n=7)

Cause of death	Cerebral hemorrhage	3	43%
	Pulmonary edema	3	43%
	Poor reversal from anesthetic	1	14%

There were 7 maternal deaths giving a maternal mortality rate of (5.1%) of all patients in the study and 0.58/1000 deliveries. The causes of maternal mortality were cerebral hemorrhage (3 Patients), pulmonary edema (3 patients) and poor reversal from anesthesia (1 patient). (Table 17)

Table 18: Socio-demographic characteristics vs. development of complications

		Yes		No			
Characteristic		**Count**	**%**	**Count**	**%**	**X^2**	**P value**
Age groups	14-18 years	7	50.0%	7	50.0%	4.97	0.290
	19-23 years	19	42.2%	26	57.8%		
	24-29 years	25	48.1%	27	51.9%		
	29-33 years	6	33.3%	12	66.7%		
	>33	5	83.3%	1	16.7%		
Marital Status	Single	9	45.0%	11	55.0%	0.92	0.632
	Married	53	47.3%	59	52.7%		
	Divorced	0	.0%	0	.0%		
	Widowed	0	.0%	1	100.0%		
Education	None	3	33.3%	6	66.7%	2.49	0.477
	Primary	43	48.9%	45	51.1%		
	Secondary	15	40.5%	22	59.5%		
	Tertiary	1	100.0%	0	.0%		

There was no significant relationship between the socio-demographic characteristics and the development of eclampsia ($p>0.05$). (Table 18)

Table 19: Antenatal Clinical Attendance vs. Complications

Attended	Complications	%	None	%	X^2	P value
Yes	24	38.1	58	80.6	21.17	<0.0001
No	39	61.9	14	19.4		
Total	**63**	**100**	**72**	**100**		

The majority of patients who did not attend ante-natal clinic (61.9%) developed complications. Among the patients who attended ANC, 38.1 % developed complications. This relationship was statistically significant (p=0.0001). (Table19)

Table 20: physical signs at admission vs. Complications (n=135)

Sign		Complication	%	None	%	X^2	P value
Diastolic BP(mmhg) on admission	<90	0	0.0	2	2.7	13.47	0.004
	90-100	10	16.4	27	37		
	101-110	23	37.7	29	39.7		
	>110	29	45.9	15	20.5		
	Total	**62**	**100**	**73**	**100**		
Oedema	Yes	59	95.2	69	94.5	0.06	0.56
	No	3	4.8	4	5.5		
	Total	**62**		**73**	**100**		
Protenuria at admission	None	0	0.0	0	0.0	2.41	0.3
	1+	2	3.2	1	1.1		
	2+	16	25.8	28	38.6		
	3+ and above	44	71	44	60.3		
	Total	**62**	**100**	**73**	**100**		

There was a significant relationship between development of complications and diastolic BP. (P= 0.004). There was no significant relationship between edema (p =0.56) and protenuria (P= 0.3). (Table 20)

Table 21: Maternal death versus complications

Mortality	**Complications**	**%**	**None**	**%**	**X^2**	**P value**
Yes	7	11.2	0	0.0	4.66	0.031
No	55	88.2	73	100		
Total	**62**	**100**	**74**	**100**		

All the patients who died had developed complications. The relationship between development of complications and maternal death was statistically significant (p=0.031). (Table 21)

Table 22: comparison of those who developed complications with those who did not against the other various parameters

	Maternal Complications	N	Mean	Std. Deviation	P value
Age	**Yes**	62	24.68	5.175	0.382
	No	73	23.96	4.351	
Parity	**Yes**	62	85	1.535	0.607
	No	73	74	1.041	
Gestation first attendance	**Yes**	26	2.15	.368	0.918
	No	56	2.14	.483	
Time interval(hours)	**Yes**	48	7.38	8.178	0.716
	No	54	6.76	8.769	
Diastolic blood pressure at admission (mmHg)	**Yes**	61	113.05	10.282	<0.001
	No	73	104.70	15.597	
Duration after delivery (hours)	**Yes**	6	15.00	2.828	0.439
	No	7	25.43	31.506	

The relationship between diastolic BP on admission was statistically significant (P=0.001). The other parameters were not statistically significant age(p=0.382),parity(0.607), gestation of first attendance(0.918),time interval from onset of first fit(0.716) and duration after delivery (0.439).(Table22)

CHAPTER 4: DISCUSSION

In this study 135 patients with eclampsia were interviewed and evaluated. During this period there were 12000 deliveries. The incidence of eclampsia was 11/1000 deliveries. This incidence is much higher than similar studies at the same hospital. Mati found an incidence of 1.8/1000 deliveries while Machoki found an incidence of 1.9/1000 deliveries [6, 7].Wasiche found an incidence of 10/1000 deliveries[12].

The high incidence could be due to an increase in the population of gravid women.

Most of the mothers in this study 59% were below 23 years. This compares to other studies that eclampsia is likely in the younger population [4].

The majority of patients were nulliparas (57%). Other studies have also reported this high incidence among primigravida [7, 8].

In this study 82(60.7%) of the patients had attended clinic while 53 (39.3%) had not. Machoki found that 30.2% had not attended ante-natal clinic [7]. Wasiche found that 51.1% 0f the patients who developed eclampsia had attended ANC.

The majority of patients were delivered through caesarian section (74.8%) while those who delivered vaginally were (25.2%). The main indication for Caesarian section was a poor bishop score (83%).Innocent O George and colleagues found a caesarian rate of 55.7% among the patients admitted with eclampsia[25].Mwinyoglee reported a caesarean section rate of 66.7% [26].Wasiche found a caesarian rate of 73%. These findings were similar. The high rate was unavoidable since the commonest indication was unfavorable cervix.

In this study, 45.9% of the patients developed complications following eclampsia. This rate is similar to that found by Wasiche who did a retrospective study on maternal complications [12].

The commonest complications were acute renal failure (22.6%), pulmonary edema (17.7%), sepsis (14.5%), abruptio-placenta (11.3%) Post-partum hemorrhage (11.3%), visual disturbances (6.5%), anemia (4.8%), deep venous thrombosis (4.8%) and cerebral hemorrhage (3.2%)

Other studies have a slightly different prevalence for the various complications. Wasiche found the major complications to be sepsis (40.3%), acute renal failure (10.4%), cerebral hemorrhage (10.4%) abruptio placenta (9%), laryngeal edema (7.5%), post-partum hemorrhage (4.5%) and visual disturbances (3%) [12]. Machoki found that the infection rate was slightly higher in eclamptics than in other patients[4].The slight decrease in the incidence of sepsis could be due to the widespread use of antibiotics before and after surgery.

Of the patients who developed complications, 22.5% had to be admitted in ICU. These patients were admitted in ICU because of the need for ventilatory support because of complications such as pulmonary oedema and poor reversal from anesthesia.

There were seven maternal deaths in this study. The case fatality rate was 5.1%. Wasiche in a previous study found a case fatality rate of 5%[12].This two findings are similar. Other studies in Africa have reported higher case fatality rates Mwinyoglee reported a case fatality rate of 21.2%[26]. Douglas found a rate of 1.8% in the United Kingdom[11].

The causes of maternal mortality were pulmonary oedema (3 patients), cerebrovascular hemorrhage (3 patients) and poor reversal (1 patient). The

causes of maternal mortality are similar to the previous study by Wasiche with only minor variations [12].

The perinatal mortality rate was 2.8/1000 deliveries. Wasiche reported a rate of 3.3/1000 deliveries[12].Earlier studies reported higher perinatal mortality rates at the same center. Mati found a perinatal mortality rate of 82.2/1000 deliveries while Machoki reported a rate of 225.8/1000 deliveries [6, 7].

The study was carried out to establish the determinants of maternal and perinatal outcome in eclampsia. There was no significant relationship between development of complications and socio-demographic characteristics, age (p= 0.29), marital status (p0.632)
and level of education (p=0.471).This is similar to the findings of a similar study on complications carried out by Wasiche [12].

Most of the patients (60.7%) who developed eclampsia complications had not attended ANC and this relationship was statistically significant (p=0.0001).This can be explained by the fact that warning signs were not detected in this group. Innocent George and colleagues found that 90.9% of the patients who developed eclampsia had not attended ANC at the University of Port Harcourt in Nigeria [25].

A high diastolic blood pressure was associated with development of complications. This relationship was statistically significant (p=0.001). The mean diastolic pressure for those who developed complications was 113 mmHg while for those who did not was 104.5mmHg. This differed from an earlier study by Wasiche who found no statistically significant finding among the two groups [12].It is possible that some of the patients she studied had been given anti-hypertensive drugs at the referring hospital. The level of protenuria was not statistically significant (p=0.3)

The mean interval between admission was longer for those who developed complications (mean 7.38 hours) compared to those who did not (mean 6.76). The relationship was not statistically significant (p=0.716)

Patients who died had developed complications. There was a statistically significant relationship between development of complications and maternal death (p=0.031).

CONCLUSION

The study shows an increasing incidence of eclampsia at KNH of almost five fold.

The key findings from the study are that there is a high caesarean rate among patients with eclampsia. It was also established that ANC non attendance was associated with an increase in complications. Very high diastolic blood pressure levels are also associated with adverse outcomes.

The complications seen in eclampsia are similar to those reported in other studies though the incidence of sepsis was slightly lower while that of ARF and pulmonary oedema were slightly higher.

Eclampsia was also associated with case fatality rates

RECOMMANDATIONS

The following recommendations have been made from the study

1. Health educations for pregnant women to sensitize them on dangers of pregnancy induced hypertension and attendant complications such as eclampsia. This should be done at the booking visit.

2. Improve and equip level 5 and level 6 hospitals. This will ensure management of eclampsia in the periphery to avoid unnecessary delays in the referral system.

3. Active management of patients with eclampsia and timely referrals if facilities for their care are not available.

4. Review the management of eclampsia at KNH to address rising case fatality rates.

5. Increased vigilance of patients who have had no antenatal care.

BUDGET

The expenditure during the study was:

Stationery	**35,000 kshs.**
Statistician	**35,000 kshs.**
Research assistants	**20,000 kshs.**
Miscellaneous	**5,000 kshs.**

Total **95,000 kshs**

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APPEDIX 1

DATA COLLECTION TOOL

1. Patients study number ☐ ☐ ☐
2. Age (completed years) ☐ ☐
3. Level of education

a)None ☐ b) Primary ☐

c)Secondary ☐ d) University/college ☐

4. Residence

a) Urban ☐ b) Rural ☐

5.Marital status (put X or tick)

a) Single ☐ b) Married ☐

c) Divorced/separated ☐ d) Widowed ☐

PAST OBSTETRIC HISTORY

6. Parity ☐ + ☐

7. Delivered before,

a) Yes ☐ b) No ☐

8. If delivered before, eclampsia in previous pregnancy

a) Yes ☐ b) No ☐

Pregnancy	Year
1st	☐☐☐☐
2nd	☐☐☐☐
3rd	☐☐☐☐

INDEX PREGNANCY

	Day	month	year
9. Last menstrual period	☐	☐	☐

10. ANC attended (insert X or tick)

a) Yes ☐

b) No ☐

If NO go to question 13.

11. ANC attendance (insert X or tick)

a) Rural health centre ☐

b) City council ☐

c) Private clinic/hospital ☐

d) Public hospital ☐

12. Gestation at first ANC attendance

a) less than 20weeks ☐

b) 21-28 weeks ☐

c) 29-36 weeks ☐

d) More than 36 weeks ☐

13. Any of the following noted in pregnancy

a) High blood pressure ☐

b) Protein in urine ☐

c) Swelling of the legs ☐

If none of the above go to question 19

14. If the blood pressure was high medication given?

15. If the blood pressure was high any referral to another hospital?

a) Yes ☐

b) No ☐

If no to question 15 go to 17

16. The blood pressure on referral?

Systolic ☐mmHg Diastolic ☐ mmHg

17. If no to question 15 did the blood pressure improve in Subsequent visits

a) Yes ☐

b) No ☐

If yes to question 17 go to 19

18. If no to question 17, management?

a) Admitted ☐

b) Referred to another facility ☐

c) Other (specify)

19. Documented medical conditions?

a) None ☐

b) Diabetes ☐

c) Cardiac disease ☐

d) Epilepsy ☐

e) Other (specify) ☐

AT ADMISSION

20. Date and time of first convulsion

Date Time (am/pm)

21. Date seen at KNH Time (am/pm)

22. Number of convulsions at the time of admission

23. Condition at admission

a) Alert ☐

b) Sedated ☐

c) Unconscious ☐

24. Blood pressure at admission

Systolic ☐ mmhg Diastolic ☐ mmhg

25. Level of protenuria at admission

a) None ☐

b) 1+ ☐

c) 2+ ☐

d) 3+ and more

26. Delivery before admission

a) Yes ☐

b) No ☐

If no to question 26 go to 28

27. If yes, duration after delivery

28. Time interval between admission to KNH and delivery (hours)

29. Mode of delivery

a) SVD ☐

b) Vacuum extraction ☐

c) C/S ☐

30. If C/S was done what was the indication

a) Poor bishop score ☐

b) Poor progress ☐

c) Abruptio placenta ☐

d) Fetal distress ☐

e) 0ther (specify)

31. Newborn outcome

a) Live ☐

b) FSB ☐

c) MSB ☐

d) Neonatal death ☐

32. Birth weight of baby (kgs) ☐

MATERNAL COMPLICATIONS

33. Any complications?

a) Yes ☐
b) No ☐

If no go to question 41

34. If yes to question 33, what were the complications (reference to the file for clinical diagnosis and laboratory tests such as renal function)

a) Acute renal failure ☐
b) Pulmonary edema ☐
c) Cerebral hemorrhage ☐
d) Abruptio placenta ☐
e) DIC ☐
f) Sepsis ☐
g Other (specify)

35. Admission to ICU

a) Yes ☐
b) No ☐

If no to question 35 go to 41

36. If yes to question 35, reason for admission?

a) Pulmonary edema ☐
b) Cerebral hemorrhage ☐
c) Difficult reversal from anesthesia ☐
d) Other (specify)

37. Length of stay in ICU (days)

38. If ARF, was dialysis done?

a) Dialysis ☐

b) Conservative ☐

39. Maternal death

a) Yes ☐

b) No ☐

If no go to question 39 go to 41

40. If yes to question 39, what was the cause of death?

a) ARF ☐

b) Cerebral hemorrhage ☐

c) Pulmonary edema ☐

d) DIC ☐

e) Sepsis ☐

f) Cardiopulmonary failure ☐

g) Other specify

41.I f no to 39, length of stay in hospital (days)

42. Any permanent disabilities attributed to eclampsia?

a) Yes ☐

b) No ☐

43. If yes to question 42 which are the disabilities?

APPENDIX 2

CONSENT FORM

I Dr Sambu Solomon Tyaa and my research assistants are caring out a study on the determinants of maternal and perinatal outcome in patients with eclampsia

This involves collecting data of all the patients admitted with eclampsia at KNH labor ward.

We will be asking questions regarding your pregnancy as well as personal details. The information obtained will be confidential.

The information gained from the study will help detect mothers at risk of complications which could harm the baby and yourself

The care given to you will not change and there will be no added cost.

Refusing to participate will not change the care given to you.

Consent

***I*……**

Have agreed to participate in the study and was not coerced.

NAME :
SIGNATURE:
DATE :

MATERNAL AND PERINATAL OUTCOME IN PATIENTS WITH ECLAMPSIA AT KENYATTA NATIONAL HOSPITAL

RESEARCH DISSERTATION SUBMITTED AS PARTIAL

FULFILMENT FOR MMED IN OBSTETRICS AND

GYNAECOLOGY, UNIVERSITY OF NAIROBI

PRINCIPAL INVESTIGATOR:

DR. SOLOMON T. SAMBU, MBChB

M.**MED STUDENT DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY**

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF NAIROBI.

DECLARATION

This is to certify that this study is my original work and has not been presented for a degree course in any other university. I further certify that my study has been supervised by senior members in the department of Obstetrics and gynecology, University of Nairobi.

DR SAMBU SOLOMON MICHAEL TYAA,

Signature…….. Date…….

This is to certify that the commentary in this dissertation was researched upon by DR. Sambu Solomon Michael under my guidance and supervision and the dissertation is submitted with my approval

DR. ALICE K MUTUNGI,

MBCHB; MMED OBS&GYN; MSC REPROD BIOL;MPHL
SENIOR LECTURER,
UNIVERSITY OF NAIROBI

Signature…….. Date……

DR GATHARI NDIRANGU,

MBCHB, MMED OBS&GYN
HONORARY LECTURER,
UNIVERSITY OF NAIROBI

Signature…….. Date…….

CERTIFICATE OF AUTHENTICITY

This is to certify that this dissertation is the original work of Dr Solomon T.Sambu Master of Medicine student in the Department of Obstetrics and Gynecology, registration number H58/70887/2007, University of Nairobi (2007-2011). The research was carried out in the department of Obstetrics and Gynecology, School of Medicine, College of Health Sciences. It has not been presented in any other university for the award of a degree.

Signature.....

Date.....

Prof. Koigi Kamau,

Associate Professor of Obstetrics and Gynecology,

Consultant Obstetrics and Gynecology,

Chairman,

Department of Obstetrics and Gynecology,

University of Nairobi.

TABLE OF CONTENTS

LIST OF ABREVIATIONS

ANC	Ante-Natal Clinic
ARF	Acute Renal Failure
BP	Blood Pressure
C/S	Caesarean Section
EEG	Electroencephalogram
FSB	Fresh still birth
HIV	Human immunodefiency virus
MSB	Macerated still birth
ND	Neonatal death
PET	Pre-eclampsia
PPH	Post Partum Hemorrhage
HELLP	Haemolysis, Elevated Liver enzymes and Low Platelets
KNH	Kenyatta National Hospital
NHIF	National hospital insurance fund

DEDICATION

This book is dedicated to my best friend Wacuka Ngari, my parents Mr. and Mrs. Leonard T. Sambu. Your love and support has been my strength and I sincerely want to thank you.

ACKNOWLEDGEMENT

I wish to thank the Government of Kenya for sponsoring my training at the University of Nairobi.

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Finally, I would like to thank all my lecturers and colleagues at the University of Nairobi and Kenyatta National Hospital for their support, guidance and encouragement.

DEFINATION OF TERMS

1. Pre-eclampsia

Pre-eclampsia refers to hypertension with protenuria and edema. This usually develops after 20 weeks gestation.

2. Eclampsia

Eclampsia is pre-eclampsia with convulsions that cannot be attributed to other medical causes.

3. Protenuria

This is the presence of protein in urine.

4. Antenatal care

This is the care given to pregnant women at a clinic to prepare them for delivery.

5. SVD

This refers to delivery of a baby vaginally. The presenting part is the vertex.

6. C/S

This is a surgical procedure that involves delivery of a baby through an incision made in the lower abdomen and on the uterus.

ABSTRACT

Background: Eclampsia is defined as pre-eclampsia complicated with convulsions and/or coma. The incidence of eclampsia is 0.2%-0.5% of all deliveries globally [2]. It is a common obstetric emergency in Kenya and it is associated with adverse maternal and neonatal outcomes. Some of the documented complications are pulmonary edema, cerebral hemorrhage, acute renal failure and placental abruptio.

