



Assessment of Maternal Outcome Among Preeclamptic Women at Dilla University Referral Hospital, Dilla Ethiopia

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Abstract: Background: Pre-eclampsia is hypertension in pregnancy after 20 weeks of gestation characterized by blood pressure greater than 140/90 mm Hg, using the Korotkoff phase V sound for the diastolic value, on two occasions 4 hours apart. It is one of a spectrum of pregnancy disorders which result in different complications including maternal death. Methodology: Retrospective cross-sectional study design was employed. A total of 295 samples were recruited and systematic sampling technique was used to select study subjects who were admitted with preeclampsia from January 1, 2016 and December 31, 2018 at Dilla University Referral Hospital. Medical records review was done using pretested data abstraction tool. Data was entered in EpiData version 4.4.2.1 and exported into SPSS (statistical package of social science) version 25.0 for analysis. Binary and multiple logistic regressions were used to identify association between variables. Adjusted odds ratio along with 95% confidence interval was estimated to assess the strength of the association, and a p-value ≤ 0.05 was used to declare the level of statistical significance. Results: In this study 295 medical charts of pre-eclamptic women were reviewed. The most 210 (72.2%) of the participants were between the age of 20-34 years. Severe type of preeclampsia was 174 (58.0%). HELLP syndrome was the most common complication of severe preeclampsia 81 (66.6%) followed by DIC, renal failure and liver failure, 25 (20.5%), 9 (7.4%) and 1 (0.8%) respectively. Maternal deaths due to preeclampsia were 6 this gives case fatality of 2%. In multivariable logistic regression, rural residence has 5.038 times more risk of unfavorable maternal outcome [AOR=5.038, 95%CI 1.971-12.879], gestational age ≤ 33 weeks has 3.67 times higher risk of unfavorable maternal outcome [AOR=3.67, 95%CI 1.829-7.364] and admission of women with diagnosis of severe preeclampsia has 6.42 times higher risk of unfavorable maternal outcome [AOR=6.42, 95%CI 2.017-21.103]. Conclusion and recommendation: Although there was current envisaged on maternal health improvement, this study has shown that maternal complications were common among pre-eclamptic women. The most common maternal complications due to preeclampsia were HELLP syndrome, DIC and renal failure. Health care professionals specially who work at PHC center should take appropriate trainings on immediate management and counseling a women coming for ANC and prompt referral for preeclampsia women with severity sign.

Keywords: Preeclampsia, Maternal Outcome, Maternal Death, Ethiopia

1. Introduction

Pre-eclampsia is HDP after 20 weeks of gestation usually diagnosed as mild preeclampsia when blood pressure measured at least 140 mm Hg (systolic) or at least 90 mm Hg (diastolic) on at least two occasions and at least 4–6 h apart and excretion of 300mg of protein in a 24-hour urine

collection, alternative to a urine protein (mg/dL)/creatinine ratio (mg/dL) ≥ 0.3 has good sensitivity (98.2%) and specificity (98.8%) in women known to be normotensive before 20 weeks of gestation and regarded as severe if there are sustained rises in blood pressure to at least 160 mm Hg (systolic), at least 110 mm Hg (diastolic) and proteinuria (≥ 5 g/24 hours or $\geq 3+$ on two random samples 4 hours apart) with manifestations of end-organ disease: oliguria (< 500 mL

in 24 hours), cerebral or visual disturbances, pulmonary edema, cyanosis, epigastric or right-upper quadrant pain, impaired liver function, thrombocytopenia [1, 2].

Globally, the MMR fell by nearly 44% over the past 25 years, to an estimated 216 maternal deaths per 100,000 live births in 2015, from an MMR of 385 in 1990 with annual decrease of maternal deaths by 43% from 532 000 in 1990 to an estimated 303 000 in 2015. However, in developing regions account for 99% (302 000) of the global maternal deaths in 2015, with sub-Saharan Africa alone accounting for roughly 66% (201 000), followed by Southern Asia (66 000) [3]. Thus hypertension was the second most common direct cause worldwide after hemorrhage by 14% of maternal death [4]. One third of all pregnancy-related deaths are due to complications of preeclampsia at a rate of 1.5/100,000 live births. Approximately 40% of these deaths are attributable to cerebrovascular events caused by preeclampsia. Early-onset preeclampsia increases the risk of fetal death, perinatal death and severe neonatal morbidity [5].

