

Prevalence and Associated Factors of Pre-eclampsia among Pregnant Women at Antenatal Booking in the Halaba Kullito General Hospital, Southern Ethiopia.

Rediet Belay Andarge, Abebe Alemu Anshebo, Hassen Mosa Halil*, Biruk Assefa Kebede, Ritbano Ahmed Abdo

Department of Midwifery, College of Medicine and Health Sciences, Wachemo University, Hosanna, Ethiopia

ABSTRACT

Background: Pre-eclampsia is a multi-system hypertensive disorder specific to pregnancy. It is one of the leading causes of maternal, foetal and neonatal morbidity and mortality worldwide particularly, in developing countries. However, in Ethiopia there is a paucity of information on the prevalence and determinants of pre-eclampsia. Hence, this study aimed to assess the prevalence and associated factors of pre-eclampsia among pregnant women at antenatal booking in the Halaba Kullito General Hospital, Southern Ethiopia.

Method: This a hospital-based cross-sectional was conducted on 242 women using systematic sampling technique during February 1-28, 2019. Data were collected using a pre-tested, structured interviewer-administered questionnaire and chart review, which was performed to obtain women's medical information and laboratory test results that could not be acquired by the interview. Data were entered into EpiData (version 3.1) and analyzed using SPSS (version 24). Both bivariate and multiple variable logistic regression analysis were computed. Odds ratio with their 95% confidence intervals (CI) were calculated to measure the strength of the association between the outcome and the independent variables. P-value <0.05 was considered as a statistically significant.

Results: In the study setting, the prevalence of pre-eclampsia was observed to be 9.9%. Previous history of pre-eclampsia [AOR=8.9, 95% CI (1.03, 16.61)], gestational diabetes mellitus [AOR=5.8, (1.38, 17.54)] and twin pregnancy [AOR=1.72, 95% CI (1.05, 3.71)] were associated factors of pre-eclampsia.

Conclusions: A considerable proportion of pregnant women were experienced pre-eclampsia. Previous history of pre-eclampsia, gestational diabetes mellitus and multiple gestations were associated factors of pre-eclampsia. Therefore, the finding suggests that health care providers and other stakeholders should use these risk factors as a screening mechanism for the timely identification and management of pre-eclampsia by regular antenatal monitoring and careful follow-up.

Keywords: Pre-eclampsia; Prevalence; Associated factors; Antenatal; Ethiopia

Abbreviations: ANC: Antenatal Care; CI: Confidence Interval; PIH: Pregnancy Induced Hypertension; OR: Odd Ratio; SPSS: Statistical Package for the Social Sciences

INTRODUCTION

Pre-eclampsia is a multi-system pregnancy specific disorder happening in 3-5% of all pregnancies, and it is one of the leading causes of maternal and fetal morbidity and mortality [1]. Pre-eclampsia accounts for up to 12% of all the yearly worldwide

maternal deaths [2]. In addition, it is responsible for 25% of fetal and neonatal deaths [3].

In Ethiopia, the major direct obstetric complications (hemorrhage, obstructed labor, hypertensive disorders of pregnancy, unsafe abortion, sepsis) accounts for 85% of the

*Corresponding author: Hassen Mosa Halil, Department of Midwifery, College of Medicine and Health Sciences, Wachemo University, Hosanna, Ethiopia, Tel: +251916691578; E-mail: hassenmosa17@gmail.com

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maternal deaths. Pre-eclampsia alone contributes to 11% of the maternal deaths [4,5].

Antenatal care (ANC) is one of the freely provided maternal care services in Ethiopia. Blood pressure measurement and urine analysis are some of the routinely performed activities of ANC. According to the 2016 Ethiopian demographic and health survey report, 62% of women had at least one ANC visit. From this, 75% of the women's blood pressure was measured and 66% of them had a urine test [6]. In the country the prevalence of pre-eclampsia ranges from 3.9%-67.4% [7-10].

Pre-eclampsia is quite grievous as it can lead to various complications both for the mother and the baby. The maternal complications include; renal failure, liver failure and neurological sequelae, morbidity and mortality, whereas, the fetal complications incorporate; preterm birth, respiratory distress syndrome, fetal growth restriction and intra-uterine death [11,12].

The Ethiopian government has made a substantial progress in maternal health care services by providing training for health care providers to detect and manage pre-eclampsia, including magnesium sulphate protocol, provision of logistics, and supportive supervision. In spite of all the government efforts, maternal mortality in the country is high, 412 per 100,000 live births [6, 13]. However, the majority of deaths due to pre-eclampsia are avoidable through the provision timely and effective management of such complications [14].