Facilities for intensive care are scarce in low resource settings. Identifying determinants of maternal and perinatal outcome among eclamptics will provide insight as to which group of mothers at risk would benefit from earlier referral.

Objective: To study the determinants of maternal and perinatal outcome among patients with eclampsia at Kenyatta National Hospital.

Design: This was a Cross-sectional descriptive study.

Methodology: All mothers with eclampsia admitted in labor ward, ante-natal wards and those reviewed in the postnatal clinic were interviewed and information collected with respect to age, parity, ANC attendance, duration of gestation, place of first fit, BP and degree of protenuria at admission, fit –delivery interval, clinical management, mode of delivery, perinatal outcome, maternal mortality and duration of hospital stay was recorded in a questionnaire. Additional was obtained from patient records.

Setting: The study was conducted at Kenyatta National Hospital labor ward, antenatal wards and post natal clinic. KNH is Kenya's largest referral hospital.

Data collection analysis: Data collected was entered into a a database. This data was then analyzed electronically using SPSS widows statistical software. The chi square test was used to identify factors that were related to development of complications.

Outcome measures: The study variables include age, parity, booking status, gestational age, location at time of first seizure, number of fits, seizure to delivery interval, maternal complications and the clinical management.

Results: During the study 135 patients who developed eclampsia and who met the inclusion criteria were interviewed. The predictors of outcome were age, parity, booking status, gestational age, location at time of first seizure, number of seizures and seizure interval and delivery. There was no significant relationship between socio-demographic characteristics and development of complications($p > 0.05$). The majority of the patients who had not attended ANC (61.9%) developed complications. The relationship between the attendance of ANC and non-attendance and the occurrence of complications was statistically significant. ($p=0.0001$)

There was a statistically significant relationship between the diastolic BP and development of complications ($p=.001$).The commonest complications were pulmonary oedema (17.7%), acute renal failure (22.6%) ,sepsis (14.5%), postpartum hemorrhage, (11.3%) and abruptio placenta (11.3%). Development of complications significantly affected maternal mortality ($p=0.031$).The incidence of perinatal mortality was 2.8/1000 deliveries. The case fatality rate was 5.1%.

Conclusion: Development of complications in eclampsia was significantly influenced by ANC attendance and the diastolic blood pressure on admission.

Recommendations: From the study findings it is important for health care workers to review the management of eclampsia to address the rising case fatality rate. There is also need for increased vigilance of patients who have had no antenatal care.

INTRODUCTION

Hypertension in pregnancy is a common obstetric complication. The identification and effective management of eclampsia plays a significant role in ensuring a good maternal and perinatal outcome of pregnancy [1].

Hypertensive disorders complicating pregnancy have been classified into;

1. Pre-existing hypertension
2. Pre-eclampsia
3. Eclampsia
4. Pre-eclampsia in addition to pre-existing chronic hypertension

Pre-existing hypertension is defined as a systolic blood pressure of 140 mmHg or greater, and/or a diastolic blood pressure of 90 mmHg or more, either pre-pregnancy or before 20 weeks.

Pre-eclampsia is defined as a systolic blood pressure of 140 mmHg or greater, and/or a diastolic blood pressure of 90mmHg or more ,developing after 20 weeks gestation accompanied by protenuria with or without edema.

The minimum criterion for diagnosis of pre-eclampsia is;

1. BP greater or equal to 140/90 mmHg, after 20 weeks gestation. An increase of 30 mmhg for systolic blood pressure and 15 mmhg for diastolic blood pressure above the ANC booking blood pressure is significant.
2. Protenuria greater or equal to 300mg per 24hrs.

Eclampsia is defined as the occurrence of seizures that cannot be attributed to other causes in a woman with pre-Eclampsia [2].

Once eclampsia occurs, the risk to the mother and fetus is appreciable.

HELLP syndrome is one of the documented maternal complications, with a reported incidence of 2.8% at KNH[3.]

Pulmonary edema was documented in 2.9% of patients with pregnancy induced hypertension at KNH [3].Sibai and colleagues found an incidence of 2.9 % of pulmonary edema in patients with pregnancy induced hypertension[3].

Cerebral hemorrhages ranging from petechiae to gross bleeding in the brains of women with eclampsia examined soon after death have been documented[4.]

Other complications include placental abruptio, neurological deficits , pulmonary edema, cardiopulmonary arrest, acute renal failure and maternal death [5].

Eclampsia is most common in the last trimester and becomes increasingly more frequent as term approaches. Depending on whether convulsions appear before, during or after labor, eclampsia is designated as ante-partum, intra-partum or postpartum respectively. Treatment consists of anticonvulsant therapy to control convulsions and control of BP, followed by delivery. Once the patient is stable delivery is planned. Patients with a favorable Bishop score and without any contraindications to vaginal delivery are delivered vaginally.Those with a poor bishop score or any obstetric indications for a Caesarian section are delivered surgically[2].

CHAPTER 1: LITERATURE REVIEW, JUSTIFICATION AND OBJECTIVES

1.1 LITERATURE REVIEW

Burden of eclampsia

Eclampsia is a common obstetric emergency. It is a common cause of maternal and perinatal morbidity and mortality. The incidence of eclampsia is 2-5/1000 for all deliveries[2].High incidences have been reported in Kenyan hospital based studies. At KNH the incidence of eclampsia was reported to be 1.8/1000 deliveries by Mati while Machoki reported an incidence of 1.9/1000 deliveries [7, 8]. Bansal at pumwani maternity hospital reported an incidence of 1.04/1000 deliveries[9].

Pathophysiology

The pathogenesis of eclamptic seizures is poorly understood. Seizures have been attributed to platelet thrombi, localized vasoconstriction and foci of hemorrhage in the brain cortex. There is evidence from autopsies that the problem is ischemia secondary to intensive vasoconstriction [10].

Naidu in his study using CT –scan single photon emission and transcranial sonography concluded that the patho-physiology of eclampsia is primarily cerebral vasospasm with resultant ischemia and cerebral edema involving the main watershed areas and the parieto-occipital areas of the brain. Vasoconstriction is a protective reflex in response to extremes of arterial pressure to ensure that cerebral perfusion remains constant .Specific EEG abnormalities can usually be demonstrated for sometime after a seizure. Most of these abnormalities subside within three months[11].

Clinical presentation

Almost without exception pre-eclampsia precedes the onset of eclamptic convulsions. Depending on whether convulsions occur before, during or after labor eclampsia is designated ante-partum, intra-partum or post-partum.

Patients present with tonic-clonic convulsions then coma ensues. Unless treated the first convulsion is usually the fore-runner of others which may vary in number from one or two in mild cases or even continuous convulsions, a condition known as status epilepticus[2].The woman does not remember the convulsion or, in all probability, events immediately before. Over time this memory returns. The duration of coma after a convulsion is variable. When the convulsions are infrequent the woman usually recovers some degree of consciousness after each attack. Protenuria is almost always present and frequently pronounced. Urine output is likely diminished appreciably and occasionally anuria develops. Haemmoglobunuria is common, but haemmoglobinaemia is rarely observed[10].

Complications

Matter and Sibai described the hazard in 399 consecutive women with eclampsia delivered between 1977and1998 in their centre in Memphis. Major complications included: Placental abruption (10%), neurological deficits (7%), aspiration pneumonia (7%), pulmonary edema (7%), cardiopulmonary arrest (4%), ARF (4%), maternal death (1%).Wasiche reported maternal complications in 67% of a patients with eclampsia in KNH.

The commonest complications were sepsis 40.4%, pulmonary edema 25.3%, acute renal failure 10.4%, and cerebral hemorrhage 10.4%. The maternal mortality was 0.48/1000 deliveries [12].

From literature review the main complications are;

a)Neurological deficits

In about 10% of women with eclampsia some degree of blindness follows a seizure. The causes of blindness or impaired vision are varying degrees of retinal detachment and occipital lobe ischemia or edema. In both instances the prognosis for return to normal is good and is complete within a week[13].

About 5% of women have substantively altered consciousness including persistent coma following a seizure. This is due to cerebral edema and transtentorial herniation[14].Headaches and visual symptoms are common with severe pre-eclampsia and associated convulsions define eclampsia. Principal postmortem brain lesions are hyperemia, ischemia, thrombosis, edema and haemmorrage.In an older series Govan reported that cerebral hemorrhage was the cause of death in 39 out of 110 fatal cases of eclpmpsia[15]. Sheehan found hemorrhages ranging from petechiae to gross bleeding in 56% of 48 females with eclampsia he examined soon after death[5].

Headaches and visual symptoms are common with pre- eclampsia and associated convulsions define eclampsia. The principal postmortem lesions are edema, hyperemia, ischemia, thrombosis and haemmorrage[5,10].

b) HELLP syndrome

This is an acronym for haemolysis [H], elevated liver enzymes [EL], and low platelets [LP].The incidence of the syndrome varies. In one large study it was identified in almost 20% of women with severe pre-eclampsia or eclampsia[16]. In a multicenter study, Haddad and colleagues described 183 women with the syndrome, adverse effects occurred in 40% of cases and 2 women died[17] .

c) Renal

Renal tubular lesions are common in women with eclampsia. Acute Renal failure from acute tubular necrosis may develop. Such kidney failure is characterized by oliguria and anuria and rapidly developing azootemia. Drakely and co-workers described 72 women with eclampsia and renal failure, half of whom had HELLP syndrome and a third of whom had placental abruption[18] .

Haddad and colleagues reported that 5% of 183 women with HELLP syndrome developed renal failure. Half of these also had placental abruption and most had Post partum hemorrhage. Irreversible renal cortical necrosis was uncommon in the study population[17].

d) Maternal death

The prognosis for eclampsia is always bad; it is one of the most dangerous conditions in pregnancy. Eastman and Hellmann reported a maternal mortality rate of between 10 and 15% of patients with ecampsia[19]. Berg and co-workers reported a rate of 6% for the period 1991-1997[20].

e) Fetal effects

Because of maternal hypoxemia and lactic academia caused by convulsions, it is not unusual for fetal bradycardia to follow a seizure. This usually recovers within 3 to 5 minutes. If it persists for more than ten minutes, another cause such as placental abruption or imminent delivery should be considered [10]. The perinatal mortality is very high to the extent of 30-40%. The causes are prematurity, intra-uterine asphyxia arising out of infarction, retro- placental hemorrhage and spasm of the utero-placental vasculature. Effects of drugs used to control the convulsions and trauma during operative delivery also contribute to the high perinatal mortality rate[1.]

Clinical management

Pritchard and associates initiated a standardized treatment regimen for eclampsia. The results of this regimen employed 245 women with eclampsia. The treatment consists of a loading dose of magnesium sulphate of 4g slowly over 10 minutes, followed by a maintenance dose of 1g per hour.

Magnesium sulphate is discontinued 24 hours after delivery or 24 hours after the last convulsion whichever comes first. BP control is by an infusion of hydrallazine[21] .Studies have also been done to compare the efficacy of magnesium sulphate to other anticonvulsants (phenytoin and valium).

The multi-national Eclampsia Trial Collaborative Group studied the efficacy of magnesium therapy . This study involved 1687 women. In one study 453 women were randomly given magnesium sulphate and compared with 452 given diazepam. Another 388 eclamptic women were randomly given magnesium sulphate and compared with 387 women given phenytoin. The death rate was 3.8% in the 453 women randomly allocated magnesium sulphate compared with 5.1% in the 452 women given diazepam. The mortality rate in the group given phenytoin was 5.2%
Maternal mortality was lower in the magnesium group compared with that in the phenytoin group (3.8%vs5.2%)[22].

Maternal and perinatal outcome

There are few studies that have been done to look at determinants of maternal outcome in patients with eclampsia in developing countries. Majoki and colleagues evaluated 25 425 deliveries over an 18 month period at Harare maternity hospital. Of these deliveries 151 women had eclampsia. The case fatality ratio was 26.5% and 67.5% of the seizures occurred ante-partum. The majority of the fatal cases involved women above 35 (25.8%vs22.3%) .Deficiencies in clinical management were more common in the women who died (39.5%vs20.9%) [23]. Shanaz and colleagues evaluated 2200 deliveries at the postgraduate teaching hospital Peshawar, Pakistan. Fifty of the admitted women were eclamptic. The ante-partum/intra-partum and post-partum incidences of eclampsia in the 50 admissions with eclampsia were 72% and 28% respectively . All patients were unbooked and belonged to a low socio-economic status. A total of 4 deaths were due to eclampsia[24].Wasiche in 1999 reported an incidence of eclampsia of 10/1000 deliveries compared with 1.8/1000 and 1.9/1000 deliveries by Mati and Machoki respectively [7, 8.]

Innocent O. George and Israel Jeremiah conducted a prospective cross-sectional study on 88 mothers presenting with eclampsia at University of Port Harcourt Teaching Hospital in Nigeria.

There aim was to asses the perinatal outcome in these mothers. They looked at the socio-demographic characteristics, mode of delivery, perinatal complications and outcome. Unbooked patients who had received inadequate or no antenatal care comprised 90.9% of the women who presented with eclampsia.The mean gestational age at presentation was 35.04 ± 4.21 weeks with a range of 24 weeks - 43 weeks and 57.1% of them presenting preterm . Caesarean delivery was the commonest mode of delivery 49 (55.7%).The total number of births was 90, which included 86 singleton births and 2 sets of twins with a mean birth weight of 2.44 ± 8.18 Kg and a range 0.7 Kg-4.0 Kg. Fifty four babies (61.4%) were admitted into the special Care Baby Unit. The indications for admission were; prematurity (n=23), low birth weight (n=10), severe birth asphyxia (n=12), neonatal jaundice (n=4) and neonatal sepsis (n=5).There were 37 perinatal deaths, giving a perinatal mortality rate of 411.1 per 1000 live births of babies born to eclamptic mothers. These included 19 still births (51.4%) and 18 early neonatal deaths (48.6%). Birth asphyxia (33.3%), respiratory distress syndrome (22.2%) and prematurity (22.2%) were the commonest causes of neonatal deaths. Babies of unbooked mothers accounted for 66.7% of the perinatal deaths. This was significantly higher than the perinatal deaths among babies of booked mothers[25].Mwinyoglee J and colleagues studied the epidemiology of eclampsia and the maternal and fetal outcome at Ga-Rankuwa hospital in South Africa in the period 1st January 1994 to December 1995.Out of 18145 women delivered, 66 had eclampsia (3.6/1000). Of the 36 maternal deaths in the same period, 14 (38.9%) were caused by eclampsia. The case fatality rate was 21.2%. Maternal mortality was significantly higher in the unbooked population, women aged 30 years

and above, and those with multiple fit. The mean (SD) maternal age was 22.3 (6.8) years and fits occurred in the presence of high diastolic blood pressure (mean 113.7 +/- 15.6 mmHg).

The majority of fits (90.1%) occurred at home and in 70.3% of patients, this happened before 37 weeks (mean gestational age 33.2 (3.9) weeks). In 77.3%, eclampsia was ante-partum while it occurred postpartum in 4.5% of cases. The caesarean section rate was 66.7% . The perinatal mortality rate was 47.7% and maternal complications were varied and severe. They concluded that health care providers failed to act on warning signs in 14 (46.7%) of the 30 booked patients that were evident long before they developed fits[26].

Chaudhary P carried out a hospital based retrospective study to determine the incidence, clinical profile of eclamptic patients and the effect of current intervention strategy for eclampsia on maternal and perinatal outcome at Kathmandu maternity hospital.

He analyzed the case of records of all eclampsia cases from mid-April, 2000 to mid-April, 2001.

The Incidence of eclampsia was found to be 2.9 per 1000 deliveries. Eclampsia was primarily a disease of young women (97.22%) and nulliparas (80.85%). Approximately half of eclamptic patients had some ante-natal care (55.31%) and majority of them had fits before the onset of labor (70.21%). Most eclamptic patients presented with fits at term pregnancy (72.34%). About three fourth of them started fitting at home (74.46%) but one fourth had the first fit while already admitted in the hospital (25.53%).

Caesarean section was the common mode of delivery (55.31%).

There was no maternal death. The majority of patients stopped fitting upon intervention (80.85%) and went home within three weeks (95.73%). One fifth of babies died [stillbirths (14%), neonatal deaths (6%)] [27].

Studies have also been carried out in the developed world to establish factors that result in poor maternal and fetal outcome.

Dr H.Sawhney and colleagues carried out a retrospective analysis of 69 maternal deaths due to (eclampsia-61:severe pre-eclampsia-8) during a period of 17 years (1982-1998).Maternal condition on admission, associated complications and principal cause of death were analyzed in each case. They found that the mean time interval between hospitalization and maternal death was 49.56 + 62.01 hrs (1–240 hrs).Twenty (28.9%) women died undelivered. Twenty-three (37.7%) women were in grade IV coma and 52.4% of eclampsia patients had recurrent convulsions (> 10) prior to admission. Associated complications in form of hemorrhage, cerebrovascular accidents, acute renal failure, jaundice, aspiration pneumonia and pulmonary oedema were 30.4, 31.8, 34.8, 18.8, 17.8, and 5.8%, respectively. Maternal mortality in eclampsia was significantly low in time period B (4.1%) when magnesium sulphate was used as an anticonvulsant. They concluded that maternal condition on admission and associated complications are the major determinant of maternal outcome. Use of magnesium sulphate is associated with a significant reduction of maternal mortality[28].

Mackay A. and colleagues examined the role of pre-eclampsia and eclampsia in pregnancy related mortality They used data from the Centers' for Disease Control and Prevention's Pregnancy Mortality Surveillance System to examine pregnancy-related deaths from pre-eclampsia and eclampsia from 1979 to 1992. The pregnancy-related mortality ratio for pre-eclampsia and eclampsia was defined as the number of deaths from pre-eclampsia and eclampsia per 100,000 live births. Case-fatality rates for 1988-1992 were calculated for pre-eclampsia and eclampsia deaths per 10,000 cases during the delivery hospitalization, using the National Hospital Discharge Survey.

They found that of the 4024 pregnancy-related deaths at 20 weeks' or more gestation in 1979-1992, 790 were due to pre-eclampsia or eclampsia (1.5 deaths/100,000 live births). Mortality from pre-eclampsia and eclampsia increased with increasing age. The highest risk of death was at gestational age 20-28 weeks and after the first live birth. Black women were 3.1 times more likely to die from pre-eclampsia or eclampsia as white women. Women who had received no prenatal care had a higher risk of death from pre-eclampsia or eclampsia than women who had received any level of prenatal care. The overall pre-eclampsia-eclampsia case-fatality rate was 6.4 per 10,000 cases at delivery, and was twice as high for black women as for white women.

They concluded that the continuing racial disparity in mortality from pre-eclampsia and eclampsia emphasizes the need to identify
those differences that contribute to excess mortality among black women, and to develop specific interventions to reduce mortality from pre-eclampsia and eclampsia among all women [29].

Prognosis

Eclampsia remains one of the most dangerous conditions in pregnancy. Between 1991 and 1997, approximately 6% of maternal deaths in the United States were related to eclampsia.The study indicates that eclampsia should be considered as a major threat to maternal life [21].