The risk of getting maternal preeclampsia and pregnancy induced hypertension were higher in Sub-Saharan African countries the only exception being Australia [6]. Most common risks for developing preeclampsia were nulliparous women in whom the incidence of preeclampsia may be as high as 7.5%, change in paternity or an increased inter pregnancy interval, young maternal age, women with a history of preeclampsia in a prior pregnancy, medical conditions like chronic hypertension, diabetes mellitus, renal disease, body mass index (BMI) > 30 before pregnancy, age \geq 40 years, metabolic syndrome, and hypercoagulable states and obstetric conditions with increased placental mass, such as multifetal gestation and hydatidiform mole, increase preeclampsia risk [7, 2].

Predicting whether or not a particular pregnancy will be complicated by preeclampsia is important to ensure the mother receives optimal care. Because current science does not have preventive therapies, predicting the risk of preeclampsia should lead to more optimal treatment of the progression of a patient's hypertension as well as reducing the severity of the disease [5]. The data of research conducted on maternal outcome in preeclampsia Ethiopia and other Africa countries are limited this make abridged attention on prevention and management hence, the maternal mortality and morbidity still remain high in Africa and other developing countries. This study was planned to assess maternal outcome and factors associated with it among pre-eclamptic cases.

2. Methodology

2.1. Study Area and Period

This study was conducted at Dilla University referral hospital (DURH). DURH is one of the University referral hospitals in country which found in SNNPR, Gedeo Zone Dilla town. Dilla town is capital of Gedeo zone and found 89km away from regional capital Hawassa and 365km from

capital city of Ethiopia, Addis Ababa it is located at an altitude of 1300-3000m above sea level and the climate favor desert conditions has one referral hospital and two health center under city administration with population size of 79,892 (5). This hospital was referral and emergency service for 24hrs/7days and has OBS/GYN, medical, surgical, dental clinic, pathologic and dermatology units, and man power of 18 specialists, 44 GPs, 24 midwifery, 130 nurses and others. Total catchment area of this hospital hosts around 3-5 million population. Study was conducted in Dilla University Referral Hospital (DURH) from February 1 to April 15, 2019.

Study design and population

Retrospective cross-sectional study design was employed. Study population was pre-eclamptic women who admitted at Dilla university referral hospital. The study was carried out on medical records of mothers diagnosed with preeclampsia at DURH between January 1, 2016-December 31, 2018.

Sample size determination and sampling procedure

Single population proportion formula was used to calculate the sample size n required to estimate a population proportion with a given level of precision d was:

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

where, $Z=1.96$ reflects the confidence level, N =total population size, P =Population proportion 0.225 from maternal outcome which was mgso₄ toxicity (6), and d =degree of accuracy expressed as proportion (0.05)

$$n = \frac{(1.96)^2 0.225 (1-0.225)}{(0.05)^2} = 268$$

Then by adding 10% of incomplete documentation 268+27=295

The participants were selected by using systematic random sampling technique after identifying pre-eclamptic cases from delivery registration and incomplete documentations were excluded. Total number of pre-eclamptic women admitted and gave birth at DURH in last three years were 825. So number of study subjects was selected after dividing five years cases to sample size at k^{th} value.

$$n=825/295=2.79\approx 3$$

Hence, study subjects were included every 3rd units after selecting the first participant by randomly out of three.

Data collection instrument and procedure

The data was collected using pre-tested data abstraction tool the questions for variables were adopted [8] and modified based on the review of different literatures by principal investigator.