Studies conducted in various parts of the world reported a range of risk factors though findings are not conclusive exhibiting variations among populations and ethano-geographic groups. Despite of this, the commonly acknowledged predisposing factors of pre-eclampsia includes; socio-demographic factors like; age ≥ 30 years, low educational level. The clinical and obstetric related factors comprises: high body mass index, nulliparity, lack of ANC, cardiac or renal disease, urinary tract infection, and severe anemia [15].

Generally, in Ethiopia there are limited studies on the prevalence and associated factors of pre-eclampsia. Even, these few studies are conducted based on a secondary data [7]. Availing up to date information on the magnitude and contributing factors of pre-eclampsia is essential for its early identification and management. Therefore, the current study explored the prevalence and associated factors of pre-eclampsia among women at antenatal booking in the Halaba Kullito General Hospital.

MATERIALS AND METHODS

Study area and period

This a hospital-based cross-sectional was conducted in the Halaba Kullito General Hospital, Southern Ethiopia during February 1-28, 2019. The source populations were all pregnant women who received ANC in the Halaba Kullito General Hospital during the study period. The study populations were randomly selected pregnant women who received ANC services after a gestational period of 20 weeks or greater.

Inclusion and exclusion criteria

Pregnant women who received ANC services after gestational period of 20 weeks or greater were included in the study. Whereas, those women who were seriously sick and unable to communicate during the study period were excluded. The single population proportion formula was used to compute the sample size with the following assumptions; the proportion of pre-eclampsia was taken from the study conducted Arbaminch Town (18.25%), with a 95% confidence interval, marginal error of 5% and a 5% non-response rate [11]. The final sample size was found to be 242. The systematic random sampling technique was used to select the study participants. The sampling interval was determined by dividing the total number of pregnant women who seek maternity services at previous year which was (631) by the calculated sample size. The k-value was estimated and taken as three. The first woman was selected by a lottery method on the first day of the data collection period.

Measurement

Pre-eclampsia was considered when a systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg on two separate readings taken at least four hours apart after 20 weeks of gestation in a woman with previously had a normal blood pressure and proteinuria.

Proteinuria was assessed using urine dipstick method. Those women who had levels of +1 and more were deliberated as having proteinuria. Gestational diabetes mellitus was defined as increased blood sugar level (fasting glucose level > 6.7 mmol/L) after 20 weeks of gestational age.

Data collection tool and procedures

Data were collected using a pre-tested, structured interviewer-administered questionnaire and chart review, which was performed to obtain women's medical information and laboratory test results that could not be acquired by the interview. The questionnaire was adapted from related published studies by considering the purpose of the study [7-10]. It had four sections; socio-demographic factors, behavioral factors, medical factors and obstetric related factors. The tool was prepared in English language and translated back to Amharic. Then, the Amharic version was again translated to English to ensure its consistency. The consistency of the tool was checked by translating it back to English by two different experts. Finally, the data was collected by Amharic version which is the local language of the study area. The validity of the tool was approved by properly applying the validity criteria (content validity). A reliability test was performed after pre-test, and the internal reliability (coefficient of alpha) of the tool was found to be 0.79. Three diplomas and two bachelors of degree midwives were collected and supervised the data. Blood pressure measurement was carried out after the women were allowed to take rest for about ten minutes. Mercury sphygmomanometer apparatus was used to take blood pressure readings while the women were sat in upright position.

To keep the quality of data, the questionnaire was pre-tested at Halaba health center on 24 respondents before the actual data

collection period. Based on the result of the pre-test, the necessary adjustment was made. In addition, the data collectors and supervisor were trained for one day about the objective of the study and data collection procedures. Data collection process was strictly followed day to day by the supervisor and principal investigators. Moreover, the collected data was checked its completeness and consistency every day by supervisors and principal investigators. Blood pressure of every pregnant mother was measured using a standard technique and calibrated equipment for every measurement.

Data processing and analysis

Data was entered into EpiData (version 3.1) and analyzed using Statistical Package for Social Sciences (SPSS) (version 24). First, bivariate logistic regression was conducted to select candidate variables for the multi-variable logistic regression. Variables which have a p-value of <0.25 in bivariate logistic regression were entered to multi-variable logistic regression analysis. The multi-variable logistic regression was done for variables that have a p-value of <0.25 during the bivariate logistic regression analyses to identify the independent predictors of the pre-eclampsia and to control its potential confounders. The strength of association between the outcome variable and independent variables were assessed using an odds ratio with their 95% confidence intervals (CI). P-value of <0.05 was considered as statistically significant. The Hosmer-Lemeshow had p-value of 0.75 which exhibit the model was a good fit.

Ethics approval and consent to participate

Ethical approval was obtained from the Institutional Review Committee of Wachemo University. A formal permission letters was taken from the Halaba health office bureau and Halaba general hospital before the beginning of data collection. The respondents were informed about the purpose, procedures, potential risks and benefits of the study. Informed written consent was pursued from selected participant to approve their willingness to involve in the study before the commencement of

the interview. To ascertain confidentiality of the data, name was not included in the written questionnaire. Also the study respondents were ensured that refusal to consent or withdrawal from the study would not alter or put at risk their access to care.