Prevention

Early detection and treatment of pre-eclampsia may prevent eclampsia. Generally all ante-natal mothers less than 25 years of age and having their first baby should be monitored closely as they are at risk of developing pre-eclampsia than the rest of the population [8, 9].

The roll-over test done in mid trimester is positive if there is a rise of diastolic blood pressure of 20 mmHg or more.

Onuoga in his study on 46 primigravida at 28-32 weeks found of the 13 patients who developed pre-eclampsia 11 of them had a positive roll-over test[30]. The mean arterial pressure can also be used as a predictive test, where a value of 105mmHg or more is significant [31].

Alpha feto-protein (AFP) is found elevated in open neural tube defects, congenital nephrosis, multiple pregnancy and intra- uterine fetal death (IUFD). These conditions can be diagnosed by ultra sound.

For patients with unexplained elevation of alpha feto- protein some have been found to develop pre-eclampsia later in pregnancy[32].

Assay of cholesterol in the first trimester may also be useful in predicting the development of pre-eclampsia.

Van der Elzen in a study on pregnant women 36 years and over in the first trimester found that total cholesterol level was associated with development of pre-eclampsia especially for levels greater than 6mmol//[33].

For patients who develop severe pre-eclampsia magnesium sulphate has been used to prevent the development of eclampsia[34].Michael A. Belfort and colleagues carried out a study to compare the efficacy of magnesium sulphate and nimodipine for the prevention of eclampsia.The conducted an unblinded, multicenter trial in which 1650 women with severe pre-eclampsia were randomly assigned to receive either nimodipine (60 mg orally every 4 hours) or intravenous magnesium sulfate (given according to the institutional protocol) from enrollment until 24 hours post partum. High blood pressure was controlled with intravenous hydrallazine as needed. The primary outcome measure was the development of eclampsia, as defined by a witnessed tonic–clonic seizure. Demographic and clinical characteristics were similar in the two groups.

The women who received nimodipine were more likely to have a seizure than those who received magnesium sulfate (21 of 819 [2.6 percent] vs. 7 of 831 [0.8 percent].

The adjusted risk ratio for eclampsia associated with nimodipine, as compared with magnesium sulfate, was 3.2 (95 percent confidence interval, 1.1 to 9.1). The ante-partum seizure rates did not differ significantly between the groups, but the nimodipine group had a higher rate of postpartum seizures (9 of 819 [1.1 percent] vs. 0 of 831, P=0.01). There were no significant differences in neonatal outcome between the two groups. More women in the magnesium sulfate group than in the nimodipine group needed hydrallazine to control blood pressure (54.3 percent vs. 45.7 percent)[35].

1.2 RESEARCH QUESTION

What are the determinants of maternal and perinatal complications in women admitted with eclampsia at Kenyatta National Hospital?

1.3 RATIONALE AND JUSTIFICATION

Eclampsia is a common obstetric emergency and a common cause of maternal and perinatal morbidity and mortality.

The maternal mortality rate ranges between 1-20% while the perinatal mortality rate ranges between 130-300/1000 deliveries[14].Maternal complications may occur in eclampsia and they include pulmonary oedema, acute renal failure, cerebrovascular hemorrhage, and cerebral oedema. There are few studies that give statistics on prevalence of maternal complication and the determinants of outcome at KNH.

Undertaking this study this was justified because of several reasons. One, facilities for intensive care are scarce in low resource settings. Identifying determinants of maternal and perinatal outcome will provide insight as to which group of mothers at risk would benefit from increased vigilance. Secondly, from literature review, eclampsia is still responsible for considerable morbidity and mortality for the mother and the baby. HEELP syndrome, acute renal failure, DIC and pulmonary oedema are its serious complications and preventing them is a challenge. This challenge will be met if there is willingness to carry out studies to determine the mothers at risk of developing eclampsia in facilities across the country.

Thirdly there is very little data on the determinants of maternal and perinatal outcome in eclampsia in our country that can be used during investment in maternal health. This study is aimed at identifying the causes of poor maternal and perinatal outcomes and applying the findings to improve maternal and perinatal outcomes.

1.4 OBJECTIVES

Broad objective

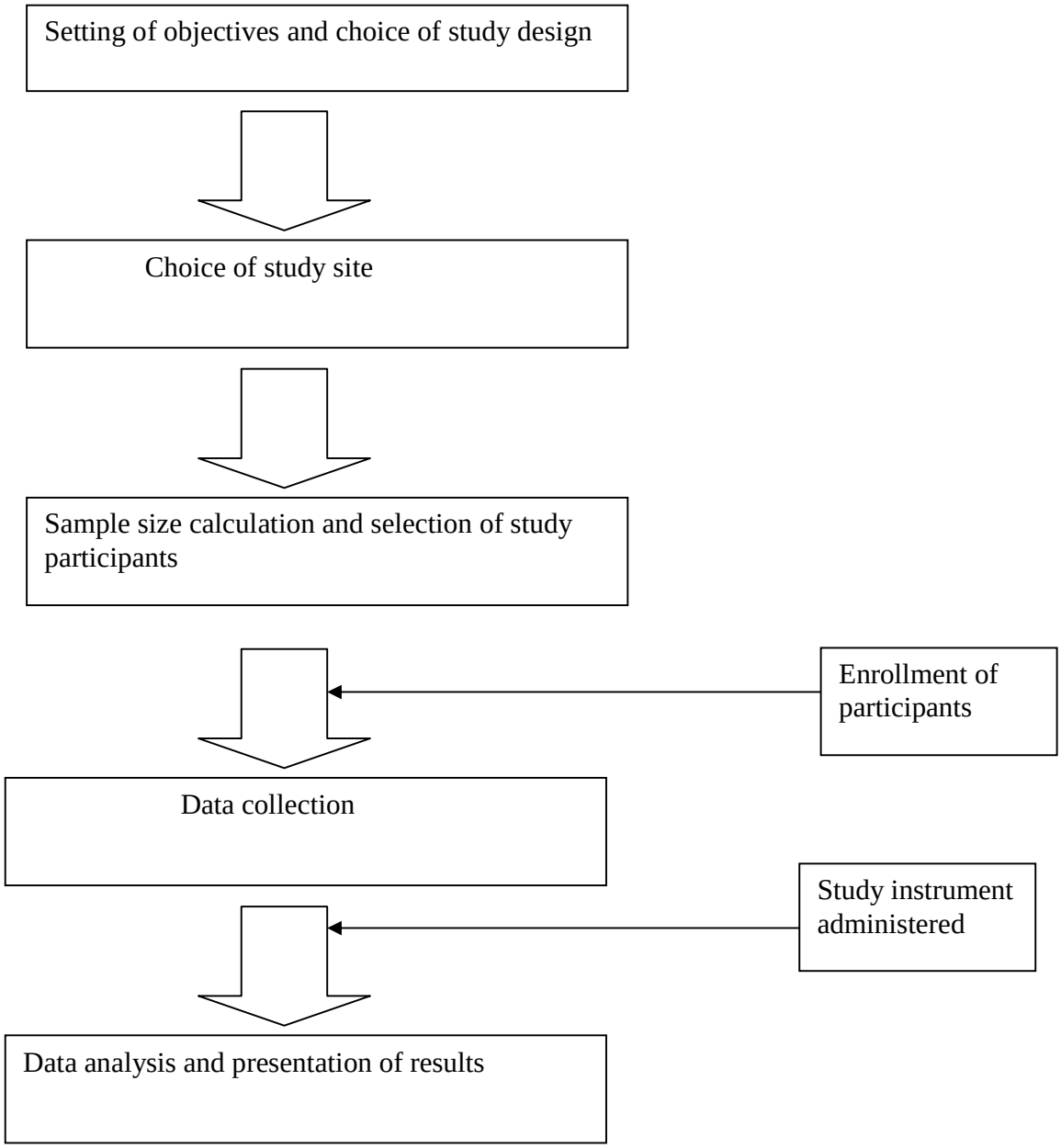
- To establish the factors that determine maternal and newborn outcome in patients with eclampsia.

Specific objectives

1. To determine the socio-demographic and obstetric characteristics of patients who present with eclampsia at Kenyatta National Hospital.
2. To describe the clinical management instituted in patients with eclampsia.
3. To describe the maternal and new born complications and outcomes and their prevalence.
4. To determine the predictors of maternal and new born complications.

1.5 CONCEPTUAL FRAMEWORK

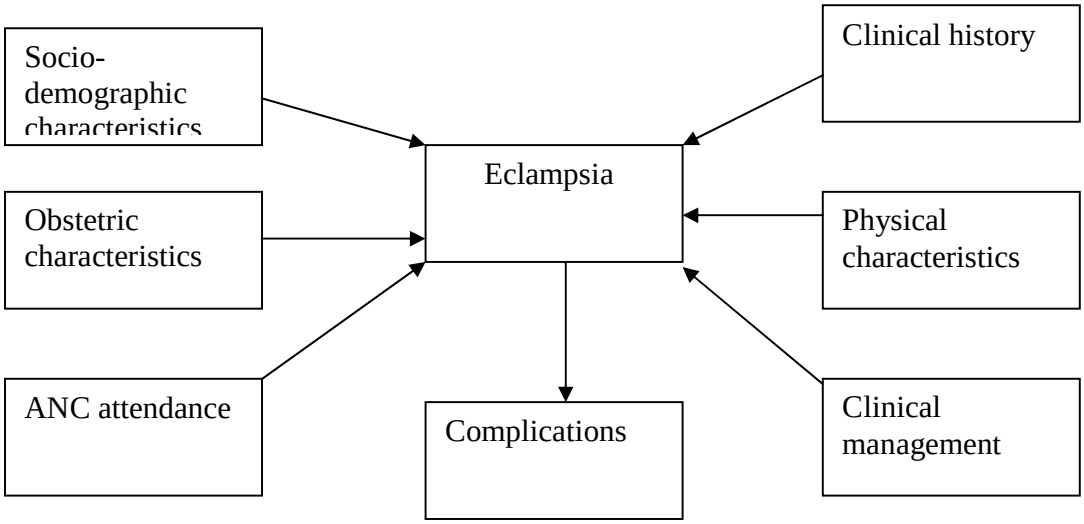
Figure 1: Summary of the study



The study began with a recognition of the fact that eclampsia is a common obstetric emergency that is life threatening to both the mother and the child. A research question was formulated to determine the maternal and perinatal

outcome in eclampsia. Objectives for the study were set and the study design chosen, (Crossectional descriptive). Kenyatta National hospital was selected as the study site due to its size and suitability. A suitable sample size was calculated and study participants enrolled, figure 1.

Figure 2: conceptual framework



The variables studied were the socio-demographic characteristics, obstetric characteristics, ANC attendance, clinical history, physical characteristics and clinical management, figure 2.

CHAPTER 2: STUDY DESIGN AND METHODOLOGY

2.1 Study design

This was a cross-sectional descriptive study. Patients with eclampsia were interviewed at labor ward, postnatal wards and post natal clinic. This was able to capture all patients admitted with eclampsia at KNH.

2.2 Study site

The study was done at Kenyatta National Hospital (KNH) which is located in Nairobi, the capital city of Kenya

Kenyatta National Hospital is one of the two level six referral hospitals in Kenya. The obstetric unit has 3 antenatal wards, one labor ward and 2 maternity theatres. Labor ward has a bed capacity of 20 beds. Pregnant mothers report to the labor ward where a team comprising a resident in obstetrics and gynecology and midwives manage the patients. A specialist on call is usually ready to offer guidance and assistance. There is an acute room with 3 beds for managing very sick mothers including those with eclampsia.

On average 40 mothers are attended to every day. There is a standard protocol for the management of eclampsia. In the protocol, once a mother is diagnosed with eclampsia convulsions are controlled with an initial loading dose of 4g of 20% magnesium sulphate given intravenously slowly over 5 minutes. This is followed with 1ntramuscular injection of 10g of 50% magnesium sulphate. Five grams is injected into each buttock. Blood pressure control is with 5mg of hydrallazine intravenously every 15 minutes till the diastolic blood pressure is less than 110mmgh. The vital signs, patellar reflexes and urine output are monitored.

2.3 Study population

This comprised of women admitted with eclampsia at labor ward and those on follow up in the postnatal clinic in KNH. Information about the diagnosis was obtained from the patients clinical records.

Inclusion criteria

Mothers admitted with eclampsia at KNH labor ward, antenatal ward and those on follow up in the postnatal clinic who consented.

Exclusion criteria

- Mothers with other obstetric complications unrelated to eclampsia.
- Mothers with other underlying chronic illnesses.
- Mothers under 18 years of age with no next of kin.

2.4 SAMPLE SIZE CALCULATION AND SAMPLING PROCEDURE

2.4.1Sample size calculation

From literature review the prevalence of complications was 8.6% [25].
For purposes of calculation the prevalence of complications (8.6%) was used to determine the sample size.
The following formula was used for sample size determination.

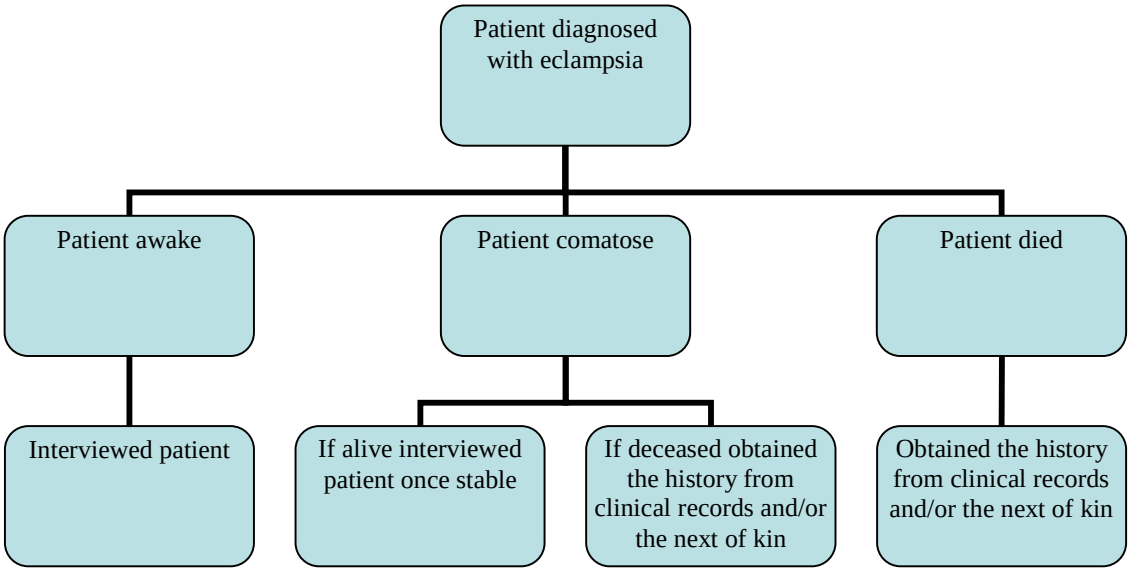
$$n = \frac{N \times Z^2 \times P(1-P)}{d^2 \times (N-1) + Z^2 \times P(1-P)}$$

Where
n = minimal sample size.
N=Number of deliveries in KNH in a year (average 1800).
Z=standard error from the mean corresponding to 95% confidence interval
Taken as 1.96
P=prevalence of maternal complications in eclampsia taken as 8.6%%.
D=precision/reliability with which to determine p taken as 0.05.
The minimum calculated sample size was 135.
The aim of the study was to estimate the frequency of complications with an error margin of 5%.

2.4.2 Sampling procedure

Consecutive women diagnosed with eclampsia and being managed in labor ward, antenatal ward and post natal clinic who consented were recruited into the participate in the study. This procedure of recruitment was applied till the sample size was obtained. Patients who were comatose were interviewed once they were stabilized and able to consent.(figure 3)

Figure 3: Summary of the interview process



Consenting process

The process of getting consent was private. The patient her next of kin was again briefed on the nature of the study and its justification. Then the patient was given the consent form to read. If there were any questions, these were answered by the interviewer. When the patient was satisfied she signed the consent form. For patients who could neither read nor write the interviewer read the consent form in Kiswahili and if the patient agreed to participate her right thumbprint was taken. Members' of staff on duty assisted if communication was a hindrance. For mothers' under 18 years of age the consent was obtained from the next of kin.

2.4.3Data collection procedure

The study was conducted at KNH labor ward, postnatal wards and postnatal clinic.

Recruitment and training of research assistants

Two midwives from KNH labor ward whom I recruited and trained assisted in data collection. Recruitment was based on merit and these midwives' past experience in data collection. The midwives were trained on the study design and objective.

Pre-testing of the data collection instrument

The pre-testing of the data collection instrument (questionnaire) was done by the research team before the actual study begun .The main aim of this exercise was to establish the suitability, practicability and reliability of the study questions. Pre-testing took place at KNH labor ward. Ten questionnaires were used during this exercise. Information obtained was used to update the questionnaire and make changes accordingly.

Data coding and quality control

The following data coding procedures were used;

1. Exhaustive: a unique code was created for each category, for example marital status (single, married, divorced or widowed)
2. Mutually exclusive: information being coded was assigned to one category, for example was the BP high (yes or no)
3. Residual other: provided for the participant to provide information that is not anticipated, for example any documented medical condition (none, diabetes mellitus, Cardiac disease, epilepsy, other).

Data collection

Mothers admitted with eclampsia were interviewed on admission if conscious. Mothers were also interviewed in the antenatal ward and in the postnatal clinics.
Very sick mothers were clinically stabilized first before conducting the Interview.
Mothers eligible for the study were identified from the clinical history. Those who met the inclusion criteria were briefed on the nature of the study and its justification. In cases where the mother did not understand English or Kiswahili, help was sought from any member of staff on duty who understood the patients' language.
This was carried out by two research assistants and myself when available. The research assistants were midwives who have worked in labor ward for more than 10 years.
Patients admitted at night when none of us were there were interviewed the following day.

Those who consented were randomly allocated numbers ranging from 1 to 135. These numbers were contained in unmarked envelopes. This was for the purposes of avoiding any bias.

The process of data collection was through face to face interviews and was conducted in private.

The interviewer made the patient comfortable then proceeded to ask questions from the questionnare.The interviewer stuck to the questions on the questionnaire.

Some information on the questionnaire, for example renal function was obtained from the clinical records because the patient did not have access to this information.

Data collection was uniform. A black pen was used during the exercise and a tick was inserted in the box after the question.

Once the interviewer completed the interview he/she went through the questionnaire to check for errors or any omissions made during the interview process. The questionnaire was then filed to avoid data loss. Once the study was complete the data was entered into frequency tables through tallying.

For patients who died before the interview information was obtained from the next of kin and the patients clinical records.

2.5DATA MANAGEMENT AND STATISTICAL ANALYSIS

2.5.1 Data management

All participants' data did not bear the names of the participant but rather a serial number. Data forms were kept in a secure lockable cabinet only accessible by the principal investigator and the statistician. Data was entered into a password protected Ms Access database prepared by the statistician. The investigator upon completion of data entry checked all the entered data against the hard copy forms.

2.5.2 Statistical analysis

Data analysis was performed using Statistical Package for Social Scientists. Descriptive statistics were determined during the analysis. The chi square and Mann -Whitney u test were applied to identify factors were related to development of complications in the patients who presented with eclampsia.

