International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 9 Issue 5, May 2022

ISSN: 2394-4404

Maternal And Perinatal Outcomes Amongst Expectantly Managed Early-Onset Pre-Eclamptic Mothers With Severe Features In A Tertiary Hospital In Rwanda

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Abstract:

Background/Objective: *Pre-eclampsia with severe features represents a worsening form of pre-eclampsia that is associated with either severe hypertension or end-organ damage; it is one of the leading causes of maternal and perinatal morbidity and mortality worldwide. This study evaluates maternal and perinatal outcomes amongst early-onset pre-eclamptic pregnant mothers with severe features at King Faisal Hospital Kigali.*

Methodology: *This is a retrospective study conducted between 01 June 2015 to 30 June 2020. Data were extracted from the patient's files onto structured questionnaires and STATA version 14. These were then presented as mean, percentage, or range as appropriate. Multivariate logistic regression was performed to assess the association between the gestational age of the mothers who presented at diagnosis and primary outcomes, with a P-value < 0.05 considered significant.*

Result: *The study observed that the median prolongation of pregnancy amongst mothers with pre-eclampsia with severe features was 3 days. The commonest indication for delivery was due to non-reassuring fetal status (41%) evidenced by the cardiotocography report. The maternal complications observed from expectantly managed mothers in this study were HELLP syndrome (8.97%).*

Conclusion: *The expectant management in well selected pre-eclamptic mothers with severe features at earlier gestation is associated with better outcomes.*

Keywords: *Eclampsia, Pre-eclampsia, Severe eclampsia, Perinatal mortality*

I. INTRODUCTION

Pre-eclampsia with severe features represents a worsening form of pre-eclampsia associated with either severe hypertension (≥ 160/110mmHg) or end-organ damage[1]. It is one of the leading causes of maternal and perinatal morbidity and mortality worldwide[1-3]. Pre-eclampsia is a serious health challenge in developing countries with high rates of adverse outcomes accounting for a 12-18% mortality rate. 5-7% of pregnancies are affected, and early-onset pre-eclampsia developing remote from term (less than 34 weeks) accounts for 25% of pregnancies complicated with pre-eclampsia[4, 5].

In Africa, the prevalence of pre-eclampsia amongst pregnant women greatly varies between 1.8 to 16.7%[6-10];

which is significantly higher than the worldwide range of 2-10%[9]. The World Health Organization WHO, estimated the incidence of pre-eclampsia to be seven times higher (2.8% of live births) in developing than the developed countries (0.4%)[11]. The risk of a woman in a low-resource country dying from these maternal-related causes such as pre-eclampsia during her lifetime is about 33 times higher than those living in developed countries[12]. In 2015, 99% of all maternal deaths were contributed to by developing countries and sub-Saharan Africa contributed 66% of all maternal deaths[12].

The delivery of the placenta remains the only curative treatment for mothers presenting with pre-eclampsia with severe features, as this prevents maternal exposure to pre-eclampsia complications, but results in increased perinatal morbidity and mortality[13]. However, if delivery is deferred to ≥ 34 weeks, while balancing both maternal and fetal risks, perinatal outcomes are improved without necessarily increasing the rate of maternal complications[14].

In Africa, expectant management of pre-eclampsia with severe features is being practiced in few health facilities, as it is associated with considerable maternal morbidity and mortality[15]. However, it is known that for women who have pre-eclampsia with severe features between 24 and 34 weeks gestation, expectant management with close monitoring of the mother and fetus reduces neonatal complications and days in the neonatal intensive care unit[14].

It has been observed over the years in this current study area that pre-eclampsia with severe features was the most common medical complication of pregnancy in the maternity ward. Expectant management that may potentially lead to maternal complications, but minimizes iatrogenic prematurity with its potential complications to the fetus, whose care is a challenge in our resource limited environment, is practiced, but no previous description of maternal and perinatal outcomes at gestation remote from term (less than 34 weeks), and there existed paucity of data to a generalization.

Therefore, this study determined the maternal and perinatal outcomes of pre-eclamptic pregnant women with severe features who underwent expectant management at King Faisal hospital, Rwanda.

II. METHODS

STUDY DESIGN

This was a retrospective study

STUDY SITE

The study was conducted at King Faisal Hospital, Kigali, the capital of Rwanda, with over 1200 deliveries annually. It is a secondary and tertiary referral center that provides care to patients from all areas in Rwanda, the elite social-economic class from neighboring countries especially the Eastern Democratic Republic of Congo and Republic of Burundi. The department of Obstetrics and Gynaecology is 1 of the 4 clinical directorates in the hospital, being run by a team of seven consultants. The department runs gynecological clinics including preconception, antenatal, intrapartum, and postnatal services.

STUDY POPULATION

The study observed all women with severe pre-eclampsia between the 26 and 34 weeks of gestation or with a fetus weighing 500g or more on ultrasound assessment, who were not delivered after 24 hours of admission at the Obstetrics and Gynecology department of the Hospital.

