

Prevalence of pre-eclampsia and associated factors among women attending antenatal care services in Felege-Hiwot referral hospital, Bahir Dar city, Northwest Ethiopia

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Abstract

Introduction Preeclampsia, also called pregnancy-induced hypertension is a pregnancy-specific hypertensive disorder usually occurs after 20 weeks of gestation and affects both the mother and the fetus. preeclampsia is one of the driving causes of maternal and perinatal horribleness and mortality.

Objective To assess the prevalence of preeclampsia and associated factors among women attending antenatal care service at Felge Hiwot Referral Hospital, Bahir Dar, Ethiopia, 2017.

Methods Institution based cross-sectional study was conducted from March 1st up to 30th 2017. Study participants was recruited by using systematic random sampling technique. A pre-tested questionnaire was used for data collection. The data were checked for its completeness and consistency each day and the collected data was coded and entered into Epi Data version 3.1 and analyzed by using Statistical package for social science version 23. The logistic regression assumption was checked and fitted at $P > 0.05$.

Result The prevalence of preeclampsia was found to be 13.0% (95%CI: 8.3,17.6). Factors that had a statistically significant association with preeclampsia were women having a family history of hypertension [AOR=4.61(1.06, 20.07)], Gestational diabetes mellitus [AOR=11.41(1.40, 92.83)], using traditional medicine during pregnancy [AOR= 26.29(3.68, 187.84)].

Conclusion the result indicated that the prevalence of preeclampsia in this hospital was higher than similar studies conducted in Ethiopia.

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Keywords: Pre-eclampsia, pregnant mothers, Felege Hiwot Referral Hospital, ANC Follow-up.

Strength and Limitations of the study

- It is difficult to establish a causal relationship b/n the dependent and independent variables.
- Being an institutional based study, it could be difficult to infer the finding of the study to the target population as all pregnant women may not attend their pregnancy in the hospital.
- Since the current study was not triangulated with a qualitative method; it might not help to in-depth explore on factors that contribute to the occurrence of preeclampsia.

Introduction

Severe pre-eclampsia commonly occurs during the second trimester or third trimester of gestation, which is characterized by blood pressure, elevated than 160/110 mmHg, proteinuria greater than 5g per 24 hrs., visual disturbances, epigastric pain or more specifically right upper quadrant pain (1, 2).

The factors that have been postulated to influence the risk of pre-eclampsia in various studies include diabetes and gestational diabetes, obesity, multiple pregnancy, personal and family history of pre-eclampsia, chronic infections, urinary tract infection, first pregnancy and older maternal age or younger than 20 years age, renal disease and autoimmune disorder, the prolonged interval between pregnancies and the history of abortion and maternal diet (3).

In the world, Pre-eclampsia influences a considerable public ill health, a tributary to maternal and perinatal dreariness and mortality. Its impact accounts between 5 to 10 percent of pregnancies (4). There is approximately one maternal death due to pre-eclampsia-eclampsia per 100,000 live birth with a case-fatality rate of 6.4 deaths per 10,000 cases (5, 6).

In developing countries, the impact of the condition, however, is thought to be more severe and with the prevalence of between 1.8% and 16.7% which is significantly higher than 2%, the maternal and infant mortality and morbidity (7).

The world health organization estimated the incidence of pre-eclampsia to be seven times higher in developing countries than in developed countries (8).

In Africa, preeclampsia occurs in 10% of pregnancy, which is significantly higher than the global average of 2 percent (9).

The Ethiopian national emergency obstetric and newborn care showed that eclampsia contributed for the complication of approximately 1% of all deliveries and 5% of all pregnancies moreover, it had contributed to 16% of direct maternal mortality and 10% of all maternal mortality and morbidity (10).

This study was provided a clear picture of risk factors by depicting their association with eclampsia. It also can be used as baseline information for other researchers who could conduct further study on a similar issue.