2.6 ETHICAL CONSIDERATIONS

Confidentiality of the results was paramount and was maintained.

This study was approved by the Kenyatta National Hospital Ethics and Research Committee. Informed consent was obtained from the client before being recruited. This involved signing a consent form after an explanation by the investigator about the details of the study. This included the facts and basis of the study, the risks and benefits anticipated as well as confidentiality and voluntary nature of the study.

The contact address of the investigator was given to the client in case she may have required further details about the study or may have wished to withdraw from the study. The information was communicated both verbally and in writing (appendices 1 and 2). Refusal to participate in the study did not deny the patient the appropriate management. The client did not bear any cost. The next of kin for very ill patients were also briefed on the nature of the study and those who agreed to be interviewed and consented on the patients behalf were included in the study.

2.7 STUDY LIMITATIONS

The constraints encountered included;

- Some patients were unconscious and unaccompanied making data collection difficult.
- Some patients recall was not absolute when they were asked what was already in the past.

For the patients who were unconscious interviews were conducted once they regained consciousness. Relatives were contacted during visiting hours to collaborate the history when need arose. These constraints did not impact on the interpretation of the final findings

CHAPTER 3.RESULTS

The study was conducted over a period of five months between January 2011 and May 2011. Patients with eclampsia were interviewed

Table 1: Socio-demographic characteristics (n=135)

Variable		Count	%
Age	14-18 years	14	10.4%
	19-23 years	45	33.3%
	24-29 years	52	38.5%
	29-33 years	18	13.3%
	>33	6	4.4%
	Total	**135**	100
Education	None	9	6.7%
	Primary	88	65.2%
	Secondary	37	27.4%
	Tertiary	1	.7%
	Total	**135**	100.0%
Residence	Urban	123	91.7%
	Rural	11	8.3%
	Total	**135**	100.0%
Marital Status	Single	20	15.0%
	Married	114	84.2%
	Divorced	0	.0%
	Widowed	1	.8%
	Total	**135**	100.0%

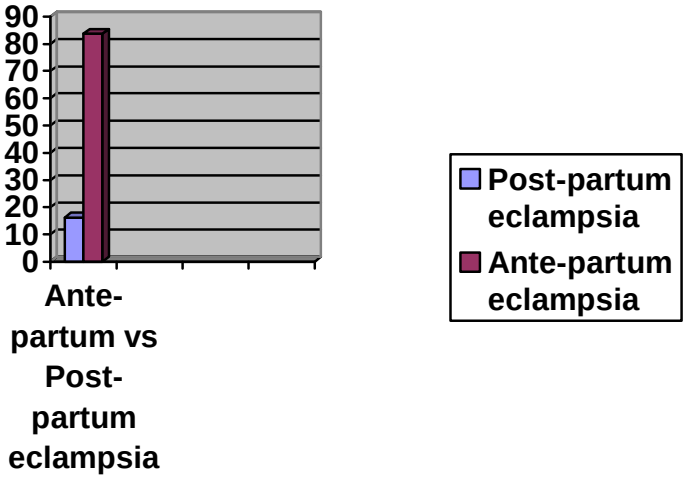
The age ranged from 17 to 36 years with a mean of 22 years (SD.5.4).Most of the patients were (82.2%) below 29 years and 84.2% were married.

Majority of patients (65.2%) had attained primary level of education and were urban dwellers (91.7%) This is in keeping with the socio-demographic characteristics of patients who seek services in KNH. (Table 1)

Table 2: Ante partum Vs Postpartum eclampsia

Delivery	**Yes**	22	16.3%
	No	113	83.7%
	Total	**135**	**100.0%**

Figure 4 :Ante-partum vs. post partum eclampsia



One hundred and thirteen patients (83.7) fitted before delivery and 22 (16.3%) fitted after delivery. This is in keeping with the observation in various studies where eclampsia is most common as term approaches, (Table 2) (Figure 4)

Table 3: Gestational age for the patients with ante-partum eclampsia (n=113)

Gestation (weeks)	Count	%
≤ 28	2	1.7
29-32	12	10.6
33-36	98	86.7
≥ 37	1	1
Total	**113**	**100**

Gestation ranged from 24-40 weeks with a mean of 33 (SD5.1 weeks) Majority of patients were between 33-36 weeks (86.7%) This was in keeping with the fact that eclampsia is most common in the third trimester of pregnancy. (Table3)

Table 4: Antenatal Clinic Attendance

ANC	Yes	82	60.7%
	No	53	39.3%
	Total	**135**	**100.0%**
ANC Place	Rural health center	7	8.8%
	City council	61	73.8%
	Private clinic	8	10.0%
	Public hospital	6	7.5%
	Total	**82**	**100.0%**
Gestation at first visit	Less than 20 weeks	2	2.4%
	21-28 weeks	67	81.7%
	29-36 weeks	12	14.6%
	>36 weeks	1	1.2%
	Total	**82**	**100.0%**

Most of the patients (60.7%) had started ANC attendance with the majority attending city council clinics (73.8%). Most of the patients started ANC attendance between 21-28 weeks (81.7).This is in keeping with ANC attendance in the city of Nairobi. (Table 4)

Table 5: Complications during ANC visits (n=82)

High BP noted	**No**	72	88.1%
	Yes	10	11.9%
	Total	**82**	100.0%
Protein noted	**No**	78	96.3%
	Yes	4	3.7%
	Total	**82**	100.0%
Swelling of Legs noted	**No**	7	13.3%
	Yes	75	86.7%
	Total	82	100.0%

Most of the patients did not have an elevated BP (88.1) or protenuria (96.5%) noted during ANC.

In this study 86.7% reported the presence of oedema in pregnancy. (Table 5)

Table 6: Past Obstetric history (n=135)

History		Count	%
Parity	0	77	57.0%
	1	29	21.5%
	2	18	13.3%
	3	9	6.7%
	5	1	.7%
	10	1	.7%
	Total	**135**	**100.0%**
Eclampsia	No	135	100.0%
	Total	**135**	**100.0%**

Majority of the patients who developed eclampsia were primigravida (57%) and none of the patients had any prior history of eclampsia. (Table 6)

Table 7: Physical signs at admission (n=135)

Sign	Count	%
Condition at admission		
Alert	2	1.5
Sedated	90	66.7
Unconscious	43	31.9
Total	**135**	**100**
Systolic BP(mmHg)		
100-140	32	23.7
141-180	75	55.6
181-220	20	14.8
> 220	8	5.9
Total	**135**	**100**
Diastolic BP (mmHg)		
<90	18	13.3
90-100	42	31.1
101-110	26	19.3
>110	49	36.3
Total	**135**	**100**
Presence of oedema		
Yes	117	86.7
No	18	33.3
Total	**135**	**100**
Protenuria		
1+	2	2.3
2+	44	33.1
≥ 3+	89	64.6
Total	**135**	**100**

Majority of the patients (66.7%) were sedated. This was due to the treatment initiated in casualty or at the referring hospital. Systolic BP ranged from 130-220 with a mean of 172. Diastolic BP ranged from 90-130 with a mean of 109.All patients had protenuria with 64.6% having a protein level of 3+ and above. (Table 7)

Table 8: Interval between first fit and admission to KNH for post partum eclampsia (n=22)

Interval (hours)	Count	Percentage
<12	15	68
12-24	5	23
>24	2	9
Total	**22**	**100**

In most cases patients were seen at KNH within 12 hours after the first fit for post partum eclampsia (68%) meaning eclampsia was most likely to occur during this period. The interval between delivery and admission to KNH ranged from 4 to 96 hours with a mean of 21 hours. (Table 8)

Table 9: Interval between admission to KNH and delivery for ante-partum eclampsia (n=113)

Interval (hours)	Count	Percentage
<6	64	57
6-12	39	35
>12	11	8
Total	**113**	100

The time interval between admission and delivery was 2-48 hours with a mean of 7 hours. Majority of the patients (57%) delivered within 6 hours. (Table 9)

Table 10: Mode of delivery and reason for caesarean section (n=113)

Mode of delivery	SVD	35	25.2
	C/S	100	74.8
	Total	**135**	**100**
Indication for C/S	Poor Bishop score	78	78
	Fetal distress	10	10
	Poor progress	6	6
	Abruptio placenta	6	6
	Total	**100**	**100**

The commonest mode of delivery was caesarian section (74.8%) with SVD accounting for 25.2% .The commonest indication for caesarian section was a poor bishop score (78%).(Table 10)

Table 11: Birth weight (n=135)

Weight(grams)	**Number**	**Percentage**
≤ 1000	12	9
1001-1500	14	10.4
1501-2000	36	26.7
2001-2500	41	30.4
2501-3000	17	13
3001-3500	14	10.4
>3500	1	0.1
Total	**135**	**100**

The birth weight ranged from 900g to 4kg with a mean of 2kg (SD1).The majority of babies (30.4%) weighed between 2 kg and 2.5kg .(Table 11)

Table 12: Neonatal outcome of delivery (n=135)

Outcome	Count	%
Live	101	75.4
FSB	15	11.2
Neonatal death	14	3.0
MSB	5	10.4
Total	135	100

There were 34 perinatal deaths (24.6%). The perinatal mortality rate was 2.8/1000 deliveries,(Table 12) .The maternal mortality rate was 0.58/1000 deliveries.

Table 13: Interval between admission and delivery vs. Outcome of delivery

Neonatal outcome	Interval							
	<6 hours		6-12 hours		> 12 hours		Total	
	Count	%	Count	%	Count	%	Count	%
Live	47	73.4	30	81.5	9	100	75	73.5
FSB	8	12.5	3	8.1	0	0.0	11	10.8
MSB	1	1.6	2	5.4	0	0.0	3	2.9
Neonatal death	8	12.5	5	13.5	0	0.0	13	12.7
Total	**64**	**100**	**37**	**100**	**9**	**100**	**113**	**100**

Most of the patients delivering within 12 hours had a favorable outcome 73.4% for those delivering within 6 hours and 81.5% for those delivering in 6-12 hours. (Table 13)

Table 14: Birth weight vs. Outcome of delivery (n=135)

Birth wt (g)	Outcome					
	Live	%	Death	%	Total	%
≤ 1000	0	0	12	100	12	100
1001-1500	2	14.3	9	85.7	14	100
1501-2000	24	66.7	12	33.3	36	100
2001-2500	41	100	0	0.0	41	100
2500-3000	17	100	0	0.0	17	100
3001-3500	14	100	0	0.0	14	100
>3500	1	100	0	0.0	1	100

There were more perinatal deaths in those less than 1000g (100%) and those between 1001-1500g (81.6%) This was more likely due to the early gestational age at the time of delivery. (Table 14)

Table 15: Types of maternal complications (n=62)

Complication	Count	%
Pulmonary oedema	11	17.7
Sepsis	9	14.5
Acute renal failure	14	22.6
Cerebral hemorrhage	2	3.2
Abruptio placenta	7	11.3
Laryngeal oedema	2	3.2
Postpartum hemorrhage	7	11.3
Anemia	3	4.8
Visual disturbance	4	6.5
Deep Venous thrombosis	3	4.8

During the study 62 patients (45.9%) developed complications. The commonest complications seen were acute renal failure (22.6), abruptio-placenta (11.3%) and post-partum hemorrhage (11.3%). (Table 15)

Table 16: Duration of stay in ICU (n=16)

		Count	%
ICU stay (days)	1-2 days	2	15
	3-4 days	4	8.8
	5-6 days	9	69.2
	>=7 days	1	7

Of the patients admitted in ICU the majority stayed for 5-6 days. (Table 16)

Table 17: Causes of maternal death (n=7)

Cause of death	Cerebral hemorrhage	3	43%
	Pulmonary edema	3	43%
	Poor reversal from anesthetic	1	14%

There were 7 maternal deaths giving a maternal mortality rate of (5.1%) of all patients in the study and 0.58/1000 deliveries. The causes of maternal mortality were cerebral hemorrhage (3 Patients), pulmonary edema (3 patients) and poor reversal from anesthesia (1 patient). (Table 17)

Table 18: Socio-demographic characteristics vs. development of complications

		Yes		No			
Characteristic		**Count**	**%**	**Count**	**%**	**X^2**	**P value**
Age groups	14-18 years	7	50.0%	7	50.0%	4.97	0.290
	19-23 years	19	42.2%	26	57.8%		
	24-29 years	25	48.1%	27	51.9%		
	29-33 years	6	33.3%	12	66.7%		
	>33	5	83.3%	1	16.7%		
Marital Status	Single	9	45.0%	11	55.0%	0.92	0.632
	Married	53	47.3%	59	52.7%		
	Divorced	0	.0%	0	.0%		
	Widowed	0	.0%	1	100.0%		
Education	None	3	33.3%	6	66.7%	2.49	0.477
	Primary	43	48.9%	45	51.1%		
	Secondary	15	40.5%	22	59.5%		
	Tertiary	1	100.0%	0	.0%		

There was no significant relationship between the socio-demographic characteristics and the development of eclampsia ($p>0.05$). (Table 18)

Table 19: Antenatal Clinical Attendance vs. Complications

Attended	Complications	%	None	%	X^2	P value
Yes	24	38.1	58	80.6	21.17	<0.0001
No	39	61.9	14	19.4		
Total	**63**	**100**	**72**	**100**		

The majority of patients who did not attend ante-natal clinic (61.9%) developed complications. Among the patients who attended ANC, 38.1 % developed complications. This relationship was statistically significant (p=0.0001). (Table19)

Table 20: physical signs at admission vs. Complications (n=135)

Sign		Complication	%	None	%	X^2	P value
Diastolic BP(mmhg) on admission	<90	0	0.0	2	2.7	13.47	0.004
	90-100	10	16.4	27	37		
	101-110	23	37.7	29	39.7		
	>110	29	45.9	15	20.5		
	Total	**62**	**100**	**73**	**100**		
Oedema	Yes	59	95.2	69	94.5	0.06	0.56
	No	3	4.8	4	5.5		
	Total	**62**		**73**	**100**		
Protenuria at admission	None	0	0.0	0	0.0	2.41	0.3
	1+	2	3.2	1	1.1		
	2+	16	25.8	28	38.6		
	3+ and above	44	71	44	60.3		
	Total	**62**	**100**	**73**	**100**		

There was a significant relationship between development of complications and diastolic BP. (P= 0.004). There was no significant relationship between edema (p =0.56) and protenuria (P= 0.3). (Table 20)

Table 21: Maternal death versus complications

Mortality	**Complications**	**%**	**None**	**%**	**X^2**	**P value**
Yes	7	11.2	0	0.0	4.66	0.031
No	55	88.2	73	100		
Total	**62**	**100**	**74**	**100**		

All the patients who died had developed complications. The relationship between development of complications and maternal death was statistically significant (p=0.031). (Table 21)

Table 22: comparison of those who developed complications with those who did not against the other various parameters

	Maternal Complications	N	Mean	Std. Deviation	P value
Age	**Yes**	62	24.68	5.175	0.382
	No	73	23.96	4.351	
Parity	**Yes**	62	85	1.535	0.607
	No	73	74	1.041	
Gestation first attendance	**Yes**	26	2.15	.368	0.918
	No	56	2.14	.483	
Time interval(hours)	**Yes**	48	7.38	8.178	0.716
	No	54	6.76	8.769	
Diastolic blood pressure at admission (mmHg)	**Yes**	61	113.05	10.282	<0.001
	No	73	104.70	15.597	
Duration after delivery (hours)	**Yes**	6	15.00	2.828	0.439
	No	7	25.43	31.506	

The relationship between diastolic BP on admission was statistically significant (P=0.001). The other parameters were not statistically significant age(p=0.382),parity(0.607), gestation of first attendance(0.918),time interval from onset of first fit(0.716) and duration after delivery (0.439).(Table22)

CHAPTER 4: DISCUSSION

In this study 135 patients with eclampsia were interviewed and evaluated. During this period there were 12000 deliveries. The incidence of eclampsia was 11/1000 deliveries. This incidence is much higher than similar studies at the same hospital. Mati found an incidence of 1.8/1000 deliveries while Machoki found an incidence of 1.9/1000 deliveries [6, 7].Wasiche found an incidence of 10/1000 deliveries[12].

The high incidence could be due to an increase in the population of gravid women.

Most of the mothers in this study 59% were below 23 years. This compares to other studies that eclampsia is likely in the younger population [4].

The majority of patients were nulliparas (57%). Other studies have also reported this high incidence among primigravida [7, 8].

In this study 82(60.7%) of the patients had attended clinic while 53 (39.3%) had not. Machoki found that 30.2% had not attended ante-natal clinic [7]. Wasiche found that 51.1% 0f the patients who developed eclampsia had attended ANC.

The majority of patients were delivered through caesarian section (74.8%) while those who delivered vaginally were (25.2%). The main indication for Caesarian section was a poor bishop score (83%).Innocent O George and colleagues found a caesarian rate of 55.7% among the patients admitted with eclampsia[25].Mwinyoglee reported a caesarean section rate of 66.7% [26].Wasiche found a caesarian rate of 73%. These findings were similar. The high rate was unavoidable since the commonest indication was unfavorable cervix.

In this study, 45.9% of the patients developed complications following eclampsia. This rate is similar to that found by Wasiche who did a retrospective study on maternal complications [12].

The commonest complications were acute renal failure (22.6%), pulmonary edema (17.7%), sepsis (14.5%), abruptio-placenta (11.3%) Post-partum hemorrhage (11.3%), visual disturbances (6.5%), anemia (4.8%), deep venous thrombosis (4.8%) and cerebral hemorrhage (3.2%)

Other studies have a slightly different prevalence for the various complications. Wasiche found the major complications to be sepsis (40.3%), acute renal failure (10.4%), cerebral hemorrhage (10.4%) abruptio placenta (9%), laryngeal edema (7.5%), post-partum hemorrhage (4.5%) and visual disturbances (3%) [12]. Machoki found that the infection rate was slightly higher in eclamptics than in other patients[4].The slight decrease in the incidence of sepsis could be due to the widespread use of antibiotics before and after surgery.

Of the patients who developed complications, 22.5% had to be admitted in ICU. These patients were admitted in ICU because of the need for ventilatory support because of complications such as pulmonary oedema and poor reversal from anesthesia.

There were seven maternal deaths in this study. The case fatality rate was 5.1%. Wasiche in a previous study found a case fatality rate of 5%[12].This two findings are similar. Other studies in Africa have reported higher case fatality rates Mwinyoglee reported a case fatality rate of 21.2%[26]. Douglas found a rate of 1.8% in the United Kingdom[11].

The causes of maternal mortality were pulmonary oedema (3 patients), cerebrovascular hemorrhage (3 patients) and poor reversal (1 patient). The

causes of maternal mortality are similar to the previous study by Wasiche with only minor variations [12].

The perinatal mortality rate was 2.8/1000 deliveries. Wasiche reported a rate of 3.3/1000 deliveries[12].Earlier studies reported higher perinatal mortality rates at the same center. Mati found a perinatal mortality rate of 82.2/1000 deliveries while Machoki reported a rate of 225.8/1000 deliveries [6, 7].