The tool consists of maternal details (age, GA, gravidity, parity, educational status, previous history of preeclampsia and hypertension), ANC follow up, type of diagnosis, gestational age of occurrence of preeclampsia, admission status of the mother to the intensive care unit, blood transfusion, duration of hospital stay, major maternal complications (Liver failure, renal failure, HELLP syndrome, aspiration pneumonia, DIC, eclampsia and oligouria) and

vital sign and investigation result. Four BSc midwives and one MSc midwifery professional were recruited as data collectors and supervisor respectively and two days training were given on objective of the study, the method of data collection and discuss thoroughly on the tools prepared for data collection by the principal investigator.

All documents from January 1, 2016– December 31, 2018 include and incomplete documentations were excluded from the study.

2.2. Data Quality

To keep the quality of data: Two days training was given to the data collectors and supervisors on the data collection tool and the data collection procedure, then the questionnaire was pretested on 10% of the sample size out of the study area (Hawasa Univeristy Specialized Hospital) prior to two weeks before actual data collection takes place to ensure its validity.

Data collectors were supervised closely by the supervisors and the principal investigator. Completeness of each data abstraction checklists were checked by the supervisors on daily basis. And double data entry was done by two data clerks and consistency of the entered data was cross checked by comparing the two separately entered data. Finally, multivariate analysis was run in the binary logistic regression model to control the confounding factors.

2.3. Data Processing and Analysis

The collected data was manually checked for completeness and for any inconsistency then coded and entered into Epi Data 4.4.2.1 and then exported and analyzed using SPSS version 25.0. Descriptive statistics such as simple frequencies, percentage, measures of central tendency and measures of variability was used to describe the characteristics of participants such as Socio- demographic, like age, residence, parity, gestetional age.

Binary logistic regression was fitted to assess the factors associated with maternal outcome in preeclampsia. Variables with p -value ≤ 0.25 in the binary logistic regression were considered in the multiple logistic regressions to control the confounding factors. Adjusted odds ratio (AOR) along with 95% confidence interval was estimated to assess the strength of the association, and a p -value ≤ 0.05 were used to declare the level of statistical significance. Finally, the data were presented in text, tables, and graphs.

2.4. Operational Definition

Maternal outcome: was defined as condition of mother after diagnosed with preeclampsia which is favorable or unfavorable outcome.

Favorable outcome: patient with preeclampsia whose managed expectantly and improved.

Unfavorable outcome: were defined as women admitted with preeclampsia and managed expectantly and has at least one complication from cerebral complications like (seizures, cerebral hemorrhage, cerebral infarction, severe headache and blurred vision), and liver capsular rapture, renal failure,

hemolysis, elevated liver enzymes and low platelets (HEELP syndrome) and death.

Expectant management: Glucocorticoid administration followed by delivery for specific maternal and fetal indication.

Maternal improvement: was defined as women admitted with preeclampsia and finally improved at discharge.

Maternal death: was defined as women admitted with preeclampsia in hospital and finally died at discharge.

Early onset of preeclampsia: was defined as a pregnant women diagnosed with preeclampsia before 34 weeks of gestation.

Late onset of preeclampsia: was defined as a pregnant women diagnosed with preeclampsia after 33 weeks of gestation.

2.5. Ethical Approval

An official letter on ethical clearance for proposed research was obtained from institutional review board (IRB) of Addis Ababa University College of health science and School of nursing and midwifery, and Department of Maternity ad reproductive research publication committee. After ethical clearance received the permission to conduct study was also obtained from DURH medical director and obstetric and gynecological departments.

To keep confidentiality after retrieving medical record all records were transported by principal investigatir to privet room for data collection. All collected data was coded and locked in a separate room before entered in to the computer. After entered to the computer the data was locked-up by password, and should not be disclose to any person other than principal investigator. All information collected from mothers medical records were kept strictly confidential and names of patients or mothers were not include in the data abstraction checklist.

3. Result

3.1. Socio Demographic Characteristics

A total of 10,324 mothers were admitted to Dilla university referral hospital obstetric and gynecological units for delivery service from January 1, 2016 to December 1, 2018 among these 825 mothers were admitted with preeclampsia from those 295 charts were selected.