Methods And Materials

Study Area, Period and Design

The study was conducted at FHRH, which is one of the top ten governmental hospitals in Ethiopia, it's situated in Bahir Dar city, which is the capital city of Amhara National Regional State. It is found 565 km away from Addis Ababa, the Capital city of Ethiopia. Currently, the Hospital is giving services for more than 5 up to 7 million people per year in the western part of the region as a referral hospital. The present capacity of the hospital has more than 350 beds of which 55 are currently allocated for the department of Obstetrics and Gynecology, about 3,521 mothers attend in antenatal care each year, and the hospital has 61 medical doctors among those 19 senior specialized doctors, 17 medical residents, 25 General practitioners, from Gynecology and Obstetrics ward; 2 gynecologist, 33 midwives and 6 medical doctors, 3 ANC classroom. (11). The study was conducted from March 1st up to 30th /2017 G.C using an institutional based cross-sectional study design.

Sample Size Determination

The sample size was determined using a single population proportion formula with an assumption of 95% confidence interval, 4% margin of error and the proportion of preeclampsia among ANC attendant mothers was 8.4% (12).

Where

n= sample size
of preeclampsia =8.4%
between the sample and the population=4%

p=prevalence
d= margin of error

z=1.96 at confidence level 95%, by considering the non-response rate of 10%

$$n = (1.96)^2 \times 0.084 (1-0.084) / 0.04^2 = 185$$

Since our source population (N), is below 10,000 we use correction formula

$$nf = n / (1 + (n/N))$$

Where: N- Source population, nf- final sample size

Thus: $nf = 185 \div 1 + 185 \div 3521 = 176$

Therefore; the final sample size for this study was 193

Sampling Procedure

Study participants were selected by using a systematic random sampling technique by considering a list of ANCs follows up as a sampling frame. Pregnant women's gestational age was measured based on their recall of the last menstrual period. Ultrasound estimation for gestational age was also considered when women fail to remember the last menstrual period.

Inclusion criteria: Among ANC attending women, those with SBP ≥ 140 mmHg and DBP ≥ 90 mm Hg on two separate readings taken at least four hours apart with previously normal blood pressure and when proteinuria is greater than or equal to 300 mg per 24-hour urine collection or dipstick reading of 1+ were included in the study.

Exclusion Criteria: Women who were unable to speak due to severe illness at the time of data collection and women with known hypertension and renal disease were excluded from the study.

Obstetric history: Gravidity Parity, Pregnancy, Stillbirth, Interval multiplicity of pregnancies of newborn, Material blood group, Rh-factor

Behavior factors: Nutrition advice during ANC, alcohol consumption, ANC visit during pregnancy, Coffee intake during pregnancy

Operational Definitions

Pre-eclampsia: Gestational hypertension SBP ≥ 140 mmHg and DBP ≥ 90 mm Hg after 20 Weeks of gestation plus the presence of proteinuria.

Proteinuria: Protein in the urine, which is greater than or equal to 300 mg per 24hours or Dipstick reading 1+.

Patient and Public Involvement statement

The data were collected using a structured questionnaire and a sphygmomanometer.

Four clinical nurses and one BSC midwifery supervisor were involved in the data collection process. Therapeutic records were likewise looked into for some clinical and laboratory results including proteinuria. Each participant was allowed to take rest for ten minutes before measuring her blood pressure. Blood pressure readings were taken while the woman was seated in the upright position using a mercury sphygmomanometer apparatus which covers two-thirds of the upper arm. The measurement was taken from the participant's right hand. The cuff was inflated at a rate of 2–3 mmHg per second. Systolic blood pressure was taken upon hearing the first sound, and diastolic blood pressure was taken up on the 4th (muffled) Korotkoff sound. Those pregnant women with abnormal findings were checked again and again and then have undergone another BP measurement after 4–6 hours in order to confirm the diagnosis. For the sake of assuring whether the mercury sphygmomanometer apparatus was functioning correctly, the data collectors checked it by measuring the blood pressure of other data collectors. When a pregnant woman was found to have severe preeclampsia (BP of 160/110 mmHg), she was sent for immediate re-checkup and medical advice. Data regarding proteinuria and other clinical information was accessed from the women's medical record books. Proteinuria was assessed using a urine dipstick, which is a routine investigation for all pregnant women.