The study was carried out to establish the determinants of maternal and perinatal outcome in eclampsia. There was no significant relationship between development of complications and socio-demographic characteristics, age (p= 0.29), marital status (p0.632)
and level of education (p=0.471).This is similar to the findings of a similar study on complications carried out by Wasiche [12].

Most of the patients (60.7%) who developed eclampsia complications had not attended ANC and this relationship was statistically significant (p=0.0001).This can be explained by the fact that warning signs were not detected in this group. Innocent George and colleagues found that 90.9% of the patients who developed eclampsia had not attended ANC at the University of Port Harcourt in Nigeria [25].

A high diastolic blood pressure was associated with development of complications. This relationship was statistically significant (p=0.001). The mean diastolic pressure for those who developed complications was 113 mmHg while for those who did not was 104.5mmHg. This differed from an earlier study by Wasiche who found no statistically significant finding among the two groups [12].It is possible that some of the patients she studied had been given anti-hypertensive drugs at the referring hospital. The level of protenuria was not statistically significant (p=0.3)

The mean interval between admission was longer for those who developed complications (mean 7.38 hours) compared to those who did not (mean 6.76). The relationship was not statistically significant (p=0.716)

Patients who died had developed complications. There was a statistically significant relationship between development of complications and maternal death (p=0.031).

CONCLUSION

The study shows an increasing incidence of eclampsia at KNH of almost five fold.

The key findings from the study are that there is a high caesarean rate among patients with eclampsia. It was also established that ANC non attendance was associated with an increase in complications. Very high diastolic blood pressure levels are also associated with adverse outcomes.

The complications seen in eclampsia are similar to those reported in other studies though the incidence of sepsis was slightly lower while that of ARF and pulmonary oedema were slightly higher.

Eclampsia was also associated with case fatality rates

RECOMMANDATIONS

The following recommendations have been made from the study

1. Health educations for pregnant women to sensitize them on dangers of pregnancy induced hypertension and attendant complications such as eclampsia. This should be done at the booking visit.

2. Improve and equip level 5 and level 6 hospitals. This will ensure management of eclampsia in the periphery to avoid unnecessary delays in the referral system.

3. Active management of patients with eclampsia and timely referrals if facilities for their care are not available.

4. Review the management of eclampsia at KNH to address rising case fatality rates.

5. Increased vigilance of patients who have had no antenatal care.

BUDGET

The expenditure during the study was:

Stationery	**35,000 kshs.**
Statistician	**35,000 kshs.**
Research assistants	**20,000 kshs.**
Miscellaneous	**5,000 kshs.**

Total **95,000 kshs**

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APPEDIX 1

DATA COLLECTION TOOL

1. Patients study number ☐ ☐ ☐
2. Age (completed years) ☐ ☐
3. Level of education

a)None ☐ b) Primary ☐

c)Secondary ☐ d) University/college ☐

4. Residence

a) Urban ☐ b) Rural ☐

5.Marital status (put X or tick)

a) Single ☐ b) Married ☐

c) Divorced/separated ☐ d) Widowed ☐

PAST OBSTETRIC HISTORY

6. Parity ☐ + ☐

7. Delivered before,

a) Yes ☐ b) No ☐

8. If delivered before, eclampsia in previous pregnancy

a) Yes ☐ b) No ☐

Pregnancy	Year
1st	☐☐☐☐
2nd	☐☐☐☐
3rd	☐☐☐☐

INDEX PREGNANCY

	Day	month	year
9. Last menstrual period	☐	☐	☐

10. ANC attended (insert X or tick)

a) Yes ☐

b) No ☐

If NO go to question 13.

11. ANC attendance (insert X or tick)

a) Rural health centre ☐

b) City council ☐

c) Private clinic/hospital ☐

d) Public hospital ☐

12. Gestation at first ANC attendance

a) less than 20weeks ☐

b) 21-28 weeks ☐

c) 29-36 weeks ☐

d) More than 36 weeks ☐

13. Any of the following noted in pregnancy

a) High blood pressure ☐

b) Protein in urine ☐

c) Swelling of the legs ☐

If none of the above go to question 19

14. If the blood pressure was high medication given?

15. If the blood pressure was high any referral to another hospital?

a) Yes ☐

b) No ☐

If no to question 15 go to 17

16. The blood pressure on referral?

Systolic ☐mmHg Diastolic ☐ mmHg

17. If no to question 15 did the blood pressure improve in Subsequent visits

a) Yes ☐

b) No ☐

If yes to question 17 go to 19

18. If no to question 17, management?

a) Admitted ☐

b) Referred to another facility ☐

c) Other (specify)

19. Documented medical conditions?

a) None ☐

b) Diabetes ☐

c) Cardiac disease ☐

d) Epilepsy ☐

e) Other (specify) ☐

AT ADMISSION

20. Date and time of first convulsion

Date Time (am/pm)

21. Date seen at KNH Time (am/pm)

22. Number of convulsions at the time of admission

23. Condition at admission

a) Alert ☐

b) Sedated ☐

c) Unconscious ☐

24. Blood pressure at admission

Systolic ☐ mmhg Diastolic ☐ mmhg

25. Level of protenuria at admission

a) None ☐

b) 1+ ☐

c) 2+ ☐

d) 3+ and more

26. Delivery before admission

a) Yes ☐

b) No ☐

If no to question 26 go to 28

27. If yes, duration after delivery

28. Time interval between admission to KNH and delivery (hours)

29. Mode of delivery

a) SVD ☐

b) Vacuum extraction ☐

c) C/S ☐

30. If C/S was done what was the indication

a) Poor bishop score ☐

b) Poor progress ☐

c) Abruptio placenta ☐

d) Fetal distress ☐

e) 0ther (specify)

31. Newborn outcome

a) Live ☐

b) FSB ☐

c) MSB ☐

d) Neonatal death ☐

32. Birth weight of baby (kgs) ☐

MATERNAL COMPLICATIONS

33. Any complications?

a) Yes ☐
b) No ☐

If no go to question 41

34. If yes to question 33, what were the complications (reference to the file for clinical diagnosis and laboratory tests such as renal function)

a) Acute renal failure ☐
b) Pulmonary edema ☐
c) Cerebral hemorrhage ☐
d) Abruptio placenta ☐
e) DIC ☐
f) Sepsis ☐
g Other (specify)

35. Admission to ICU

a) Yes ☐
b) No ☐

If no to question 35 go to 41

36. If yes to question 35, reason for admission?

a) Pulmonary edema ☐
b) Cerebral hemorrhage ☐
c) Difficult reversal from anesthesia ☐
d) Other (specify)

37. Length of stay in ICU (days)

38. If ARF, was dialysis done?

a) Dialysis ☐

b) Conservative ☐

39. Maternal death

a) Yes ☐

b) No ☐

If no go to question 39 go to 41

40. If yes to question 39, what was the cause of death?

a) ARF ☐

b) Cerebral hemorrhage ☐

c) Pulmonary edema ☐

d) DIC ☐

e) Sepsis ☐

f) Cardiopulmonary failure ☐

g) Other specify

41.I f no to 39, length of stay in hospital (days)

42. Any permanent disabilities attributed to eclampsia?

a) Yes ☐

b) No ☐

43. If yes to question 42 which are the disabilities?

APPENDIX 2

CONSENT FORM

I Dr Sambu Solomon Tyaa and my research assistants are caring out a study on the determinants of maternal and perinatal outcome in patients with eclampsia

This involves collecting data of all the patients admitted with eclampsia at KNH labor ward.

We will be asking questions regarding your pregnancy as well as personal details. The information obtained will be confidential.

The information gained from the study will help detect mothers at risk of complications which could harm the baby and yourself

The care given to you will not change and there will be no added cost.

Refusing to participate will not change the care given to you.

Consent

***I*……**

Have agreed to participate in the study and was not coerced.

NAME :
SIGNATURE:
DATE :

MATERNAL AND PERINATAL OUTCOME IN PATIENTS WITH ECLAMPSIA AT KENYATTA NATIONAL HOSPITAL

RESEARCH DISSERTATION SUBMITTED AS PARTIAL

FULFILMENT FOR MMED IN OBSTETRICS AND

GYNAECOLOGY, UNIVERSITY OF NAIROBI

PRINCIPAL INVESTIGATOR:

DR. SOLOMON T. SAMBU, MBChB

M.**MED STUDENT DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY**

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF NAIROBI.

DECLARATION

This is to certify that this study is my original work and has not been presented for a degree course in any other university. I further certify that my study has been supervised by senior members in the department of Obstetrics and gynecology, University of Nairobi.

DR SAMBU SOLOMON MICHAEL TYAA,

Signature…….. Date…….

This is to certify that the commentary in this dissertation was researched upon by DR. Sambu Solomon Michael under my guidance and supervision and the dissertation is submitted with my approval

DR. ALICE K MUTUNGI,

MBCHB; MMED OBS&GYN; MSC REPROD BIOL;MPHL
SENIOR LECTURER,
UNIVERSITY OF NAIROBI

Signature…….. Date……

DR GATHARI NDIRANGU,

MBCHB, MMED OBS&GYN
HONORARY LECTURER,
UNIVERSITY OF NAIROBI

Signature…….. Date…….

CERTIFICATE OF AUTHENTICITY

This is to certify that this dissertation is the original work of Dr Solomon T.Sambu Master of Medicine student in the Department of Obstetrics and Gynecology, registration number H58/70887/2007, University of Nairobi (2007-2011). The research was carried out in the department of Obstetrics and Gynecology, School of Medicine, College of Health Sciences. It has not been presented in any other university for the award of a degree.

Signature.....

Date.....

Prof. Koigi Kamau,

Associate Professor of Obstetrics and Gynecology,

Consultant Obstetrics and Gynecology,

Chairman,

Department of Obstetrics and Gynecology,

University of Nairobi.

TABLE OF CONTENTS

LIST OF ABREVIATIONS

ANC	Ante-Natal Clinic
ARF	Acute Renal Failure
BP	Blood Pressure
C/S	Caesarean Section
EEG	Electroencephalogram
FSB	Fresh still birth
HIV	Human immunodefiency virus
MSB	Macerated still birth
ND	Neonatal death
PET	Pre-eclampsia
PPH	Post Partum Hemorrhage
HELLP	Haemolysis, Elevated Liver enzymes and Low Platelets
KNH	Kenyatta National Hospital
NHIF	National hospital insurance fund

DEDICATION

This book is dedicated to my best friend Wacuka Ngari, my parents Mr. and Mrs. Leonard T. Sambu. Your love and support has been my strength and I sincerely want to thank you.

ACKNOWLEDGEMENT

I wish to thank the Government of Kenya for sponsoring my training at the University of Nairobi.

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DEFINATION OF TERMS

1. Pre-eclampsia

Pre-eclampsia refers to hypertension with protenuria and edema. This usually develops after 20 weeks gestation.

2. Eclampsia

Eclampsia is pre-eclampsia with convulsions that cannot be attributed to other medical causes.

3. Protenuria

This is the presence of protein in urine.

4. Antenatal care

This is the care given to pregnant women at a clinic to prepare them for delivery.

5. SVD

This refers to delivery of a baby vaginally. The presenting part is the vertex.

6. C/S

This is a surgical procedure that involves delivery of a baby through an incision made in the lower abdomen and on the uterus.

ABSTRACT

Background: Eclampsia is defined as pre-eclampsia complicated with convulsions and/or coma. The incidence of eclampsia is 0.2%-0.5% of all deliveries globally [2]. It is a common obstetric emergency in Kenya and it is associated with adverse maternal and neonatal outcomes. Some of the documented complications are pulmonary edema, cerebral hemorrhage, acute renal failure and placental abruptio.

Facilities for intensive care are scarce in low resource settings. Identifying determinants of maternal and perinatal outcome among eclamptics will provide insight as to which group of mothers at risk would benefit from earlier referral.

Objective: To study the determinants of maternal and perinatal outcome among patients with eclampsia at Kenyatta National Hospital.

Design: This was a Cross-sectional descriptive study.

Methodology: All mothers with eclampsia admitted in labor ward, ante-natal wards and those reviewed in the postnatal clinic were interviewed and information collected with respect to age, parity, ANC attendance, duration of gestation, place of first fit, BP and degree of protenuria at admission, fit –delivery interval, clinical management, mode of delivery, perinatal outcome, maternal mortality and duration of hospital stay was recorded in a questionnaire. Additional was obtained from patient records.

Setting: The study was conducted at Kenyatta National Hospital labor ward, antenatal wards and post natal clinic. KNH is Kenya's largest referral hospital.

Data collection analysis: Data collected was entered into a a database. This data was then analyzed electronically using SPSS widows statistical software. The chi square test was used to identify factors that were related to development of complications.

Outcome measures: The study variables include age, parity, booking status, gestational age, location at time of first seizure, number of fits, seizure to delivery interval, maternal complications and the clinical management.

Results: During the study 135 patients who developed eclampsia and who met the inclusion criteria were interviewed. The predictors of outcome were age, parity, booking status, gestational age, location at time of first seizure, number of seizures and seizure interval and delivery. There was no significant relationship between socio-demographic characteristics and development of complications($p > 0.05$). The majority of the patients who had not attended ANC (61.9%) developed complications. The relationship between the attendance of ANC and non-attendance and the occurrence of complications was statistically significant. ($p=0.0001$)

There was a statistically significant relationship between the diastolic BP and development of complications ($p=.001$).The commonest complications were pulmonary oedema (17.7%), acute renal failure (22.6%) ,sepsis (14.5%), postpartum hemorrhage, (11.3%) and abruptio placenta (11.3%). Development of complications significantly affected maternal mortality ($p=0.031$).The incidence of perinatal mortality was 2.8/1000 deliveries. The case fatality rate was 5.1%.

Conclusion: Development of complications in eclampsia was significantly influenced by ANC attendance and the diastolic blood pressure on admission.

Recommendations: From the study findings it is important for health care workers to review the management of eclampsia to address the rising case fatality rate. There is also need for increased vigilance of patients who have had no antenatal care.

INTRODUCTION

Hypertension in pregnancy is a common obstetric complication. The identification and effective management of eclampsia plays a significant role in ensuring a good maternal and perinatal outcome of pregnancy [1].

Hypertensive disorders complicating pregnancy have been classified into;

1. Pre-existing hypertension
2. Pre-eclampsia
3. Eclampsia
4. Pre-eclampsia in addition to pre-existing chronic hypertension

Pre-existing hypertension is defined as a systolic blood pressure of 140 mmHg or greater, and/or a diastolic blood pressure of 90 mmHg or more, either pre-pregnancy or before 20 weeks.

Pre-eclampsia is defined as a systolic blood pressure of 140 mmHg or greater, and/or a diastolic blood pressure of 90mmHg or more ,developing after 20 weeks gestation accompanied by protenuria with or without edema.

The minimum criterion for diagnosis of pre-eclampsia is;

1. BP greater or equal to 140/90 mmHg, after 20 weeks gestation. An increase of 30 mmhg for systolic blood pressure and 15 mmhg for diastolic blood pressure above the ANC booking blood pressure is significant.
2. Protenuria greater or equal to 300mg per 24hrs.

Eclampsia is defined as the occurrence of seizures that cannot be attributed to other causes in a woman with pre-Eclampsia [2].

Once eclampsia occurs, the risk to the mother and fetus is appreciable.

HELLP syndrome is one of the documented maternal complications, with a reported incidence of 2.8% at KNH[3.]

Pulmonary edema was documented in 2.9% of patients with pregnancy induced hypertension at KNH [3].Sibai and colleagues found an incidence of 2.9 % of pulmonary edema in patients with pregnancy induced hypertension[3].

Cerebral hemorrhages ranging from petechiae to gross bleeding in the brains of women with eclampsia examined soon after death have been documented[4.]

Other complications include placental abruptio, neurological deficits , pulmonary edema, cardiopulmonary arrest, acute renal failure and maternal death [5].

Eclampsia is most common in the last trimester and becomes increasingly more frequent as term approaches. Depending on whether convulsions appear before, during or after labor, eclampsia is designated as ante-partum, intra-partum or postpartum respectively. Treatment consists of anticonvulsant therapy to control convulsions and control of BP, followed by delivery. Once the patient is stable delivery is planned. Patients with a favorable Bishop score and without any contraindications to vaginal delivery are delivered vaginally.Those with a poor bishop score or any obstetric indications for a Caesarian section are delivered surgically[2].

CHAPTER 1: LITERATURE REVIEW, JUSTIFICATION AND OBJECTIVES

1.1 LITERATURE REVIEW

Burden of eclampsia

Eclampsia is a common obstetric emergency. It is a common cause of maternal and perinatal morbidity and mortality. The incidence of eclampsia is 2-5/1000 for all deliveries[2].High incidences have been reported in Kenyan hospital based studies. At KNH the incidence of eclampsia was reported to be 1.8/1000 deliveries by Mati while Machoki reported an incidence of 1.9/1000 deliveries [7, 8]. Bansal at pumwani maternity hospital reported an incidence of 1.04/1000 deliveries[9].

Pathophysiology

The pathogenesis of eclamptic seizures is poorly understood. Seizures have been attributed to platelet thrombi, localized vasoconstriction and foci of hemorrhage in the brain cortex. There is evidence from autopsies that the problem is ischemia secondary to intensive vasoconstriction [10].

Naidu in his study using CT –scan single photon emission and transcranial sonography concluded that the patho-physiology of eclampsia is primarily cerebral vasospasm with resultant ischemia and cerebral edema involving the main watershed areas and the parieto-occipital areas of the brain. Vasoconstriction is a protective reflex in response to extremes of arterial pressure to ensure that cerebral perfusion remains constant .Specific EEG abnormalities can usually be demonstrated for sometime after a seizure. Most of these abnormalities subside within three months[11].

Clinical presentation

Almost without exception pre-eclampsia precedes the onset of eclamptic convulsions. Depending on whether convulsions occur before, during or after labor eclampsia is designated ante-partum, intra-partum or post-partum.

Patients present with tonic-clonic convulsions then coma ensues. Unless treated the first convulsion is usually the fore-runner of others which may vary in number from one or two in mild cases or even continuous convulsions, a condition known as status epilepticus[2].The woman does not remember the convulsion or, in all probability, events immediately before. Over time this memory returns. The duration of coma after a convulsion is variable. When the convulsions are infrequent the woman usually recovers some degree of consciousness after each attack. Protenuria is almost always present and frequently pronounced. Urine output is likely diminished appreciably and occasionally anuria develops. Haemmoglobunuria is common, but haemmoglobinaemia is rarely observed[10].

Complications

Matter and Sibai described the hazard in 399 consecutive women with eclampsia delivered between 1977and1998 in their centre in Memphis. Major complications included: Placental abruption (10%), neurological deficits (7%), aspiration pneumonia (7%), pulmonary edema (7%), cardiopulmonary arrest (4%), ARF (4%), maternal death (1%).Wasiche reported maternal complications in 67% of a patients with eclampsia in KNH.

The commonest complications were sepsis 40.4%, pulmonary edema 25.3%, acute renal failure 10.4%, and cerebral hemorrhage 10.4%. The maternal mortality was 0.48/1000 deliveries [12].