The mean and media of age participants were 25.48, and 25.0 respectively. Majority 210 (72.2%) of women were between the age group of 20 and 34 years followed by ≤ 19 years 62 (21.0%) and ≥ 35 years 23 (7.8%). Most of pre-eclamptic women were 215 (72.9%) from rural area. Prim-gravidia and multi-gravidia were 114 (38.3%) and 119 (40.3%) respectively. Majority of the study participants were null-para 125 (42.4%) followed by multi-para and prim-para 96 (32.5%) and 74 (25.1%) respectively. In this study women with pervious history of preeclampsia and eclampsia were 46 (15.6%) and 8 (2.7%) respectively (Table 1).

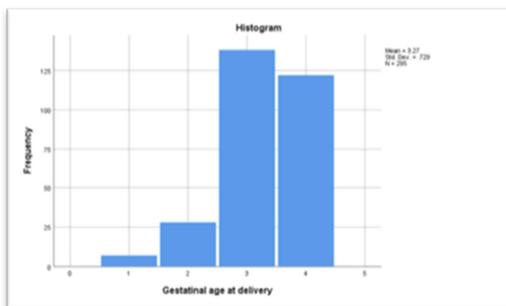
Table 1. Socio-demographic characteristics of pre-eclamptic women who admitted to OBS/GYN unit of Dilla university referral hospital (n=295), Dilla, Ethiopia 2019.

Variable	Frequency	Percentage
Age		
≤19	62	21.0%
20-34	210	72.2%
≥35	23	7.8%
Residence		
Rural	215	72.9%
Urban	80	27.1%
Gravidity		
Prim gravida	115	39.0%
Multi gravida	118	40.0%
Grand multi gravida	62	21.0%
Parity		
Null para	125	42.4%
Primipara	74	25.1%
Multi para	96	32.5%
History of preeclampsia		
Yes	46	15.6%
No	249	84.4%
History of eclampsia		
Yes	8	2.7%
No	287	97.3%

3.2. Obstetrics Characteristics and Medical History

Regarding ANC follow up and severity of disease at admission, 206 (69.8%) of women had frequent ANC follow-up and 89 (30.2%) didn't have frequent ANC follow up. Majority 171 (58%) of the women were diagnosed with severe preeclampsia and the rest 124 (42%) of the women were diagnosed with mild preeclampsia at admission.

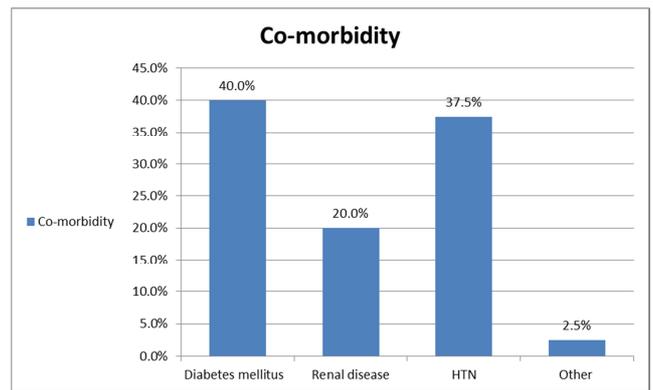
The mean and media of gestational age at onset of preeclampsia were 34.4 and 35.0 respectively whereas mean and media of gestational age at delivery were 35.5, and 36.0 respectively. The majority 166 (56.3%) of women with preeclampsia were admitted to hospital with early onset of preeclampsia before gestational age of 34weeks, and 129 (43.7%) of women admitted with late onset of preeclampsia starting from 34weeks of gestation. Concerning gestational age at delivery as shown on figure 1 below, majority of pre-eclamptic women delivered between gestational age group 33-36weeks 138 (46.85%) followed by term or ≥37 weeks 122 (41.4%), 29-32weeks 28 (9.5%) and abortion <28weeks.