RESULTS

Socio demographic characteristics

In this study a total of 242 mothers were engaged, which makes the response rate 100%. The mean age of the mothers was 27.7 (standard deviation \pm 4.6) years. The majority of mothers were married 219 (90.5%), 124 (51.2%) belongs to Halaba ethnics, 135(55.8%) were Muslims, and 130(51.2%) were housewives. Educationally, 65(26.9%) of them had pursued a primary level of education and 177 (73.1%) were urban residents (Table 1).

Obstetric related characteristics

One hundred sixteen mothers (66.3%) were multiparous, 148 (61.1%) had 1-2 ANC visits and 150 (83.7%) had no a history of abortion. Majority of mothers, 193 (79.8%) had conceived singleton foetus. One hundred forty-five (59.9%) of mothers used a contraceptive method and 142 (79.3%) of their pregnancy was planned (Table 2).

Prevalence of pre-eclampsia, medical and behavioural characteristics

In this study, the prevalence of pre-eclampsia was found to be 9.9%. Regarding to medical related complications, most of the mothers, i.e. 221(91.3%), 228 (94.2%) and 213 (88%), respectively not had experienced a chronic hypertension, previous gestational diabetes and previous history of hypertension. In terms of behavioural factors, most of the mothers did not, 197 (81.4%), 225 (93%) and 221 (91.3%) respectively, drink alcohol, use a traditional medicine and performed a physical exercise (Table 3).

Table 1: Socio demographic characteristics of the respondents in the Halaba Kullito General Hospital, February 2019.

Variable	Frequency	Percent
Age group in years		
<18	4	1.7
18-35	218	90.1
\geq 35	20	8.3
Residence		
Urban	177	73.1
Rural	65	26.9
Marital status		

Married	238	98.3
Unmarried	4	1.7
Religion		
Muslim	135	55.8
Orthodox	53	21.9
Protestant	42	17.3
Catholic	12	5
Occupation		
Housewife	130	53.7
Merchant	48	19.8
Government employee	15	6.2
Private employee	28	11.6
Student	21	8.7
Ethnicity		
Halaba	124	51.2
Oromo	34	14
Kambata	42	17.4
Wolayta	47	19.4
Educational status		
No formal education	51	21.1
Read and write	75	31
Primary	65	26.9
Secondary	23	9.5
College and above	28	11.5
Monthly income in Ethiopian birr		
<570	64	26.4
570-1140	64	26.4
≥ 1140	114	47.2

Table 2: Obstetric characteristics of respondents in the Halaba Kullito General Hospital, , February 2019.

Variables	Category	Frequency
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Birth spacing in years		
<2	80	44.4
≥ 2	100	55.6
History of abortion		
No	150	83.7
Yes	30	16.3
Parity		
Primiparous	59	33.7
Multiparous	116	66.3
History of still birth		
Yes	18	10
No	162	90
Was the pregnancy planned		
Yes	192	79.3
No	50	20.7
Gestational age in weeks		
<37	85	35.1
37-42	148	61.2
≥ 42	9	3.7
Multiplicity of gestation		
Single	193	79.8
Twin	49	20.2
Utilization of contraceptive method		
Yes	145	59.9
No	97	40.1
Number of ANC visit		
43862	148	61.1
3	58	24
≥ 4	36	14.9

Table 3: Prevalence of pre-eclampsia, medical and behavioral characteristics of respondents in the Halaba Kullito General Hospital, February 2019.

Variable	Frequency	Percent
Pre-eclampsia		
Yes	24	9.9
No	218	90.1
Chronic hypertension		
Yes	21	8.7
No	221	91.3
Previous history of hypertension		
Yes	29	12
No	213	88
Family history of hypertension		
Yes	59	24.38
No	183	75.62
Gestational diabetes mellitus		
Yes	8	3.3
No	234	96.7
Previous gestational diabetes mellitus		
Yes	14	5.8
No	228	94.2
Family history of diabetes		
Yes	58	23.96
No	184	76.04
Drink alcohol during current pregnancy		
Yes	45	18.6
No	197	81.4
Drink coffee during current pregnancy		
Yes	195	80.6
No	47	19.4
Performed physical exercise during current pregnancy		
Yes	11	9
No	221	91

Used traditional medicine		
Yes	17	7
No	225	93
Convulsion during pregnancy		
Yes	17	7
No	225	93

Factors associated with pre-eclampsia

In the multivariate logistic regression analysis, previous history of pre-eclampsia, history of abortion and having a multiple gestations were found to be associated factors of pre-eclampsia.