From literature review the main complications are;

a)Neurological deficits

In about 10% of women with eclampsia some degree of blindness follows a seizure. The causes of blindness or impaired vision are varying degrees of retinal detachment and occipital lobe ischemia or edema. In both instances the prognosis for return to normal is good and is complete within a week[13].

About 5% of women have substantively altered consciousness including persistent coma following a seizure. This is due to cerebral edema and transtentorial herniation[14].Headaches and visual symptoms are common with severe pre-eclampsia and associated convulsions define eclampsia. Principal postmortem brain lesions are hyperemia, ischemia, thrombosis, edema and haemmorrage.In an older series Govan reported that cerebral hemorrhage was the cause of death in 39 out of 110 fatal cases of eclpmpsia[15]. Sheehan found hemorrhages ranging from petechiae to gross bleeding in 56% of 48 females with eclampsia he examined soon after death[5].

Headaches and visual symptoms are common with pre- eclampsia and associated convulsions define eclampsia. The principal postmortem lesions are edema, hyperemia, ischemia, thrombosis and haemmorrage[5,10].

b) HELLP syndrome

This is an acronym for haemolysis [H], elevated liver enzymes [EL], and low platelets [LP].The incidence of the syndrome varies. In one large study it was identified in almost 20% of women with severe pre-eclampsia or eclampsia[16]. In a multicenter study, Haddad and colleagues described 183 women with the syndrome, adverse effects occurred in 40% of cases and 2 women died[17] .

c) Renal

Renal tubular lesions are common in women with eclampsia. Acute Renal failure from acute tubular necrosis may develop. Such kidney failure is characterized by oliguria and anuria and rapidly developing azootemia. Drakely and co-workers described 72 women with eclampsia and renal failure, half of whom had HELLP syndrome and a third of whom had placental abruption[18] .

Haddad and colleagues reported that 5% of 183 women with HELLP syndrome developed renal failure. Half of these also had placental abruption and most had Post partum hemorrhage. Irreversible renal cortical necrosis was uncommon in the study population[17].

d) Maternal death

The prognosis for eclampsia is always bad; it is one of the most dangerous conditions in pregnancy. Eastman and Hellmann reported a maternal mortality rate of between 10 and 15% of patients with ecampsia[19]. Berg and co-workers reported a rate of 6% for the period 1991-1997[20].

e) Fetal effects

Because of maternal hypoxemia and lactic academia caused by convulsions, it is not unusual for fetal bradycardia to follow a seizure. This usually recovers within 3 to 5 minutes. If it persists for more than ten minutes, another cause such as placental abruption or imminent delivery should be considered [10]. The perinatal mortality is very high to the extent of 30-40%. The causes are prematurity, intra-uterine asphyxia arising out of infarction, retro- placental hemorrhage and spasm of the utero-placental vasculature. Effects of drugs used to control the convulsions and trauma during operative delivery also contribute to the high perinatal mortality rate[1.]

Clinical management

Pritchard and associates initiated a standardized treatment regimen for eclampsia. The results of this regimen employed 245 women with eclampsia. The treatment consists of a loading dose of magnesium sulphate of 4g slowly over 10 minutes, followed by a maintenance dose of 1g per hour.

Magnesium sulphate is discontinued 24 hours after delivery or 24 hours after the last convulsion whichever comes first. BP control is by an infusion of hydrallazine[21] .Studies have also been done to compare the efficacy of magnesium sulphate to other anticonvulsants (phenytoin and valium).

The multi-national Eclampsia Trial Collaborative Group studied the efficacy of magnesium therapy . This study involved 1687 women. In one study 453 women were randomly given magnesium sulphate and compared with 452 given diazepam. Another 388 eclamptic women were randomly given magnesium sulphate and compared with 387 women given phenytoin. The death rate was 3.8% in the 453 women randomly allocated magnesium sulphate compared with 5.1% in the 452 women given diazepam. The mortality rate in the group given phenytoin was 5.2%
Maternal mortality was lower in the magnesium group compared with that in the phenytoin group (3.8%vs5.2%)[22].

Maternal and perinatal outcome

There are few studies that have been done to look at determinants of maternal outcome in patients with eclampsia in developing countries. Majoki and colleagues evaluated 25 425 deliveries over an 18 month period at Harare maternity hospital. Of these deliveries 151 women had eclampsia. The case fatality ratio was 26.5% and 67.5% of the seizures occurred ante-partum. The majority of the fatal cases involved women above 35 (25.8%vs22.3%) .Deficiencies in clinical management were more common in the women who died (39.5%vs20.9%) [23]. Shanaz and colleagues evaluated 2200 deliveries at the postgraduate teaching hospital Peshawar, Pakistan. Fifty of the admitted women were eclamptic. The ante-partum/intra-partum and post-partum incidences of eclampsia in the 50 admissions with eclampsia were 72% and 28% respectively . All patients were unbooked and belonged to a low socio-economic status. A total of 4 deaths were due to eclampsia[24].Wasiche in 1999 reported an incidence of eclampsia of 10/1000 deliveries compared with 1.8/1000 and 1.9/1000 deliveries by Mati and Machoki respectively [7, 8.]

Innocent O. George and Israel Jeremiah conducted a prospective cross-sectional study on 88 mothers presenting with eclampsia at University of Port Harcourt Teaching Hospital in Nigeria.

There aim was to asses the perinatal outcome in these mothers. They looked at the socio-demographic characteristics, mode of delivery, perinatal complications and outcome. Unbooked patients who had received inadequate or no antenatal care comprised 90.9% of the women who presented with eclampsia.The mean gestational age at presentation was 35.04 ± 4.21 weeks with a range of 24 weeks - 43 weeks and 57.1% of them presenting preterm . Caesarean delivery was the commonest mode of delivery 49 (55.7%).The total number of births was 90, which included 86 singleton births and 2 sets of twins with a mean birth weight of 2.44 ± 8.18 Kg and a range 0.7 Kg-4.0 Kg. Fifty four babies (61.4%) were admitted into the special Care Baby Unit. The indications for admission were; prematurity (n=23), low birth weight (n=10), severe birth asphyxia (n=12), neonatal jaundice (n=4) and neonatal sepsis (n=5).There were 37 perinatal deaths, giving a perinatal mortality rate of 411.1 per 1000 live births of babies born to eclamptic mothers. These included 19 still births (51.4%) and 18 early neonatal deaths (48.6%). Birth asphyxia (33.3%), respiratory distress syndrome (22.2%) and prematurity (22.2%) were the commonest causes of neonatal deaths. Babies of unbooked mothers accounted for 66.7% of the perinatal deaths. This was significantly higher than the perinatal deaths among babies of booked mothers[25].Mwinyoglee J and colleagues studied the epidemiology of eclampsia and the maternal and fetal outcome at Ga-Rankuwa hospital in South Africa in the period 1st January 1994 to December 1995.Out of 18145 women delivered, 66 had eclampsia (3.6/1000). Of the 36 maternal deaths in the same period, 14 (38.9%) were caused by eclampsia. The case fatality rate was 21.2%. Maternal mortality was significantly higher in the unbooked population, women aged 30 years

and above, and those with multiple fit. The mean (SD) maternal age was 22.3 (6.8) years and fits occurred in the presence of high diastolic blood pressure (mean 113.7 +/- 15.6 mmHg).

The majority of fits (90.1%) occurred at home and in 70.3% of patients, this happened before 37 weeks (mean gestational age 33.2 (3.9) weeks). In 77.3%, eclampsia was ante-partum while it occurred postpartum in 4.5% of cases. The caesarean section rate was 66.7% . The perinatal mortality rate was 47.7% and maternal complications were varied and severe. They concluded that health care providers failed to act on warning signs in 14 (46.7%) of the 30 booked patients that were evident long before they developed fits[26].

Chaudhary P carried out a hospital based retrospective study to determine the incidence, clinical profile of eclamptic patients and the effect of current intervention strategy for eclampsia on maternal and perinatal outcome at Kathmandu maternity hospital.

He analyzed the case of records of all eclampsia cases from mid-April, 2000 to mid-April, 2001.

The Incidence of eclampsia was found to be 2.9 per 1000 deliveries. Eclampsia was primarily a disease of young women (97.22%) and nulliparas (80.85%). Approximately half of eclamptic patients had some ante-natal care (55.31%) and majority of them had fits before the onset of labor (70.21%). Most eclamptic patients presented with fits at term pregnancy (72.34%). About three fourth of them started fitting at home (74.46%) but one fourth had the first fit while already admitted in the hospital (25.53%).

Caesarean section was the common mode of delivery (55.31%).

There was no maternal death. The majority of patients stopped fitting upon intervention (80.85%) and went home within three weeks (95.73%). One fifth of babies died [stillbirths (14%), neonatal deaths (6%)] [27].

Studies have also been carried out in the developed world to establish factors that result in poor maternal and fetal outcome.

Dr H.Sawhney and colleagues carried out a retrospective analysis of 69 maternal deaths due to (eclampsia-61:severe pre-eclampsia-8) during a period of 17 years (1982-1998).Maternal condition on admission, associated complications and principal cause of death were analyzed in each case. They found that the mean time interval between hospitalization and maternal death was 49.56 + 62.01 hrs (1–240 hrs).Twenty (28.9%) women died undelivered. Twenty-three (37.7%) women were in grade IV coma and 52.4% of eclampsia patients had recurrent convulsions (> 10) prior to admission. Associated complications in form of hemorrhage, cerebrovascular accidents, acute renal failure, jaundice, aspiration pneumonia and pulmonary oedema were 30.4, 31.8, 34.8, 18.8, 17.8, and 5.8%, respectively. Maternal mortality in eclampsia was significantly low in time period B (4.1%) when magnesium sulphate was used as an anticonvulsant. They concluded that maternal condition on admission and associated complications are the major determinant of maternal outcome. Use of magnesium sulphate is associated with a significant reduction of maternal mortality[28].

Mackay A. and colleagues examined the role of pre-eclampsia and eclampsia in pregnancy related mortality They used data from the Centers' for Disease Control and Prevention's Pregnancy Mortality Surveillance System to examine pregnancy-related deaths from pre-eclampsia and eclampsia from 1979 to 1992. The pregnancy-related mortality ratio for pre-eclampsia and eclampsia was defined as the number of deaths from pre-eclampsia and eclampsia per 100,000 live births. Case-fatality rates for 1988-1992 were calculated for pre-eclampsia and eclampsia deaths per 10,000 cases during the delivery hospitalization, using the National Hospital Discharge Survey.

They found that of the 4024 pregnancy-related deaths at 20 weeks' or more gestation in 1979-1992, 790 were due to pre-eclampsia or eclampsia (1.5 deaths/100,000 live births). Mortality from pre-eclampsia and eclampsia increased with increasing age. The highest risk of death was at gestational age 20-28 weeks and after the first live birth. Black women were 3.1 times more likely to die from pre-eclampsia or eclampsia as white women. Women who had received no prenatal care had a higher risk of death from pre-eclampsia or eclampsia than women who had received any level of prenatal care. The overall pre-eclampsia-eclampsia case-fatality rate was 6.4 per 10,000 cases at delivery, and was twice as high for black women as for white women.

They concluded that the continuing racial disparity in mortality from pre-eclampsia and eclampsia emphasizes the need to identify
those differences that contribute to excess mortality among black women, and to develop specific interventions to reduce mortality from pre-eclampsia and eclampsia among all women [29].

Prognosis

Eclampsia remains one of the most dangerous conditions in pregnancy. Between 1991 and 1997, approximately 6% of maternal deaths in the United States were related to eclampsia.The study indicates that eclampsia should be considered as a major threat to maternal life [21].

Prevention

Early detection and treatment of pre-eclampsia may prevent eclampsia. Generally all ante-natal mothers less than 25 years of age and having their first baby should be monitored closely as they are at risk of developing pre-eclampsia than the rest of the population [8, 9].

The roll-over test done in mid trimester is positive if there is a rise of diastolic blood pressure of 20 mmHg or more.

Onuoga in his study on 46 primigravida at 28-32 weeks found of the 13 patients who developed pre-eclampsia 11 of them had a positive roll-over test[30]. The mean arterial pressure can also be used as a predictive test, where a value of 105mmHg or more is significant [31].

Alpha feto-protein (AFP) is found elevated in open neural tube defects, congenital nephrosis, multiple pregnancy and intra- uterine fetal death (IUFD). These conditions can be diagnosed by ultra sound.

For patients with unexplained elevation of alpha feto- protein some have been found to develop pre-eclampsia later in pregnancy[32].

Assay of cholesterol in the first trimester may also be useful in predicting the development of pre-eclampsia.

Van der Elzen in a study on pregnant women 36 years and over in the first trimester found that total cholesterol level was associated with development of pre-eclampsia especially for levels greater than 6mmol//[33].

For patients who develop severe pre-eclampsia magnesium sulphate has been used to prevent the development of eclampsia[34].Michael A. Belfort and colleagues carried out a study to compare the efficacy of magnesium sulphate and nimodipine for the prevention of eclampsia.The conducted an unblinded, multicenter trial in which 1650 women with severe pre-eclampsia were randomly assigned to receive either nimodipine (60 mg orally every 4 hours) or intravenous magnesium sulfate (given according to the institutional protocol) from enrollment until 24 hours post partum. High blood pressure was controlled with intravenous hydrallazine as needed. The primary outcome measure was the development of eclampsia, as defined by a witnessed tonic–clonic seizure. Demographic and clinical characteristics were similar in the two groups.

The women who received nimodipine were more likely to have a seizure than those who received magnesium sulfate (21 of 819 [2.6 percent] vs. 7 of 831 [0.8 percent].

The adjusted risk ratio for eclampsia associated with nimodipine, as compared with magnesium sulfate, was 3.2 (95 percent confidence interval, 1.1 to 9.1). The ante-partum seizure rates did not differ significantly between the groups, but the nimodipine group had a higher rate of postpartum seizures (9 of 819 [1.1 percent] vs. 0 of 831, P=0.01). There were no significant differences in neonatal outcome between the two groups. More women in the magnesium sulfate group than in the nimodipine group needed hydrallazine to control blood pressure (54.3 percent vs. 45.7 percent)[35].

1.2 RESEARCH QUESTION

What are the determinants of maternal and perinatal complications in women admitted with eclampsia at Kenyatta National Hospital?

1.3 RATIONALE AND JUSTIFICATION

Eclampsia is a common obstetric emergency and a common cause of maternal and perinatal morbidity and mortality.

The maternal mortality rate ranges between 1-20% while the perinatal mortality rate ranges between 130-300/1000 deliveries[14].Maternal complications may occur in eclampsia and they include pulmonary oedema, acute renal failure, cerebrovascular hemorrhage, and cerebral oedema. There are few studies that give statistics on prevalence of maternal complication and the determinants of outcome at KNH.

Undertaking this study this was justified because of several reasons. One, facilities for intensive care are scarce in low resource settings. Identifying determinants of maternal and perinatal outcome will provide insight as to which group of mothers at risk would benefit from increased vigilance. Secondly, from literature review, eclampsia is still responsible for considerable morbidity and mortality for the mother and the baby. HEELP syndrome, acute renal failure, DIC and pulmonary oedema are its serious complications and preventing them is a challenge. This challenge will be met if there is willingness to carry out studies to determine the mothers at risk of developing eclampsia in facilities across the country.

Thirdly there is very little data on the determinants of maternal and perinatal outcome in eclampsia in our country that can be used during investment in maternal health. This study is aimed at identifying the causes of poor maternal and perinatal outcomes and applying the findings to improve maternal and perinatal outcomes.

1.4 OBJECTIVES

Broad objective

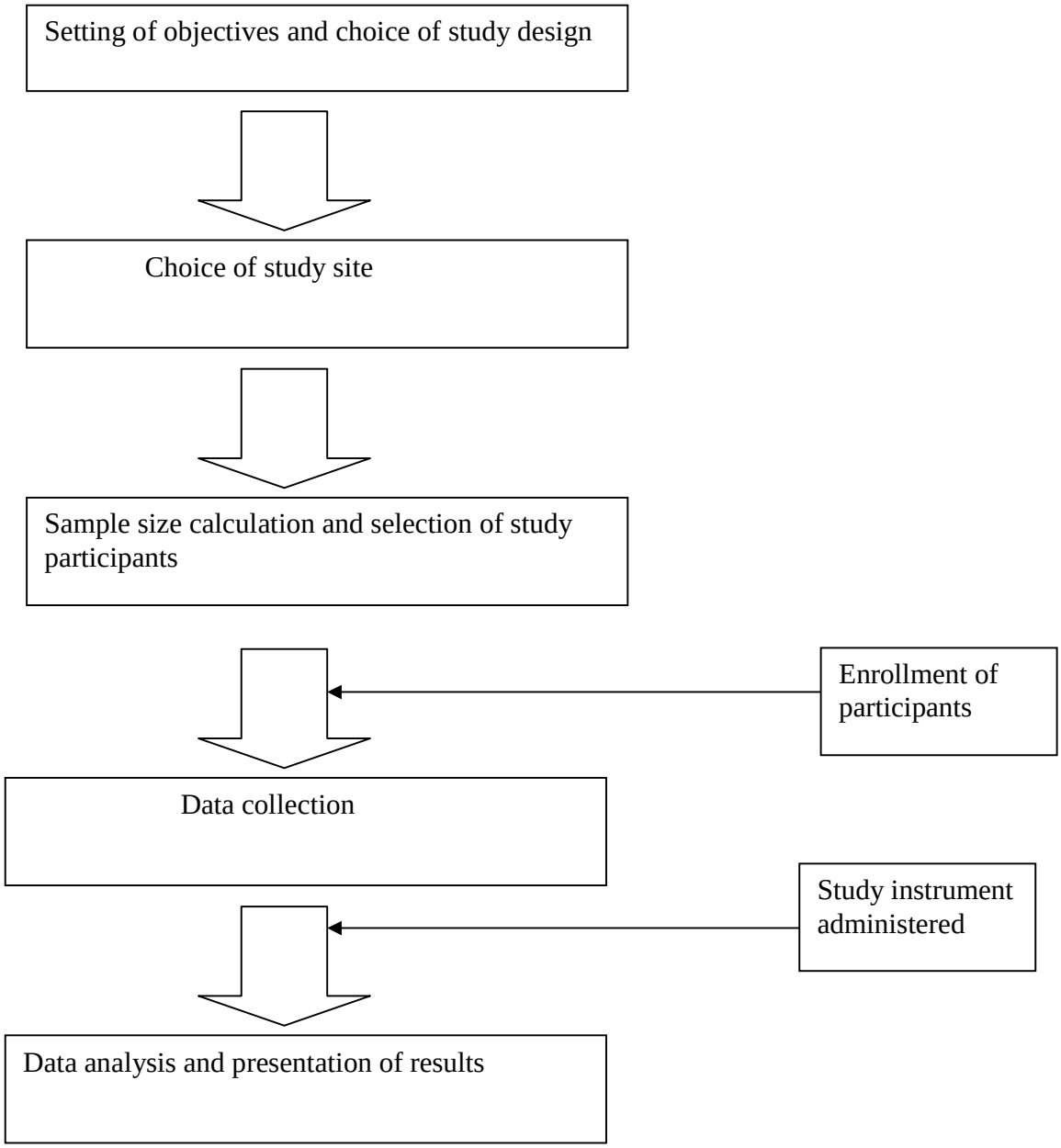
- To establish the factors that determine maternal and newborn outcome in patients with eclampsia.