Data Quality Management

The questionnaire was first prepared in English then translated to the local language (Amharic) and back-translated into English to maintain conceptual consistency. Data collectors and supervisors were trained on the objective of the study, interviewing technique, and other activities. The questionnaire was pretested for its completeness, consistency, and accuracy at Addis Alem Hospital in Bahir Dar City. Day to day supervision was made on how data were collected during the data collection and data collectors were informed to brief the respondents for any misunderstanding during the data collection.

Data Entry and analysis

Each datum was checked for its completeness, coded, cleaned and entered using Epi info version 3.5 and exported to SPSS version 21 statistical software for further analysis. Descriptive summaries such as frequencies, proportions, percentages, mean and standard deviations were determined. For determinant variable identification, bivariate logistic regression analysis was carried out to first at P-value ≤ 0.2 . Variables that were associated at p-value ≤ 0.2 in bivariate regression were entered in the multivariate logistic regression. At this step, model fitness and the presence of multicollinearity were assessed. The model fitness was checked by observing the difference of the -2-log likelihood ratio between the model with only the constant and with the factors. Statistically, the significance level for all variables was set at P-values < 0.05 .

Ethical Consideration

Ethical approval was obtained from GAMBY Medical and Business College research and ethics committee and letter of permission were obtained from the Amhara Regional Health Bureau and from FHRH. The purpose of the study was explained to all pregnant women and verbal informed consent was obtained from them. Secrecy of data was kept up by removing any personal identifier from the questionnaires.

Result

Socio-Demographic characteristics

A total of 193 participants were approached for the study and all of them gave complete responses that make a response rate of 100%. The mean (\pm SD) ages of the participants were found to be 27.73 (4.3) years. Among these 45 (23.3 %) of the mothers were below the age of 24 years, whereas 15 (7.8%) of the mothers were equal above at the age of 35 years.

Regarding their ethnicity 150 (77.7%) of the study, participants were Amhara, and 25 (13%) were Oromo. One hundred twenty-eight (66.3%) of the respondents were orthodox Christianity followers; while 39 (20.2%) were Muslim. And regarding the educational status of mothers 31 (16.1%) was unable to read and write. All of the mothers were married and 65 (33.7%) were housewives. Concerning their partners, educational status 96 (47.7%) of the respondents were complete primary school (**Table 1**).

Chronic illnesses related characteristics

Concerning chronic illness, about 46 (23.8%) of the respondents had a parental history of hypertension among this 58.7 % of them were from fathers. About 5% of study participants had a parental history of Diabetes Mellitus. Concerning the respondent's chronic illness issues, about five percent of the participants had a history of DM and 8.3% of them had a history of asthma (**Table 2**).

Obstetric Related Characteristics

Among the study participants 112 (58.0%) had the previous history of pregnancy, among these 96(85.7%) had no history gestational hypertension. On the other hand, among those who had the previous history of pregnancy, 109 (97.3%) has no history of gestational diabetes mellitus. Concerning modern contraceptive use among the study participants, 173 (89.6%) were using modern as a contraceptive (**Table 3**).

Personal Behavior Related Characteristics

Considering personal behaviors during pregnancy, all women reported that they were not smokers. Among the study participants, 111 (57.5%) of the reported that they never drank alcohol. About 17 (8.8%) of respondents were used to traditional medical treatment for different reasons like nausea and vomiting treatment during pregnancy. Based on clinical laboratory investigation 23 (11.9%) of participants were positive for albumin urea which was (+1 and above) and 159 (82.4%) were free. Fifty-seven (29.5%) of participants blood pressure was $\geq 140/90$ mm of Hg (**Table 4**).