Women with a history of having a previous pre-eclampsia were 8.9 times more likely to be pre-eclamptic as compared to their counter parts [AOR=8.9, 95% CI(1.03, 16.61)]. Likewise, a

women with twin pregnancy were 1.72 times more likely to be pre-eclamptic as compared to those women with a singleton pregnancy [AOR=1.72, 95% CI (1.05, 3.71)]. In addition, women with history of gestational diabetes mellitus were 5.8 times more likely to be pre-eclamptic as compared to those who had not gestational diabetes mellitus [AOR=5.8, (1.38, 17.54)] (Table 4).

Table 4: Associated risk factors of pre-eclampsia among respondents in the Halaba Kullito General Hospital, February 2019.

Variables	Pre-eclampsia		COR (95% CI)	AOR(95% CI)
	Yes	No		
Occupation				
Housewife	8	118	1.34(1.04, 1.71)*	1.29(0.74, 0.63)
Other(ref.)	16	102	1	1
History of pre-eclampsia				
Yes	11	18	9.4(1.06,18.23)*	8.9(1.03, 16.61)**
No(ref.)	13	200	1	1
Gestational diabetes mellitus				
Yes	5	9	6.12(1.49, 20.23)*	5.8(1.38, 17.54)**
No(ref.)	19	209	1	1
History of abortion				
Yes	4	26	1.47(1.75,15.95)*	1.45 (0.49, 0.21)
No(ref.)	20	192	1	1
Multiplicity of gestation				
Twin	5	13	4.14(0.94,2.58)*	1.72(1.04,3.71)**
Singleton(ref.)	19	205	1	1

NB;1=Reference, **=significant at p-value<0.05

DISCUSSION

This study has made an attempt to assess the prevalence and associated factors of pre-eclampsia among pregnant women at antenatal booking in the Halaba Kullito General Hospital. The prevalence of pre-eclampsia was found to be 9.9%. This prevalence was higher as compared to other studies reported in Norway, German, Dilla and Dessie, where it was 3%, 2.3%, 2.23% and 8.4% respectively [17-20]. However, this prevalence was lower as compared to studies conducted in Nigeria, Jimma Specialized Hospital and Mettu Karl Referral Hospital were 16%, 51.9%, 12.4% respectively [21-23]. The dissimilarity between the finding of this study and the former studies might be due to the difference in socio-demographic characteristics, antenatal care service utilization and diagnostic capacities and study period.

Having a previous history of pre-eclampsia was significantly associated with pre-eclampsia. Those women with a previous history of pre-eclampsia had nine times higher risk of developing pre-eclampsia. This finding is consistent with the studies conducted in Iran, Egypt and Addis Ababa [24-26]. This might be due to the fact that, the presence of soluble substance which is a circulating antiangiogenic molecule of placental origin, plays a crucial role in pre-eclampsia by antagonizing placental growth factor and vascular endothelial growth factor signalling in the maternal vasculature.

Twin pregnancy was significantly associated with pre-eclampsia. Women with twin pregnancy were 1.72 times more likely to be pre-eclamptic as compared to those women with a singleton pregnancy. This finding is consistent with another studies conducted in Nepal, Pakistan, Cameroon indicated that, those women with a twin pregnancy were more likely to be pre-eclamptic as compared to those women with a singleton pregnancy [27-29]. The plausible justification may be women with twin pregnancies have a large placental mass (hyperplacentosis), an additional demand of blood and oxygen supply, and an increase in the maternal cardiac output.

Gestational diabetes mellitus was also significantly associated with pre-eclampsia. Women with a history of gestational diabetes mellitus were 5.8 times more likely to be pre-eclamptic as compared to those who had not faced gestational diabetes mellitus. This finding is consistent with studies conducted in Mettu Karl referral hospital, Nepal, and India [23,27,30]. This could be because of women with gestational diabetes mellitus, their blood glucose level will increase which cause constricting of blood vessels and disturb the regular physiological response consequently possibility of encountering pre-eclampsia had increased.

The current study has some limitations. Initially, the cross-sectional nature of the study didn't allow us to assert whether the non-preeclamptic women remained negative until delivery or not. This survey would not also be generalized for population level.

CONCLUSION

In the studied area, a considerable proportion of women were faced pre-eclampsia. Previous history of pre-eclampsia, gestational diabetes mellitus and multiple gestations were associated factors of pre-eclampsia. Therefore; our finding suggests that, health care providers and other stakeholders should use these risk factors as a screening mechanism for early identification and management of pre-eclampsia by regular antenatal monitoring and careful follow-up. Further community-based study is recommended to determine reliable estimate of pre-eclampsia.

COMPETING INTERESTS

We declare that we have no competing interests.

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AUTHORS CONTRIBUTION

RB conceived and designed the study, conducted the analysis and interpretation of the data. AA, HM, BA and RA participated in the design, conception, analysis and interpretation of data and the critical review of the paper. All authors read and approved the final version of the manuscript.

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