Specific objectives

1. To determine the socio-demographic and obstetric characteristics of patients who present with eclampsia at Kenyatta National Hospital.
2. To describe the clinical management instituted in patients with eclampsia.
3. To describe the maternal and new born complications and outcomes and their prevalence.
4. To determine the predictors of maternal and new born complications.

1.5 CONCEPTUAL FRAMEWORK

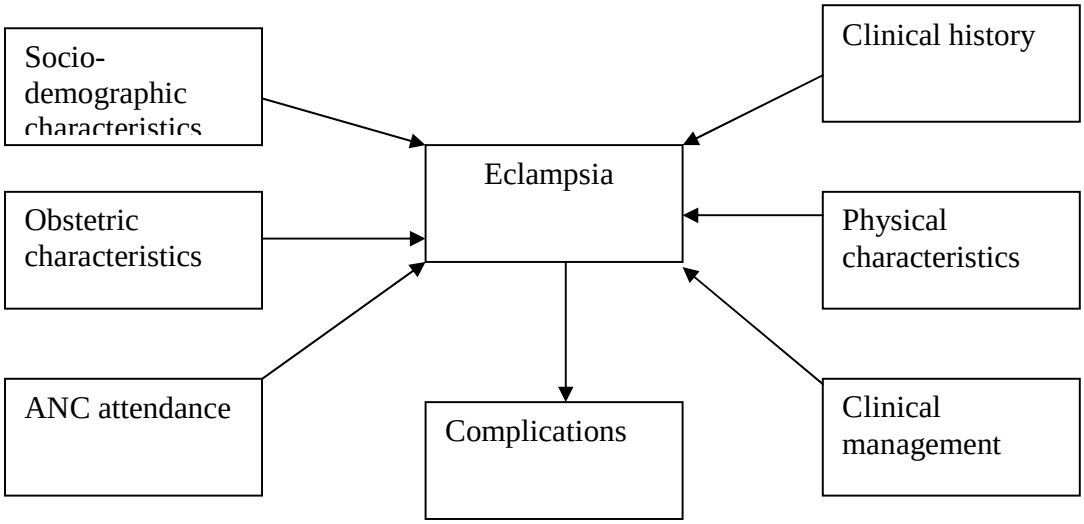
Figure 1: Summary of the study



The study began with a recognition of the fact that eclampsia is a common obstetric emergency that is life threatening to both the mother and the child. A research question was formulated to determine the maternal and perinatal

outcome in eclampsia. Objectives for the study were set and the study design chosen, (Crossectional descriptive). Kenyatta National hospital was selected as the study site due to its size and suitability. A suitable sample size was calculated and study participants enrolled, figure 1.

Figure 2: conceptual framework



The variables studied were the socio-demographic characteristics, obstetric characteristics, ANC attendance, clinical history, physical characteristics and clinical management, figure 2.

CHAPTER 2: STUDY DESIGN AND METHODOLOGY

2.1 Study design

This was a cross-sectional descriptive study. Patients with eclampsia were interviewed at labor ward, postnatal wards and post natal clinic. This was able to capture all patients admitted with eclampsia at KNH.

2.2 Study site

The study was done at Kenyatta National Hospital (KNH) which is located in Nairobi, the capital city of Kenya

Kenyatta National Hospital is one of the two level six referral hospitals in Kenya. The obstetric unit has 3 antenatal wards, one labor ward and 2 maternity theatres. Labor ward has a bed capacity of 20 beds. Pregnant mothers report to the labor ward where a team comprising a resident in obstetrics and gynecology and midwives manage the patients. A specialist on call is usually ready to offer guidance and assistance. There is an acute room with 3 beds for managing very sick mothers including those with eclampsia.

On average 40 mothers are attended to every day. There is a standard protocol for the management of eclampsia. In the protocol, once a mother is diagnosed with eclampsia convulsions are controlled with an initial loading dose of 4g of 20% magnesium sulphate given intravenously slowly over 5 minutes. This is followed with 1ntramuscular injection of 10g of 50% magnesium sulphate. Five grams is injected into each buttock. Blood pressure control is with 5mg of hydrallazine intravenously every 15 minutes till the diastolic blood pressure is less than 110mmgh. The vital signs, patellar reflexes and urine output are monitored.

2.3 Study population

This comprised of women admitted with eclampsia at labor ward and those on follow up in the postnatal clinic in KNH. Information about the diagnosis was obtained from the patients clinical records.

Inclusion criteria

Mothers admitted with eclampsia at KNH labor ward, antenatal ward and those on follow up in the postnatal clinic who consented.

Exclusion criteria

- Mothers with other obstetric complications unrelated to eclampsia.
- Mothers with other underlying chronic illnesses.
- Mothers under 18 years of age with no next of kin.

2.4 SAMPLE SIZE CALCULATION AND SAMPLING PROCEDURE

2.4.1Sample size calculation

From literature review the prevalence of complications was 8.6% [25].
For purposes of calculation the prevalence of complications (8.6%) was used to determine the sample size.
The following formula was used for sample size determination.

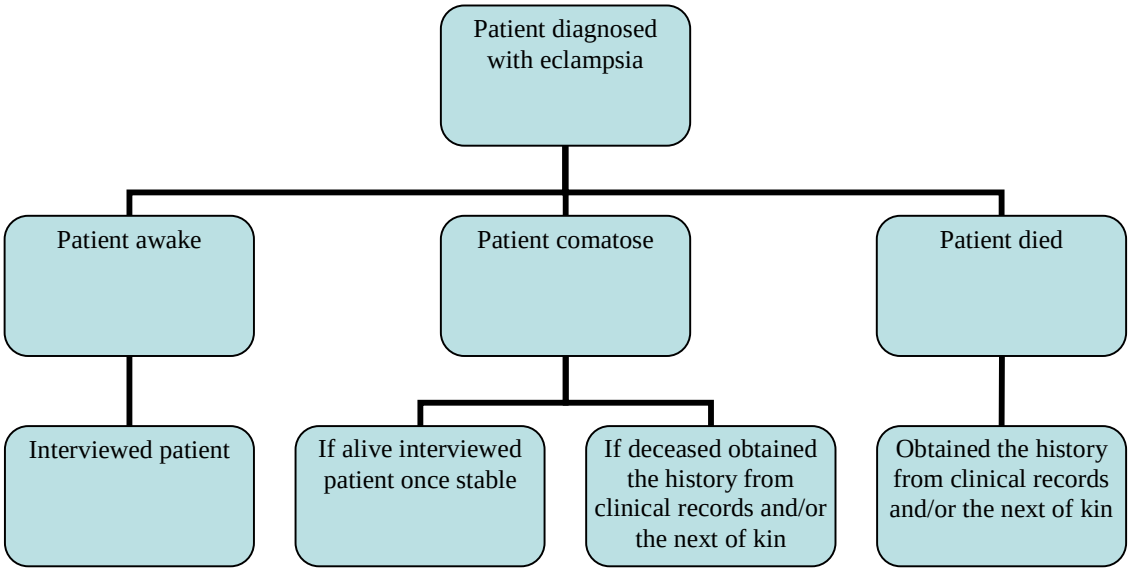
$$n = \frac{N \times Z^2 \times P(1-P)}{d^2 \times (N-1) + Z^2 \times P(1-P)}$$

Where
n = minimal sample size.
N=Number of deliveries in KNH in a year (average 1800).
Z=standard error from the mean corresponding to 95% confidence interval
Taken as 1.96
P=prevalence of maternal complications in eclampsia taken as 8.6%%.
D=precision/reliability with which to determine p taken as 0.05.
The minimum calculated sample size was 135.
The aim of the study was to estimate the frequency of complications with an error margin of 5%.

2.4.2 Sampling procedure

Consecutive women diagnosed with eclampsia and being managed in labor ward, antenatal ward and post natal clinic who consented were recruited into the participate in the study. This procedure of recruitment was applied till the sample size was obtained. Patients who were comatose were interviewed once they were stabilized and able to consent.(figure 3)

Figure 3: Summary of the interview process



Consenting process

The process of getting consent was private. The patient her next of kin was again briefed on the nature of the study and its justification. Then the patient was given the consent form to read. If there were any questions, these were answered by the interviewer. When the patient was satisfied she signed the consent form. For patients who could neither read nor write the interviewer read the consent form in Kiswahili and if the patient agreed to participate her right thumbprint was taken. Members' of staff on duty assisted if communication was a hindrance. For mothers' under 18 years of age the consent was obtained from the next of kin.

2.4.3Data collection procedure

The study was conducted at KNH labor ward, postnatal wards and postnatal clinic.

Recruitment and training of research assistants

Two midwives from KNH labor ward whom I recruited and trained assisted in data collection. Recruitment was based on merit and these midwives' past experience in data collection. The midwives were trained on the study design and objective.

Pre-testing of the data collection instrument

The pre-testing of the data collection instrument (questionnaire) was done by the research team before the actual study begun .The main aim of this exercise was to establish the suitability, practicability and reliability of the study questions. Pre-testing took place at KNH labor ward. Ten questionnaires were used during this exercise. Information obtained was used to update the questionnaire and make changes accordingly.

Data coding and quality control

The following data coding procedures were used;

1. Exhaustive: a unique code was created for each category, for example marital status (single, married, divorced or widowed)
2. Mutually exclusive: information being coded was assigned to one category, for example was the BP high (yes or no)
3. Residual other: provided for the participant to provide information that is not anticipated, for example any documented medical condition (none, diabetes mellitus, Cardiac disease, epilepsy, other).

Data collection

Mothers admitted with eclampsia were interviewed on admission if conscious. Mothers were also interviewed in the antenatal ward and in the postnatal clinics.
Very sick mothers were clinically stabilized first before conducting the Interview.
Mothers eligible for the study were identified from the clinical history. Those who met the inclusion criteria were briefed on the nature of the study and its justification. In cases where the mother did not understand English or Kiswahili, help was sought from any member of staff on duty who understood the patients' language.
This was carried out by two research assistants and myself when available. The research assistants were midwives who have worked in labor ward for more than 10 years.
Patients admitted at night when none of us were there were interviewed the following day.

Those who consented were randomly allocated numbers ranging from 1 to 135. These numbers were contained in unmarked envelopes. This was for the purposes of avoiding any bias.

The process of data collection was through face to face interviews and was conducted in private.

The interviewer made the patient comfortable then proceeded to ask questions from the questionnare.The interviewer stuck to the questions on the questionnaire.

Some information on the questionnaire, for example renal function was obtained from the clinical records because the patient did not have access to this information.

Data collection was uniform. A black pen was used during the exercise and a tick was inserted in the box after the question.

Once the interviewer completed the interview he/she went through the questionnaire to check for errors or any omissions made during the interview process. The questionnaire was then filed to avoid data loss. Once the study was complete the data was entered into frequency tables through tallying.

For patients who died before the interview information was obtained from the next of kin and the patients clinical records.

2.5DATA MANAGEMENT AND STATISTICAL ANALYSIS

2.5.1 Data management

All participants' data did not bear the names of the participant but rather a serial number. Data forms were kept in a secure lockable cabinet only accessible by the principal investigator and the statistician. Data was entered into a password protected Ms Access database prepared by the statistician. The investigator upon completion of data entry checked all the entered data against the hard copy forms.

2.5.2 Statistical analysis

Data analysis was performed using Statistical Package for Social Scientists. Descriptive statistics were determined during the analysis. The chi square and Mann -Whitney u test were applied to identify factors were related to development of complications in the patients who presented with eclampsia.

2.6 ETHICAL CONSIDERATIONS

Confidentiality of the results was paramount and was maintained.

This study was approved by the Kenyatta National Hospital Ethics and Research Committee. Informed consent was obtained from the client before being recruited. This involved signing a consent form after an explanation by the investigator about the details of the study. This included the facts and basis of the study, the risks and benefits anticipated as well as confidentiality and voluntary nature of the study.

The contact address of the investigator was given to the client in case she may have required further details about the study or may have wished to withdraw from the study. The information was communicated both verbally and in writing (appendices 1 and 2). Refusal to participate in the study did not deny the patient the appropriate management. The client did not bear any cost. The next of kin for very ill patients were also briefed on the nature of the study and those who agreed to be interviewed and consented on the patients behalf were included in the study.

2.7 STUDY LIMITATIONS

The constraints encountered included;

- Some patients were unconscious and unaccompanied making data collection difficult.
- Some patients recall was not absolute when they were asked what was already in the past.

For the patients who were unconscious interviews were conducted once they regained consciousness. Relatives were contacted during visiting hours to collaborate the history when need arose. These constraints did not impact on the interpretation of the final findings

CHAPTER 3.RESULTS

The study was conducted over a period of five months between January 2011 and May 2011. Patients with eclampsia were interviewed

Table 1: Socio-demographic characteristics (n=135)

Variable		Count	%
Age	14-18 years	14	10.4%
	19-23 years	45	33.3%
	24-29 years	52	38.5%
	29-33 years	18	13.3%
	>33	6	4.4%
	Total	**135**	100
Education	None	9	6.7%
	Primary	88	65.2%
	Secondary	37	27.4%
	Tertiary	1	.7%
	Total	**135**	100.0%
Residence	Urban	123	91.7%
	Rural	11	8.3%
	Total	**135**	100.0%
Marital Status	Single	20	15.0%
	Married	114	84.2%
	Divorced	0	.0%
	Widowed	1	.8%
	Total	**135**	100.0%

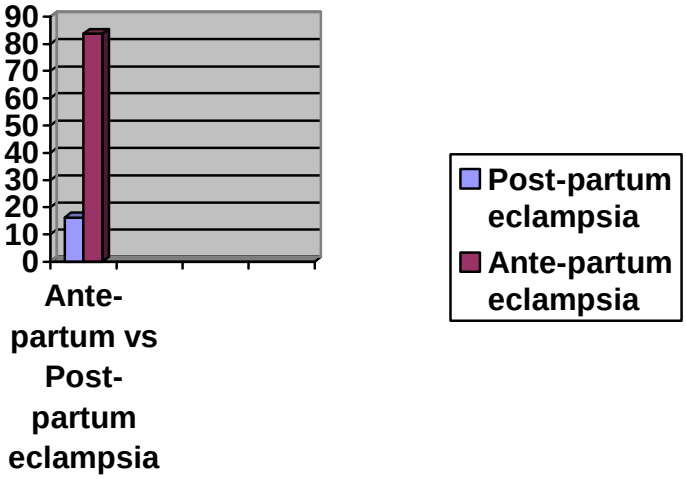
The age ranged from 17 to 36 years with a mean of 22 years (SD.5.4).Most of the patients were (82.2%) below 29 years and 84.2% were married.

Majority of patients (65.2%) had attained primary level of education and were urban dwellers (91.7%) This is in keeping with the socio-demographic characteristics of patients who seek services in KNH. (Table 1)

Table 2: Ante partum Vs Postpartum eclampsia

Delivery	**Yes**	22	16.3%
	No	113	83.7%
	Total	**135**	**100.0%**

Figure 4 :Ante-partum vs. post partum eclampsia



One hundred and thirteen patients (83.7) fitted before delivery and 22 (16.3%) fitted after delivery. This is in keeping with the observation in various studies where eclampsia is most common as term approaches, (Table 2) (Figure 4)

Table 3: Gestational age for the patients with ante-partum eclampsia (n=113)

Gestation (weeks)	Count	%
≤ 28	2	1.7
29-32	12	10.6
33-36	98	86.7
≥ 37	1	1
Total	**113**	**100**

Gestation ranged from 24-40 weeks with a mean of 33 (SD5.1 weeks) Majority of patients were between 33-36 weeks (86.7%) This was in keeping with the fact that eclampsia is most common in the third trimester of pregnancy. (Table3)

Table 4: Antenatal Clinic Attendance

ANC	Yes	82	60.7%
	No	53	39.3%
	Total	**135**	**100.0%**
ANC Place	Rural health center	7	8.8%
	City council	61	73.8%
	Private clinic	8	10.0%
	Public hospital	6	7.5%
	Total	**82**	**100.0%**
Gestation at first visit	Less than 20 weeks	2	2.4%
	21-28 weeks	67	81.7%
	29-36 weeks	12	14.6%
	>36 weeks	1	1.2%
	Total	**82**	**100.0%**

Most of the patients (60.7%) had started ANC attendance with the majority attending city council clinics (73.8%). Most of the patients started ANC attendance between 21-28 weeks (81.7).This is in keeping with ANC attendance in the city of Nairobi. (Table 4)

Table 5: Complications during ANC visits (n=82)

High BP noted	**No**	72	88.1%
	Yes	10	11.9%
	Total	**82**	100.0%
Protein noted	**No**	78	96.3%
	Yes	4	3.7%
	Total	**82**	100.0%
Swelling of Legs noted	**No**	7	13.3%
	Yes	75	86.7%
	Total	82	100.0%

Most of the patients did not have an elevated BP (88.1) or protenuria (96.5%) noted during ANC.

In this study 86.7% reported the presence of oedema in pregnancy. (Table 5)

Table 6: Past Obstetric history (n=135)

History		Count	%
Parity	0	77	57.0%
	1	29	21.5%
	2	18	13.3%
	3	9	6.7%
	5	1	.7%
	10	1	.7%
	Total	**135**	**100.0%**
Eclampsia	No	135	100.0%
	Total	**135**	**100.0%**

Majority of the patients who developed eclampsia were primigravida (57%) and none of the patients had any prior history of eclampsia. (Table 6)

Table 7: Physical signs at admission (n=135)

Sign	Count	%
Condition at admission		
Alert	2	1.5
Sedated	90	66.7
Unconscious	43	31.9
Total	**135**	**100**
Systolic BP(mmHg)		
100-140	32	23.7
141-180	75	55.6
181-220	20	14.8
> 220	8	5.9
Total	**135**	**100**
Diastolic BP (mmHg)		
<90	18	13.3
90-100	42	31.1
101-110	26	19.3
>110	49	36.3
Total	**135**	**100**
Presence of oedema		
Yes	117	86.7
No	18	33.3
Total	**135**	**100**
Protenuria		
1+	2	2.3
2+	44	33.1
≥ 3+	89	64.6
Total	**135**	**100**

Majority of the patients (66.7%) were sedated. This was due to the treatment initiated in casualty or at the referring hospital. Systolic BP ranged from 130-220 with a mean of 172. Diastolic BP ranged from 90-130 with a mean of 109.All patients had protenuria with 64.6% having a protein level of 3+ and above. (Table 7)

Table 8: Interval between first fit and admission to KNH for post partum eclampsia (n=22)

Interval (hours)	Count	Percentage
<12	15	68
12-24	5	23
>24	2	9
Total	**22**	**100**

In most cases patients were seen at KNH within 12 hours after the first fit for post partum eclampsia (68%) meaning eclampsia was most likely to occur during this period. The interval between delivery and admission to KNH ranged from 4 to 96 hours with a mean of 21 hours. (Table 8)

Table 9: Interval between admission to KNH and delivery for ante-partum eclampsia (n=113)

Interval (hours)	Count	Percentage
<6	64	57
6-12	39	35
>12	11	8
Total	**113**	100

The time interval between admission and delivery was 2-48 hours with a mean of 7 hours. Majority of the patients (57%) delivered within 6 hours. (Table 9)

Table 10: Mode of delivery and reason for caesarean section (n=113)

Mode of delivery	SVD	35	25.2
	C/S	100	74.8
	Total	**135**	**100**
Indication for C/S	Poor Bishop score	78	78
	Fetal distress	10	10
	Poor progress	6	6
	Abruptio placenta	6	6
	Total	**100**	**100**

The commonest mode of delivery was caesarian section (74.8%) with SVD accounting for 25.2% .The commonest indication for caesarian section was a poor bishop score (78%).(Table 10)

Table 11: Birth weight (n=135)

Weight(grams)	**Number**	**Percentage**
≤ 1000	12	9
1001-1500	14	10.4
1501-2000	36	26.7
2001-2500	41	30.4
2501-3000	17	13
3001-3500	14	10.4
>3500	1	0.1
Total	**135**	**100**

The birth weight ranged from 900g to 4kg with a mean of 2kg (SD1).The majority of babies (30.4%) weighed between 2 kg and 2.5kg .(Table 11)

Table 12: Neonatal outcome of delivery (n=135)

Outcome	Count	%
Live	101	75.4
FSB	15	11.2
Neonatal death	14	3.0
MSB	5	10.4
Total	135	100

There were 34 perinatal deaths (24.6%). The perinatal mortality rate was 2.8/1000 deliveries,(Table 12) .The maternal mortality rate was 0.58/1000 deliveries.