1=<28weeks, 2=28-32weeks, 3=33-36weeks 4=≥37weeks

Figure 1. The representation of gestational age of delivery among pre-eclamptic women gave birth at Dilla university referral hospital Dilla, Ethiopia 2019.

Regarding institutions where pre-elamptic women referred to DURH majority of them 103 (34.9%) were referred form health centers and the rest 88 (29.8%), 57 (19.3), and 47 (15.9%), were referred from, Hospital, self-referral and private clinic respectively. As shown on figure 2 below, 49 (16.6%) of pre-eclamptic women has at least one past history of co-morbidity/past medical history and the majority of them 246 (83.4%) doesn't have history of medical disease. Out from women who has history of medical illness 16 (40.0%), 8 (20.0%), and 15 (37.5%) were Diabetes mellitus, renal disease and previous history of hypertension respectively. (Figure 2)



HTN-hypertension other- thyroid disorder, cardiac disease

Figure 2. The distribution of co-morbidities among pre-eclamptic women who admitted to Dilla university referral hospital, Dilla, Ethiopia 2019.

Finding of this research showed women with previous history of preeclampsia were 46 (15.6%) and with previous history of eclampsia were 8 (2.7%). As depicted on figure 3 below, among a women admitted with preeclampsia 128 (43.4%) of them developed severity sign of disease 129 (43.7%) of the women were presented with severity sign of preeclampsia. From this majority of the women were presented with severe headache by 67 (52.3%) followed by blurring of vision, and epigastric pain 34 (26.6), and 20 (15.6%) respectively.

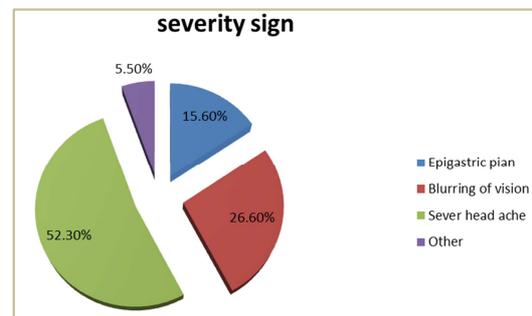


Figure 3. The distribution of severity sign of preeclampsia among pre-eclamptic women admitted at Dilla university referral hospital OBS/GYN department, Dilla, Ethiopia 2019.

3.3. Management and Mode of Delivery of Pre-eclamptic Women

Out of women admitted with preeclampsia 269 (91.2%) of

women received anti-hypertensive treatment the most common reason for no treatment with hypertensive medication for rest of women were non severity of disease or diagnosis with mild preeclampsia specially at term.

Regarding the mode of onset of labor, 115 (39.0%) and 180 (61.0%) of labor were initiated spontaneously and induced respectively. The mode of delivery for pre-eclamptic women, vaginal delivery 113 (38.3%) were higher than both instrumental (vacuum/forceps) delivery 82 (27,8) and cesarean section delivery 100 (33.9%) the most common indication for cesarean section were uncontrolled blood

pressure 24.6%, failed induction 19.3%, non-reassuring fetal heart rate pattern 31.6% and non-reassuring biophysical profile 12.5%.