Prevalence of preeclampsia

By considering gestational hypertension (SBP ≥ 140 mmHg and DBP ≥ 90 mm Hg after 20 Weeks of gestation) plus the presence of proteinuria, the prevalence of preeclampsia was found to be 13.0 % (95% CI: 8.3,17.6).

Factors associated with preeclampsia

In bivariate analysis family history of hypertension, family history of diabetes mellitus, Gestational DM, History of abortion, Fruit intake, Vegetable intake, traditional medicine, alcohol drinking during pregnancy was significantly associated with Preeclampsia. While in multivariate analysis, family history of HPN, gestational DM and using traditional medicine during pregnancy did show significant statistical association with preeclampsia.

The study revealed that women who had a family history of hypertension had higher risk for preeclampsia compared to those women who had no family history of hypertension (AOR: 4.61; 95% CI (1.06-20.07)), similarly women who gestational DM had an increased risk of preeclampsia compared to their counterparts,(AOR:11.41; 95% CI (1.40-92.83)), and those pregnant woman who had used traditional medicines during pregnancy were significantly associated with Preeclampsia as compared to those women who had not consumed (AOR: 26.29; 95% CI (3.68-187.84)) (**Table 5**).

Discussion

Preeclampsia is a disorder of pregnancy characterized by high blood pressure and a significant amount of protein in the urine. It is one of the major causes of maternal mortality worldwide. This study endeavored to examine the prevalence and factors associated with preeclampsia on a sample of 193 pregnant women who had ANC follow up at Felege Hiwot Referral Hospital. According to this study, the prevalence of preeclampsia was found to be 13.0 % (95%CI: 8.3,17.6). This was in line with the study finding in Dessie referral hospital (8.4%)(12). However higher than the studies conducted in Dilla university referral hospital which were 2.2% [21]. respectively However this finding was lower than a study finding at Arba Minch town public health institutions 18.3% (13). The difference might be due to sampling size variation and study period.

In this study having a family history of hypertension, gestational DM and taking traditional medicine during pregnancy were significantly associated with pre-eclampsia were.

In the present study, those pregnant women with a family history of hypertension were about four points six times more likely to develop preeclampsia. This finding was supported by a study done in Pakistan (14), in Dessie referral hospital(12), in Arba Minch public health institution (13), and in Addis Ababa Selected Public hospitals(15). The reason might be the association of some cardiovascular disorders with the genetic inheritance that can expose for preeclampsia.

The odds of mothers who had gestational DM were about eleven points four times more likely to develop preeclampsia as compared to those who had no gestational DM. This finding was supported by a study done in low and middle-income countries(16)

Those pregnant women who used traditional medicines during pregnancy were at high risk of developing preeclampsia as compared to their counterparts. This finding was also supported by a study done in Alexandria, USA use of herbal medicine among pregnant women were significant risk for the developing preeclampsia compare with those who couldn't use (7)and this finding was also in agreement with a study conducted in Nigeria on the use herbal medicine during pregnancy that showed users of traditional medicines during pregnancy were exposed to pregnancy-induced hypertension(17).

Strength and Limitations of the study

- Due to its cross-sectional nature of the study, it is difficult to establish a causal relationship between the dependent and independent variables.
- Being an institutional based study, it could be difficult to infer the finding of the study to the target population as all pregnant women may not attend their pregnancy in the hospital.
- Since the current study was not triangulated with a qualitative method; it might not help to in-depth explore on factors that contribute to the occurrence of preeclampsia.

Conclusion

The result indicated that the prevalence of preeclampsia in this hospital was higher than similar studies conducted in Ethiopia. Having a family history of hypertension, Gestational DM and using traditional medicines during pregnancy were statistically associated and preventable risk factors with preeclampsia. Identifying risk factors at early gestational age would be valuable for the prevention of occurrence, treatment, and prevention of complications of pre-eclampsia.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the GAMBY College of Medical Sciences, Research and Publication Office and approval letter were obtained from Felege Hiwot Referral Hospital. The purpose of the study was explained to the mothers and Verbal informed consent was obtained from them. Secrecy of data was kept up by removing any personal identifier from the questionnaires. The study participant information sheet was attached in the front page of the questionnaire and before the actual data collection process the participants were well informed and the data collection was on a voluntary basis.