Table 13: Interval between admission and delivery vs. Outcome of delivery

Neonatal outcome	Interval							
	<6 hours		6-12 hours		> 12 hours		Total	
	Count	%	Count	%	Count	%	Count	%
Live	47	73.4	30	81.5	9	100	75	73.5
FSB	8	12.5	3	8.1	0	0.0	11	10.8
MSB	1	1.6	2	5.4	0	0.0	3	2.9
Neonatal death	8	12.5	5	13.5	0	0.0	13	12.7
Total	**64**	**100**	**37**	**100**	**9**	**100**	**113**	**100**

Most of the patients delivering within 12 hours had a favorable outcome 73.4% for those delivering within 6 hours and 81.5% for those delivering in 6-12 hours. (Table 13)

Table 14: Birth weight vs. Outcome of delivery (n=135)

Birth wt (g)	Outcome					
	Live	%	Death	%	Total	%
≤ 1000	0	0	12	100	12	100
1001-1500	2	14.3	9	85.7	14	100
1501-2000	24	66.7	12	33.3	36	100
2001-2500	41	100	0	0.0	41	100
2500-3000	17	100	0	0.0	17	100
3001-3500	14	100	0	0.0	14	100
>3500	1	100	0	0.0	1	100

There were more perinatal deaths in those less than 1000g (100%) and those between 1001-1500g (81.6%) This was more likely due to the early gestational age at the time of delivery. (Table 14)

Table 15: Types of maternal complications (n=62)

Complication	Count	%
Pulmonary oedema	11	17.7
Sepsis	9	14.5
Acute renal failure	14	22.6
Cerebral hemorrhage	2	3.2
Abruptio placenta	7	11.3
Laryngeal oedema	2	3.2
Postpartum hemorrhage	7	11.3
Anemia	3	4.8
Visual disturbance	4	6.5
Deep Venous thrombosis	3	4.8

During the study 62 patients (45.9%) developed complications. The commonest complications seen were acute renal failure (22.6), abruptio-placenta (11.3%) and post-partum hemorrhage (11.3%). (Table 15)

Table 16: Duration of stay in ICU (n=16)

		Count	%
ICU stay (days)	1-2 days	2	15
	3-4 days	4	8.8
	5-6 days	9	69.2
	>=7 days	1	7

Of the patients admitted in ICU the majority stayed for 5-6 days. (Table 16)

Table 17: Causes of maternal death (n=7)

Cause of death	Cerebral hemorrhage	3	43%
	Pulmonary edema	3	43%
	Poor reversal from anesthetic	1	14%

There were 7 maternal deaths giving a maternal mortality rate of (5.1%) of all patients in the study and 0.58/1000 deliveries. The causes of maternal mortality were cerebral hemorrhage (3 Patients), pulmonary edema (3 patients) and poor reversal from anesthesia (1 patient). (Table 17)

Table 18: Socio-demographic characteristics vs. development of complications

		Yes		No			
Characteristic		**Count**	**%**	**Count**	**%**	**X^2**	**P value**
Age groups	14-18 years	7	50.0%	7	50.0%	4.97	0.290
	19-23 years	19	42.2%	26	57.8%		
	24-29 years	25	48.1%	27	51.9%		
	29-33 years	6	33.3%	12	66.7%		
	>33	5	83.3%	1	16.7%		
Marital Status	Single	9	45.0%	11	55.0%	0.92	0.632
	Married	53	47.3%	59	52.7%		
	Divorced	0	.0%	0	.0%		
	Widowed	0	.0%	1	100.0%		
Education	None	3	33.3%	6	66.7%	2.49	0.477
	Primary	43	48.9%	45	51.1%		
	Secondary	15	40.5%	22	59.5%		
	Tertiary	1	100.0%	0	.0%		

There was no significant relationship between the socio-demographic characteristics and the development of eclampsia ($p>0.05$). (Table 18)

Table 19: Antenatal Clinical Attendance vs. Complications

Attended	Complications	%	None	%	X^2	P value
Yes	24	38.1	58	80.6	21.17	<0.0001
No	39	61.9	14	19.4		
Total	**63**	**100**	**72**	**100**		

The majority of patients who did not attend ante-natal clinic (61.9%) developed complications. Among the patients who attended ANC, 38.1 % developed complications. This relationship was statistically significant (p=0.0001). (Table19)

Table 20: physical signs at admission vs. Complications (n=135)

Sign		Complication	%	None	%	X^2	P value
Diastolic BP(mmhg) on admission	<90	0	0.0	2	2.7	13.47	0.004
	90-100	10	16.4	27	37		
	101-110	23	37.7	29	39.7		
	>110	29	45.9	15	20.5		
	Total	**62**	**100**	**73**	**100**		
Oedema	Yes	59	95.2	69	94.5	0.06	0.56
	No	3	4.8	4	5.5		
	Total	**62**		**73**	**100**		
Protenuria at admission	None	0	0.0	0	0.0	2.41	0.3
	1+	2	3.2	1	1.1		
	2+	16	25.8	28	38.6		
	3+ and above	44	71	44	60.3		
	Total	**62**	**100**	**73**	**100**		

There was a significant relationship between development of complications and diastolic BP. (P= 0.004). There was no significant relationship between edema (p =0.56) and protenuria (P= 0.3). (Table 20)

Table 21: Maternal death versus complications

Mortality	**Complications**	**%**	**None**	**%**	**X^2**	**P value**
Yes	7	11.2	0	0.0	4.66	0.031
No	55	88.2	73	100		
Total	**62**	**100**	**74**	**100**		

All the patients who died had developed complications. The relationship between development of complications and maternal death was statistically significant (p=0.031). (Table 21)

Table 22: comparison of those who developed complications with those who did not against the other various parameters

	Maternal Complications	N	Mean	Std. Deviation	P value
Age	**Yes**	62	24.68	5.175	0.382
	No	73	23.96	4.351	
Parity	**Yes**	62	85	1.535	0.607
	No	73	74	1.041	
Gestation first attendance	**Yes**	26	2.15	.368	0.918
	No	56	2.14	.483	
Time interval(hours)	**Yes**	48	7.38	8.178	0.716
	No	54	6.76	8.769	
Diastolic blood pressure at admission (mmHg)	**Yes**	61	113.05	10.282	<0.001
	No	73	104.70	15.597	
Duration after delivery (hours)	**Yes**	6	15.00	2.828	0.439
	No	7	25.43	31.506	

The relationship between diastolic BP on admission was statistically significant (P=0.001). The other parameters were not statistically significant age(p=0.382),parity(0.607), gestation of first attendance(0.918),time interval from onset of first fit(0.716) and duration after delivery (0.439).(Table22)

CHAPTER 4: DISCUSSION

In this study 135 patients with eclampsia were interviewed and evaluated. During this period there were 12000 deliveries. The incidence of eclampsia was 11/1000 deliveries. This incidence is much higher than similar studies at the same hospital. Mati found an incidence of 1.8/1000 deliveries while Machoki found an incidence of 1.9/1000 deliveries [6, 7].Wasiche found an incidence of 10/1000 deliveries[12].

The high incidence could be due to an increase in the population of gravid women.

Most of the mothers in this study 59% were below 23 years. This compares to other studies that eclampsia is likely in the younger population [4].

The majority of patients were nulliparas (57%). Other studies have also reported this high incidence among primigravida [7, 8].

In this study 82(60.7%) of the patients had attended clinic while 53 (39.3%) had not. Machoki found that 30.2% had not attended ante-natal clinic [7]. Wasiche found that 51.1% 0f the patients who developed eclampsia had attended ANC.

The majority of patients were delivered through caesarian section (74.8%) while those who delivered vaginally were (25.2%). The main indication for Caesarian section was a poor bishop score (83%).Innocent O George and colleagues found a caesarian rate of 55.7% among the patients admitted with eclampsia[25].Mwinyoglee reported a caesarean section rate of 66.7% [26].Wasiche found a caesarian rate of 73%. These findings were similar. The high rate was unavoidable since the commonest indication was unfavorable cervix.

In this study, 45.9% of the patients developed complications following eclampsia. This rate is similar to that found by Wasiche who did a retrospective study on maternal complications [12].

The commonest complications were acute renal failure (22.6%), pulmonary edema (17.7%), sepsis (14.5%), abruptio-placenta (11.3%) Post-partum hemorrhage (11.3%), visual disturbances (6.5%), anemia (4.8%), deep venous thrombosis (4.8%) and cerebral hemorrhage (3.2%)

Other studies have a slightly different prevalence for the various complications. Wasiche found the major complications to be sepsis (40.3%), acute renal failure (10.4%), cerebral hemorrhage (10.4%) abruptio placenta (9%), laryngeal edema (7.5%), post-partum hemorrhage (4.5%) and visual disturbances (3%) [12]. Machoki found that the infection rate was slightly higher in eclamptics than in other patients[4].The slight decrease in the incidence of sepsis could be due to the widespread use of antibiotics before and after surgery.

Of the patients who developed complications, 22.5% had to be admitted in ICU. These patients were admitted in ICU because of the need for ventilatory support because of complications such as pulmonary oedema and poor reversal from anesthesia.

There were seven maternal deaths in this study. The case fatality rate was 5.1%. Wasiche in a previous study found a case fatality rate of 5%[12].This two findings are similar. Other studies in Africa have reported higher case fatality rates Mwinyoglee reported a case fatality rate of 21.2%[26]. Douglas found a rate of 1.8% in the United Kingdom[11].

The causes of maternal mortality were pulmonary oedema (3 patients), cerebrovascular hemorrhage (3 patients) and poor reversal (1 patient). The

causes of maternal mortality are similar to the previous study by Wasiche with only minor variations [12].

The perinatal mortality rate was 2.8/1000 deliveries. Wasiche reported a rate of 3.3/1000 deliveries[12].Earlier studies reported higher perinatal mortality rates at the same center. Mati found a perinatal mortality rate of 82.2/1000 deliveries while Machoki reported a rate of 225.8/1000 deliveries [6, 7].

The study was carried out to establish the determinants of maternal and perinatal outcome in eclampsia. There was no significant relationship between development of complications and socio-demographic characteristics, age (p= 0.29), marital status (p0.632)
and level of education (p=0.471).This is similar to the findings of a similar study on complications carried out by Wasiche [12].

Most of the patients (60.7%) who developed eclampsia complications had not attended ANC and this relationship was statistically significant (p=0.0001).This can be explained by the fact that warning signs were not detected in this group. Innocent George and colleagues found that 90.9% of the patients who developed eclampsia had not attended ANC at the University of Port Harcourt in Nigeria [25].

A high diastolic blood pressure was associated with development of complications. This relationship was statistically significant (p=0.001). The mean diastolic pressure for those who developed complications was 113 mmHg while for those who did not was 104.5mmHg. This differed from an earlier study by Wasiche who found no statistically significant finding among the two groups [12].It is possible that some of the patients she studied had been given anti-hypertensive drugs at the referring hospital. The level of protenuria was not statistically significant (p=0.3)

The mean interval between admission was longer for those who developed complications (mean 7.38 hours) compared to those who did not (mean 6.76). The relationship was not statistically significant (p=0.716)

Patients who died had developed complications. There was a statistically significant relationship between development of complications and maternal death (p=0.031).

CONCLUSION

The study shows an increasing incidence of eclampsia at KNH of almost five fold.

The key findings from the study are that there is a high caesarean rate among patients with eclampsia. It was also established that ANC non attendance was associated with an increase in complications. Very high diastolic blood pressure levels are also associated with adverse outcomes.

The complications seen in eclampsia are similar to those reported in other studies though the incidence of sepsis was slightly lower while that of ARF and pulmonary oedema were slightly higher.

Eclampsia was also associated with case fatality rates

RECOMMANDATIONS

The following recommendations have been made from the study

1. Health educations for pregnant women to sensitize them on dangers of pregnancy induced hypertension and attendant complications such as eclampsia. This should be done at the booking visit.

2. Improve and equip level 5 and level 6 hospitals. This will ensure management of eclampsia in the periphery to avoid unnecessary delays in the referral system.

3. Active management of patients with eclampsia and timely referrals if facilities for their care are not available.

4. Review the management of eclampsia at KNH to address rising case fatality rates.

5. Increased vigilance of patients who have had no antenatal care.

BUDGET

The expenditure during the study was:

Stationery	**35,000 kshs.**
Statistician	**35,000 kshs.**
Research assistants	**20,000 kshs.**
Miscellaneous	**5,000 kshs.**

Total **95,000 kshs**

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APPEDIX 1

DATA COLLECTION TOOL

1. Patients study number ☐ ☐ ☐
2. Age (completed years) ☐ ☐
3. Level of education

a)None ☐ b) Primary ☐

c)Secondary ☐ d) University/college ☐

4. Residence

a) Urban ☐ b) Rural ☐

5.Marital status (put X or tick)

a) Single ☐ b) Married ☐

c) Divorced/separated ☐ d) Widowed ☐

PAST OBSTETRIC HISTORY

6. Parity ☐ + ☐

7. Delivered before,

a) Yes ☐ b) No ☐

8. If delivered before, eclampsia in previous pregnancy

a) Yes ☐ b) No ☐

Pregnancy	Year
1st	☐☐☐☐
2nd	☐☐☐☐
3rd	☐☐☐☐

INDEX PREGNANCY

	Day	month	year
9. Last menstrual period	☐	☐	☐

10. ANC attended (insert X or tick)

a) Yes ☐

b) No ☐

If NO go to question 13.

11. ANC attendance (insert X or tick)

a) Rural health centre ☐

b) City council ☐

c) Private clinic/hospital ☐

d) Public hospital ☐

12. Gestation at first ANC attendance

a) less than 20weeks ☐

b) 21-28 weeks ☐

c) 29-36 weeks ☐

d) More than 36 weeks ☐

13. Any of the following noted in pregnancy

a) High blood pressure ☐

b) Protein in urine ☐

c) Swelling of the legs ☐

If none of the above go to question 19

14. If the blood pressure was high medication given?

15. If the blood pressure was high any referral to another hospital?

a) Yes ☐

b) No ☐

If no to question 15 go to 17

16. The blood pressure on referral?

Systolic ☐mmHg Diastolic ☐ mmHg

17. If no to question 15 did the blood pressure improve in Subsequent visits

a) Yes ☐

b) No ☐

If yes to question 17 go to 19

18. If no to question 17, management?

a) Admitted ☐

b) Referred to another facility ☐

c) Other (specify)

19. Documented medical conditions?

a) None ☐

b) Diabetes ☐

c) Cardiac disease ☐

d) Epilepsy ☐

e) Other (specify) ☐

AT ADMISSION

20. Date and time of first convulsion

Date Time (am/pm)

21. Date seen at KNH Time (am/pm)

22. Number of convulsions at the time of admission

23. Condition at admission

a) Alert ☐

b) Sedated ☐

c) Unconscious ☐

24. Blood pressure at admission

Systolic ☐ mmhg Diastolic ☐ mmhg

25. Level of protenuria at admission

a) None ☐

b) 1+ ☐

c) 2+ ☐

d) 3+ and more

26. Delivery before admission

a) Yes ☐

b) No ☐

If no to question 26 go to 28

27. If yes, duration after delivery

28. Time interval between admission to KNH and delivery (hours)

29. Mode of delivery

a) SVD ☐

b) Vacuum extraction ☐

c) C/S ☐

30. If C/S was done what was the indication

a) Poor bishop score ☐

b) Poor progress ☐

c) Abruptio placenta ☐

d) Fetal distress ☐

e) 0ther (specify)

31. Newborn outcome

a) Live ☐

b) FSB ☐

c) MSB ☐

d) Neonatal death ☐

32. Birth weight of baby (kgs) ☐

MATERNAL COMPLICATIONS

33. Any complications?

a) Yes ☐
b) No ☐

If no go to question 41

34. If yes to question 33, what were the complications (reference to the file for clinical diagnosis and laboratory tests such as renal function)

a) Acute renal failure ☐
b) Pulmonary edema ☐
c) Cerebral hemorrhage ☐
d) Abruptio placenta ☐
e) DIC ☐
f) Sepsis ☐
g Other (specify)

35. Admission to ICU

a) Yes ☐
b) No ☐

If no to question 35 go to 41

36. If yes to question 35, reason for admission?

a) Pulmonary edema ☐
b) Cerebral hemorrhage ☐
c) Difficult reversal from anesthesia ☐
d) Other (specify)

37. Length of stay in ICU (days)

38. If ARF, was dialysis done?

a) Dialysis ☐

b) Conservative ☐

39. Maternal death

a) Yes ☐

b) No ☐

If no go to question 39 go to 41

40. If yes to question 39, what was the cause of death?

a) ARF ☐

b) Cerebral hemorrhage ☐

c) Pulmonary edema ☐

d) DIC ☐

e) Sepsis ☐

f) Cardiopulmonary failure ☐

g) Other specify

41.I f no to 39, length of stay in hospital (days)

42. Any permanent disabilities attributed to eclampsia?

a) Yes ☐

b) No ☐

43. If yes to question 42 which are the disabilities?

APPENDIX 2

CONSENT FORM

I Dr Sambu Solomon Tyaa and my research assistants are caring out a study on the determinants of maternal and perinatal outcome in patients with eclampsia

This involves collecting data of all the patients admitted with eclampsia at KNH labor ward.

We will be asking questions regarding your pregnancy as well as personal details. The information obtained will be confidential.

The information gained from the study will help detect mothers at risk of complications which could harm the baby and yourself

The care given to you will not change and there will be no added cost.

Refusing to participate will not change the care given to you.

Consent

***I*……**

Have agreed to participate in the study and was not coerced.

NAME :
SIGNATURE:
DATE :