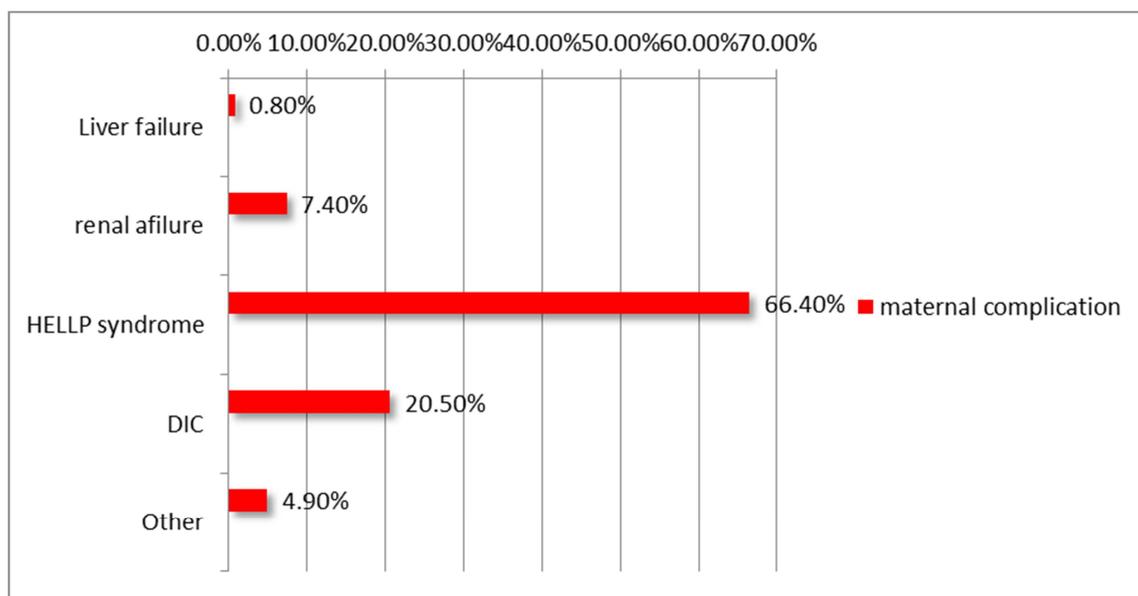
3.4. Maternal Outcome of Women Admitted with Preeclampsia

Finding of present study indicated that there were six maternal deaths from preeclampsia which accounting for a case fatality rate of 2.0%. As indicated on table 2 below, 122 (41.4%) mothers were complicated from preeclampsia.

Table 2. Maternal outcome among pre-eclamptic women who admitted at Dilla university referral hospital (n=295), Dilla Ethiopia, 2019.

Variables	Frequency	Percentage
Maternal outcome		
Favorable	173	58.6%
Unfavorable	122	41.4%
Mgso4 toxicity		
Low urine output	30	50.7%
Depressed tendon reflex	6	11.7%
Low respiratory rate	16	30.0%

As depicted on figure 4. From the all women with preeclampsia complications 81 (27.5%) of them developed HELLP syndrome followed by DIC 25 (8.5%), 9 (3.1%) and 1 (0.8%) acute renal failure, and acute liver failure respectively.



Other=Eclampsia, abruption placenta, stroke

Figure 4. The distribution of maternal complications among pre-eclamptic women at Dilla university referral hospital Dilla, Ethiopia 2019.

3.5. Factors Associated with Maternal Outcome

Six variables found to be significant in binary logistic regression which was candidates for the final analysis, therefore multivariable approach applied to determine which factors best explained and predict maternal outcome. As described on table 3 below, in bivariate logistic regression age ≥ 35 rural residence, diagnosis with sever preeclampsia, co-morbidity, early gestational age at onset of preeclampsia, and no antihypertensive treatment were associated with unfavorable maternal outcome.

In multivariable logistic regression four variables were

significantly associated with unfavorable maternal outcome include rural residence, severe preeclampsia and early onset of preeclampsia and non-treatment with anti-hypertensive medication. Therefore, rural residence has 5.038 times more risk of unfavorable maternal outcome than women from urban [AOR=5.038, 95%CI 1.971-12.879], gestational age ≤ 33 weeks has 3.67 times higher risk of unfavorable maternal outcome than women with gestational age ≥ 34 weeks [AOR=3.6795%CI 1.829-7.364] and admission with diagnosis of sever preeclampsia has 6.42 times higher risk of unfavorable maternal outcome than admission with mild preeclampsia [AOR=6.4295%CI 2.017-21.103].

Table 3. Association of selected variables with maternal outcome among preeclamptic women admitted to Dilla university referral hospital (n=292) Dilla, Ethiopia 2019.