Consent for publication

Written consent was obtained that the interview will be included in publications

Availability of data and material

The data can be accessed from the corresponding author through the following address fentahun143@gmail.com // agumlt@yahoo.com.

The data will be accessed for research purposes.

Competing interests

The authors declare that they have no competing interests

Funding: No fund was obtained

Authors' contributions

AF: Participated in data analysis and had written the manuscript

GM: Conceived the proposal, approved the proposal with some revisions

TB and AA: Had participated in the preparation of the manuscript. We authors read and approved the final manuscript.

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Abbreviations

ANC ———Antenatal Care

AOR ———Adjusted Odds Ratio

BP ———Blood Pressure

BMI———Body Mass Index

CI ———Confidence Interval

COR———Crude Odds Ratio

DBP———Diastolic Blood Pressure

DM ———Diabetes Mellitus

EDHS ———Ethiopian Demographic and Health survey

FMOH———Federal Minister of Health

FHRH——Felge Hiwot Referral Hospital

FP——Family Planning

HDP——Hypertensive Disorder pregnancy

mmHg——Millimeter of Mercury

PE/E——Preeclampsia/Eclampsia

PIH——Pregnancy Induced Hypertension

PR ——Pulse Rate

RH ——Rhesus factor

SBP——Systolic Blood pressure

TASH——Tikur Anbesa Specialized Hospital

UN——United Nation

WHO——Worlds Health Organization

SPSS ——Statistical Package for Social Science Study

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Tables

Table 1 Socio-Demographic characteristics of the pregnant mothers attended ANC service in Felege Hiwot Referral Hospital, Bahir Dar, Ethiopia, 2017. (n=193).

Variable	Category	Frequency	Percent
Age	<24	45	23.3
	25-29	91	47.2
	30-34	42	21.8
	≥35	15	7.8
Ethnicity	Amhara	150	77.7
	Oromo	25	13.0
	Tigre	18	9.3
Religion	Orthodox	128	66.3
	Muslim	39	20.2
	Catholic	12	6.2
	Protestant	14	7.3
Maternal Education	Unable to read and write	31	16.0
	Primary	136	70.5
	≥Secondary school	26	13.5
Maternal occupation	Housewife	65	33.7
	Merchant	56	29.0
	Government employee	31	16.1
	Private employee	24	12.4
	Student	17	8.8
Education status of husband	Unable to read and write	18	9.3
	Primary	96	49.7
	Secondary	36	18.7
	College and above	43	22.3
Occupational Status of husband	Merchant	44	22.8
	Government employee	63	32.6
	Private employee	48	24.9
	Farmer	38	19.7
Household income per month	<1000	49	25.4

1000-2000	69	35.8
2000-3500	28	14.5
≥3500	47	24.4

Table 2: chronic illness concerning characteristics of the pregnant mothers attended ANC Service in Felege Hiwot Referral Hospital, Bahir Dar, Ethiopia, 2017. (n=193).

Variable	Category	Frequency	Percent
Parent history of HTN	Yes	46	23.8
	No	147	76.2
history of Hypertension	Mother	19	41.3
	Father	27	58.7
Parent history of DM	Yes	11	5.7
	No	182	94.3
History of DM	Mothers	4	36.4
	Father	7	63.6
Women history DM	Yes	9	4.7
	No	184	95.3
Women history asthma	Yes	16	8.3
	No	177	91.7

Table 3: Obstetric concerning characteristics of the pregnant mothers attended ANC service in Felege Hiwot Referral Hospital, Bahir Dar, Ethiopia, 2017. (n=193).