INCLUSION CRITERIA

All singleton pregnancies admitted at King Faisal Hospital Kigali and diagnosed as pre-eclampsia with severe features between 26 and 34 weeks of gestation, based on blood pressure or end-organ symptoms [such as headache, visual disturbances, epigastric pain, tinnitus], and also received expectant management according to the American College of Obstetrics and Gynecologists' 2013 criteria[16] had their medical records obtained and were included in the study.

EXCLUSION CRITERIA

Expectant mothers with HELLP [Hemolysis, Elevated liver enzymes, Low platelets], renal failure, pulmonary edema, and other co-morbidities such as diabetes mellitus, asthma, and cardiovascular diseases in pregnancy. Also, women who delivered within the first 24 hours of admission and those with intrauterine fetal demise on admission were all excluded.

SAMPLING TECHNIQUE

All case files of pre-eclamptic mothers with severe features over 5 calendar years (between 01 June 2015 to 30 June 2020) were recruited for the study.

PROCEDURE

The case notes were retrieved from the medical record department using the identity numbers. A pro forma containing information on the maternal demographic details was then used to extract information from the case-files. Data regarding the duration of expectant management, gestational age at delivery, indication of delivery, use of magnesium sulfate prophylaxis, antihypertensive medication, and mode of delivery were retrieved. In addition, maternal complications such as eclampsia, abruptio placentae, pulmonary oedema, HELLP syndrome were also noted. Neonatal data including birth weight, admission into neonatal intensive care unit, stillbirth, early neonatal death, intraventricular hemorrhage, necrotizing enterocolitis and duration of discharge from NICU were recorded from neonate's files.

PATIENT MANAGEMENT ON THE WARD

After the initial assessment and stabilization for 12 to 24 hours, patients were monitored and medically managed at the antepartum unit to prolong pregnancy after ruling out absolute contraindications to expectant management and were kept as

in-patient until delivery. Vital signs were monitored every six hours in well controlled asymptomatic mothers. Laboratory investigations, which include complete blood count, serum creatinine, and liver chemistries were repeated at least twice weekly for monitoring end organ function.

Fetal well-being assessment involving daily fetal kick counts, non-stress tests at least twice daily, ultrasound assessment of amniotic fluid volume twice per week, estimation of fetal growth once every two weeks and weekly Doppler velocimetry of the umbilical artery were all performed.

DATA ANALYSIS

Data collected were computed and analyzed using STATA version 14. Data was presented as mean and percentage with range as appropriate. Multivariate logistic regression was performed to assess association between gestational age of the mother at diagnosis and primary outcomes with P-value < 0.05 considered as significant.

ETHICAL CONSIDERATION

Ethical approval was obtained from the Research and Ethics Committee of the hospital and it adhered to guidelines of 2013 Helsinki declaration.

III. RESULTS

A total of 78 maternal - neonatal records of mothers with pre-eclampsia with severe features were surveyed.

Table I shows majority of the women (87.1%) who delivered were in the age range between 25 and 40years, most being multipara (48.7%) were delivered by cesarean section (98.7%), after a median prolongation of pregnancy of 3 days.

Variable	Number (%)
Age group	
<25	4 (5.2)
25-29	21 (27.2)
30-34	23 (29.9)
35-40	23 (29.9)
>40	6 (7.8)
Parity	
Prime para	33 (42.3)
Multipara	38 (48.7)
Grand multipara	7 (9.0)
Gestation age at birth (weeks)	
26-27	2 (2.6)
28-29	14 (18.0)
30-32	37 (47.4)
33-34	25 (32.0)
Cerebral symptoms presence	
Yes	45 (57.7)
No	33 (42.3)
Epigastric pain presence	
Yes	22 (28.2)
No	56 (71.8)
Number of antihypertensives used	
1	21 (26.9)
2	45 (57.7)
3	12 (15.4)
Usage of MgSO4 prophylaxis	
No	33 (42.3)
Yes	45 (57.7)
Pregnancy prolongation period (days)	
1-3	41 (52.6)
4-6	14 (18.0)
7-9	9 (11.5)
10-13	6 (7.7)
14-16	2 (2.6)
≥17	6 (7.7)
Mode of delivery	
Vaginal delivery	1 (1.3)
Cesarean section	77 (98.7)

Table I: Sociodemographic and clinical characteristics

Table II shows that the commonest indication for delivery was non reassuring cardiotocography (CTG) test at 41% with IUFD, REDV (Reversed End-Diastolic Velocity) and thromboembolism having the least at 1%.