Variable	Maternal outcome		COR (CI95%)	AOR (CI95%)	
	Favorable	Unfavorable			
Age groups	≤19	21	16	1.04 (0.362-2.298)	0.49 (0.13-2.661)
	20-34	88	147	1.00	1.00
	≥35	13	10	2.14 (1.904-5.10)	0.58 (0.22-2.951)
Residence	Rural	61	154	8.10 (4.156-18.39)	5.03 (1.97-12.8)**
	Urban	61	19	1.00	1.00
Diagnosis at admission	Mild preeclampsia	102	22	1.00	1.00
	Sever preeclampsia	56	115	9.522 (4.60-38.40)	6.4 (2.01-21.10)**
GAO	≤33	73	93	4.393 (2.626-7.35)	3.67 (1.82-7.36)**
	≥34	100	29	1.00	1.00
Co-morbidity	Yes	15	34	4.04 (2.10-0.7.8)	1.69 (0.68-4.161)
	No	158	88	1.00	1.00
Anti-hypertensive	Yes	120	129	1.00	1.00
	No	2	24	9.6 (2.239-41.714)	5.7 (1.96-36.42)*

*=p value ≤0.05 **=p value ≤0.01 GAO- gestational age at onset COR=crude odd ratio AOR=adjusted odd ratio I=reference category

4. Discussion

According to this study majority of the pre-eclamptic women were with sever preeclampsia which develop complications that result in prolonged hospital stay as well as family's economic problem since most of the case was referred from far rural areas and also it affect immediate mother to new borne bond, and breast feeding. Most of 69.8% women had ANC follow up this result was less when compared with study conducted at Gandhi gynecologic hospital 95.5%, Afar Hidar hospital 95.3%, Nigeria 76.6% and Yekatiti 12 hospital 78.2% [6-9], this may be because of accessibility of health care centers, and better understanding of pregnant women on ANC follow up benefits. However, study conducted at Jimma Specialized hospital showed ANC follow up among pre-eclamptic women were 41.25% [10] this may be due to methodological difference since they used both interview and chart review as data collection method.

According to the result of this study among 58.0% of women diagnosed with sever preeclampsia 28.7% of them gave birth by cesarean section whereas 13.85% of the women delivered by instrumental delivery. When this finding is compared with study conducted in India 65.6% cesarean delivery, Pakistan 33.3% cesarean section, Nigeria, 58.1% cesarean section, Cameroon 45.8% cesarean section and another study in Abakaliki Nigeria 51.7% cesarean section [9, 11-14] it was lowest, this may be because of on time referral of before severity of disease and better maternity care setting as cesarean section was definitive management of preeclampsia in those countries. Contrary this finding was higher than retrospective study conducted in Mettu Karl hospital which state cesarean section delivery were 17.2% and Afar Hidar hospital 7.9% [15], this may be due to better operation related setting as DURH is teaching and federal hospital and Mettu Karl hospital were private hospital which don't has direct referral system from primary health care centers.

In this study from all women admitted to Obs/Gyn units of

the hospital 41.4% of women were complicated from sever preeclampsia. It is slightly lower when compared with the study conducted in Parel, Mumbai 57.0%, Yaounde, Cameroon 51.0% and Nigeria 42.3% of complication from preeclampsia [9, 16, 17]. This finding where again greater than study conducted in Addis Ababa Gandhi hospital 35.5%, South Africa 13.3%, Nepal 6.02% and India 23.52% [18-21], this may be because majority of study participant in this study were admitted after complication from severe preeclampsia.

From this study 59 (67.01%) of the pre-eclamptic women were complicated from early onset of preeclampsia before 33 weeks of gestation and 63 (30.7%) developed maternal complication with late onset of preeclampsia after 34 weeks of gestation. This finding was contrary with study conducted in USA, Washington city, 12.2% and Nigeria 5.5% of women developed maternal complication from early onset of preeclampsia [9, 22], this is most probably because quality of care, technological difference and early detection and treatment of disease.