Variable	Category	Frequency	Percent
Previous pregnancy	Yes	112	58.0
	No	81	42.0
Number of Previous gravidities	1-2	55	49.1
	3-4	23	20.5
	≥5	34	30.4
Pregnancy interval	1 year	18	16.1
	2 year	55	49.1
	≥3	39	34.8
Women gestational hypertension	Yes	16	14.3
	No	96	85.7
Women gestational DM	Yes	3	2.7
	No	109	97.3
History of abortion	Yes	28	25.0
	No	84	75.0
Numbers of abortion	1 time	25	89.3
	≥2 times	3	10.7
Numbers of parity	1 child	67	59.8
	2-4 children	24	21.4
	≥5 children	21	18.8
Wanted and planned pregnancy	Yes	167	86.5
	No	26	13.5
ANC flow up	Yes	143	74.1
	No	50	25.9
Numbers of ANC flow up	1 time	24	16.8
	2 times	68	47.6
	3 times	46	32.2
	4 times	5	3.5
Nutritional advice during pregnancy	Yes	118	82.5

	No	25	17.5
Contraceptive method	Yes	173	89.6
	No	20	10.4
Type of contraceptive	Pill	36	20.8
	Injectable	90	52.0
	Implant	43	24.9
	Others ¥	4	2.3

Table 4: Personal Behavioral related characteristics of the pregnant mothers attended antenatal care service in Felege Hiwot referral hospital, Bahir Dar, Ethiopia, 2017. (n=193).

Variable	Category	Frequency	Percent
Alcohol drinking	Yes	82	42.5
	No	111	57.5
Type of Alcohol	Beer	32	39.0
	Tela	50	61.0
Coffee drinking	Yes	96	49.7
	No	97	50.3
How often	Daily	51	53.1
	Sometimes	45	46.9
Fruit-eating	Yes	141	73.1
	No	52	26.9
How often	Daily	32	22.7
	Sometimes	109	77.3
Vegetable eating	Yes	152	78.8
	No	41	21.2
How often	Daily	41	27.0
	Sometimes	111	73.0
Sports activity	Yes	8	4.1
	No	185	95.9
Traditional treatment	Yes	17	8.8
	No	176	91.2
Urine albumin	Free	161	83.4
	+1	23	11.9
	Above 1	9	4.7
Urine Ketone body	Free	159	82.4
	+1	29	15.0
	Above 1	5	2.6
Blood pressure	>120/80	136	70.4
	≥140/90	34	17.7

160/100 21 10.8

Above 160/100 2 1.1

Table 5: Factors associated with pre-eclampsia among women currently attending ANC follow up in Felge Hiwot Referral hospital 2017.

Variable	Category	Pre-eclampsia		COR (95%CI)	AOR (95%CI)
		No	Yes		
Family history of Hypertension	Yes	31	15	6.6 (2.7,16.1)	4.61(1.06, 20.07) *
	No	137	10	1.00	1.00
Family history of Diabetes mellitus	Yes	8	3	2.7(0.6 11.0)	0.7(0.11,4.92)
	No	160	22	1.0	1.0
Gestational DM	Yes	2	7	14.7(1.2, 174.4)	11.4(1.40,92.83) *
	No	166	18	1.0	1.00
History of abortion	Yes	21	7	3.1(1.0,9.7)	1.73(0.35,8.55)
	No	76	8	1.0	1.00
Fruit intake	Yes	14	127	2.4(1.0,5.7)	0.52(0.10,2.75)
	No	11	41	1.0	1.0
Vegetable intake	Yes	17	135	1.9(0.7,4.8)	1.73(0.25,11.99)
	No	8	33	1.0	1.0
Traditional medicine use	Yes	7	10	15.3(5.0,46.1)	11.5(3.4,38.9) **
	No	161	15	1.0	1.0
Alcohol intake during pregnancy	Yes	65	17	3.3(1.3,8.2)	2.9(1.0,8.0)
	No	103	8	1.0	1.0

Supplementary Files

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- [AdditionalFilesPC.pdf](#)