Indication of delivery	Frequency (%)
Non reassuring CTG	32 (41.0)
Uncontrolled hypertension	22 (28.2)
34 weeks of gestation	12 (15.4)
HELLP	5 (6.4)
Persistent epigastric pain	2 (2.6)
Thromboembolisms	1 (1.3)
REDV	1 (1.3)
Persistent cerebral symptoms	2 (2.6)
IUFD	1 (1.3)

Table II: Indications for delivery

Table III shows that, out of the 78 mothers with pre-eclampsia with severe features, 9% developed HELLP syndrome and 5.1% were admitted to the intensive care unit, while 10% of premature neonates died, and only 7.2% didn't require respiratory support.

Maternal Outcomes	Gestation age at birth				TOTAL per outcome
	26-<27weeks and 6 days (n=2) (n%)	28-<29weeks and 6days (n=14) n(%)	30-<31weeks and 6days (n=20) n(%)	32-34 weeks (n=42) n(%)	78
HELLP SYNDR	1 (50%)	1(7.14 %)	1(14.3 %)	4(57.1 %)	7(8.97%)
ICU admission	0	0	0	4(9.5%)	4(5.13%)
Total number of maternal outcomes					11(14.1%)

Perinatal outcomes					Total number of neonates = 69
Neonatal death	2(100%)	2 (14.2%)	1(5.0%)	2(4.8%)	7(10%)
Intraventricular hemorrhage	0	1(7%)	0	0	1(1.5%)
No respiratory support	0	0	0	5(11.9%)	5(7.2%)

Apgar at 10minutes <7	1(50%)	0	0	1(2.4%)+	2(2.9%)
Nec	0	1(7%)	0	0	1(1.5%)
Iufd	0	1(7%)	0	0	1(1.5%)
Total number of perinatal outcomes					17(24..6%)

Table III: Maternal and perinatal outcomes based on gestational age at birth

Table IV shows that increase in neonatal birth weight was protective of neonatal death while increase in maternal age was associated with neonatal death.

Variable	Bivariate analysis		Multivariate analysis	
	Cor 95% ci	p-value	Cor 95% ci	p-value
Maternal age	0.53(0.41-0.68)	0.00	7.91(1.21-316.10)	0.02
Gravidity	0.33(0.21-0.51)	0.00	1.25(0.09-16.34)	1.00
Gestational age at birth	0.47(0.35-0.62)	0.00	1.67(0.37 – 16.41)	0.81
Neonate's birth weight	0.26(0.15-0.46)	0.00	0.10(0.00-0.41)	0.01
Amniotic fluid index.	0.14(0.07-0.29)	0.00	0.17(0.0-4.0)	0.26
Prolongation of pregnancy	0.17(0.08-0.34)	0.00	1.00(0.0-infinity)	--

Table IV: Associations between variables

IV. DISCUSSION

The median prolongation of pregnancy amongst mothers with pre-eclampsia with severe features was 3 days (range 3-5). This finding was comparable to other studies in different parts of the world. A study by Annette et al, 2009[17] found a median prolongation of 5 days in the United States and 8 days in China[18]. However, the prolongation was lower compared to some other studies. In Nigeria, 12 days were reported by JI Nwofor et al [15], 12 days in Mansoura Egypt[19], 15 days in South Africa at Tygerberg hospital[18] and 18.5 days in China[20]. Though our study observed shorter days, but was not significantly associated with adverse neonatal outcomes (prevention of neonatal death.), a finding that was similar to what was found in a randomized, multicenter trial that had a prolongation of pregnancy of up to 10 days[21].

The commonest indication of delivery in our study was non-reassuring fetal status (41%) evident by cardiotocography report. This is comparable to report by Le et al,[20] that had fetal distress as indication for delivery in 45.3% of the cases and Sibai at 46% [13]. However this was in contrast to report by Samantha et al, where the fetal indication for delivery was at 19.4%[22].

The maternal complications observed from expectantly managed mothers in this study were low at 7(8.97%, all had HELLP syndrome), none had other complications like maternal death as reported in another study[15]. Also, 5.13% required intensive care unit (ICU) admission which was higher than findings of Nwafor, et al where 2.5% was found.

This study is however limited with the data obtained from the patient's files and some associations with other perinatal outcome predictors as (mentioned in previous studies for perinatal outcome in pre-eclampsia with severe features) could not be done because these data were not available in patient's files and some other laboratory and radiological investigations (like serum albumin, abdominal ultrasound, Chest Xray or Chest ultrasound) were not routinely done for pre-eclampsia patients.

V. CONCLUSION

Expectant management of pre-eclamptic mothers with severe features at earlier gestational ages (less than 34 weeks) as seen in this study is associated with better outcome of maternal and perinatal morbidity, reduced perinatal mortality with no recorded maternal mortality. Even though this form of management is potentially associated with maternal complications, iatrogenic prematurity with its potential complications to the fetus is reduced when mothers are well selected. This should also be done with proper patient counseling on potential associated risks, in settings with effective fetomaternal surveillance and adequate emergency and neonatal facilities.

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