The present study result showed case fatality of preeclampsia were 2.0%, this finding were lowest of study conducted in Tanzania, India and Nigeria 17.9%, 6.23.8% and 12.1% respectively [12-14]. This may be because of under reporting of maternal death in this study area. However, case fatality of preeclampsia according to study conducted in Addis Ababa, Hidar hospital and Cameroon were 0.5%, 0.6% and 1.85% respectively [6, 7, 14] and this could be almost all of the mothers were from urban residence which don't delay in seeking health care, better quality of care and have access to health care.

According to the result of present study rural residency has 5.038 times higher risk of unfavorable maternal outcome or maternal complication than women from urban, this is in line with study conducted in Hawassa, 5.33 [23] and South Africa 4.99 [20] time higher risk of unfavorable maternal outcome, this consistency could be because of the geographical and catchment area similarity with Hawassa and methodological similarity with study conducted in South Africa.

Early onset of preeclampsia increase the risk of unfavorable maternal outcome 3.67 times higher than late onset of preeclampsia, this is supported by the study conducted in Afar, Hidar hospital 6.8times [7] and Nepal 4.09 times [21] risk of unfavorable maternal outcome with early onset of preeclampsia. This similarity may be almost similar access of health facilities. According to study in USA Washington and Nigeria the risk of unfavorable maternal outcome were 1.2 and 2.94 respectively [9, 22], this result is lower than present study, this may be due to better quality in maternity service and awareness of community about the disease in USA and Nigeria.

This study showed that the risk of developing unfavorable maternal outcome with severe preeclampsia were 6.42 times higher than mild preeclampsia. There were differences in the risk across countries and continents. According to research conducted India the risk were 9.09 times, Nigeria 11.2 times, Iran 14.34 times higher for unfavorable maternal outcome this were higher than result of this study [12, 13, 24], this is because of the fact that sever preeclampsia causes more maternal complications that can lead even to death.

5. Limitation of Study

Since the study was conducted retrospectively, there were variables that were not registered that might influence the causes of maternal outcome from preeclampsia. Due to poor chart documentation of patients information in the study area, it was difficult to increase the scope of study.

6. Conclusion

Although there were current envisaged on maternal health improvement, this study has shown maternal complications were common among pre-eclamptic women who admitted to Dilla university referral hospital. Especially the maternal morbidity was common with previous history of preeclampsia, co-morbidity or previous history of medical condition early onset of preeclampsia and severity sign of preeclampsia. Among women with complication from preeclampsia Hemolysis elevated liver enzyme and low platelet (HELLP) syndrome was the most complication followed by disseminated intravascular coagulation (DIC) and renal failure. Rural residence, early onset of preeclampsia, severity at admission, and non-treatment with anti-hypertensive medication were factors which were associated with unfavorable maternal outcome.

List of Acronyms

DURH: Dilla university referral hospital
 GHP: Gestational hypertension
 HELLP: Hemolysis elevated liver enzymes and low platelet
 HMIS: Health management information system
 HDP: Hypertensive disorder during pregnancy
 ICU: Intensive care unit
 Mgso4: Magnesium sulphate

PPH: Post-partum hemorrhage

SNNPR: Southern, nation, nationality and people region

SPE: Severe preeclampsia

Data Availability

The datasets used and/or analyzed during the current study are available from the principal author upon reasonable request.

Ethical Approval

Ethical clearance was attained from Addis Ababa University Institutional Health Research Ethics Review Committee. The official letter was written to Dilla university referral hospital.

Consent

Informed written consent was obtained from each participant after explaining the purpose and benefits of the study. Respondents were informed that participating in this study is up to the willingness of them.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Zerihun Figa and Tesfaye Temesgen were involved in the conception and design of the study, analysis of data, interpretation of data and writing of the manuscript. Abas Ahimed was involved in advising in proposal development, revising the paper, and drafting the manuscript. Ruth Tilahun and Etaferawu Bekele were involved in advising and revising the paper during proposal development, data analysis. All authors read and approved the final manuscript.

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