Original Article

Prevalence and Risk Factors of Preeclampsia Among Pregnant Women

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ABSTRACT

Introduction: *Globally, preeclampsia stands as a primary contributor to maternal and perinatal morbidity and mortality. This hypertensive disorder typically manifests after 20 weeks of gestation and exhibits a higher prevalence in low and middle-income nations.* ***Aim of the study:*** *This study aimed to assess the prevalence and risk factors of preeclampsia among pregnant women.* ***Methods and materials:*** *This hospital-based cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Dhaka Medical College and Hospital, Dhaka, Bangladesh from January 2021 to December 2021. As the study subjects, a total of 77 pregnant women who delivered at the gestational age of 28 weeks and above were enrolled by using a purposive sampling technique. For data analysis, SPSS version 23.0 was applied.* ***Results:*** *In this study, a notable 24.7% frequency of preeclampsia was observed among the participants. In the analysis of risk factors, family history of high blood pressure, household smoking, gravity >2, and serum calcium level (mg/dl) lower than normal were identified as statistically significant predictive factors. The P-values for these factors were found to be <0.001, 0.001, 0.002, and <0.001 respectively, in Odds ratio calculations and/or Student's T-tests.* ***Conclusion:*** *Approximately one-fourth of pregnant women in Bangladesh face the risk of developing preeclampsia. The potential contributors to these cases include a family history of high blood pressure and household smoking.*

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INTRODUCTION

On a global scale, preeclampsia stands out as a leading cause of maternal and perinatal morbidity and mortality. This hypertensive disorder typically arises after 20 weeks of gestation, characterized by rapidly escalating blood pressure and elevated protein levels in the urine [1,2]. Preeclampsia poses a significant risk, contributing to severe morbidity, long-term disability, and mortality for both mothers and their infants. The prevalence of maternal death is notably higher in settings where routine prenatal and intrapartum care is not readily available to pregnant women [3]. In 2015 alone, approximately 830 women lost their lives daily due to complications related to pregnancy and childbirth. Most of these tragic incidents occurred in low-resource settings, with preventability being a key factor [4]. Pregnancy-induced hypertension, including preeclampsia, emerges as a primary contributor to these fatalities [5]. Breaking down the daily toll, 550 maternal deaths occurred in Sub-Saharan Africa, 180 in Southern Asia, and a mere 5 in developed countries. This stark contrast underscores the urgent need for accessible and comprehensive maternal healthcare worldwide. In developing countries, the risk of a woman succumbing to maternal-related causes during her lifetime is approximately 33 times higher than that of a woman in a developed country [6]. Preeclampsia's prevalence in these nations varies from 1.8% to 16.7% [7]. Notably, in African women, preeclampsia occurs in 10% of pregnancies, a rate significantly surpassing the global average of around 2% [8]. For Ethiopia, the maternal mortality ratio estimate preceding the 2016 Ethiopian Demographic Health Survey (EDHS) indicates 412 deaths per 100,000 live births over 7 years. This translates to about 4 maternal deaths for every 1000 births in Ethiopia [5]. Another Ethiopian study observed a high incidence of mortality due to hemorrhage in majority of women [9]. The Ethiopian National Emergency Obstetric and Newborn Care (EMONC) reports that 16% of direct maternal mortality and 10% of overall maternal mortality (direct and indirect) were attributable to preeclampsia/eclampsia [10]. The objective of this study was to assess the prevalence and risk factors of preeclampsia among pregnant women.

METHODS & MATERIALS

This was a hospital based cross-sectional study that was conducted at the Department of Obstetrics and Gynecology, Dhaka Medical College and Hospital, Dhaka, Bangladesh from January 2021 to December 2021.This study enrolled a total of 77 pregnant women as its subjects, employing a purposive sampling technique. Before data collection, explicit and informed consent was obtained from all participants. The inclusion criteria specified that all pregnant women who delivered at a gestational age of 28 weeks and beyond at the designated hospitals during the study period were eligible. Conversely, the exclusion criteria stipulated the exclusion of patients who were severely ill, admitted to the Intensive Care Unit (ICU), or mentally incapacitated

during the data collection phase. Comprehensive demographic and clinical information of the participants was systematically recorded. The collected data underwent processing, analysis, and dissemination using MS Office tools and the SPSS version 23.0 program as deemed necessary. In the realm of statistical analysis, a P value <0.05 was deemed significant, guiding the interpretation of results.

RESULT

Table I: Age distribution of participants (N=77)

Age (Years)	n	%
18-25	19	25%
26–30	27	35%
31–35	23	30%
> 35	8	10%

Table I illustrates the age distribution of participants in the study on the prevalence and risk factors of preeclampsia among pregnant women, with a total sample size of 77 participants. The age groups are categorized as follows: 18-25 years, 26–30 years, 31–35 years, and over 35 years. Among the participants, 25% fell within the 18-25 age group, comprising 19 individuals, while the largest proportion, 35%, belonged to the 26–30 age group, consisting of 27 individuals. Additionally, 30% of participants were in the 31–35 age group (23 individuals), and the remaining 10% were over the age of 35 (8 individuals).

Table II: Marital status of participants

Marital status	n	%
Married	64	83%
Widowed	4	5%
Separated	4	5%
Divorced	3	4%
Single	2	3%

Table II presents the marital status distribution among participants in the study on the prevalence and risk factors of preeclampsia among pregnant women. The table encompasses five categories: married, widowed, separated, divorced, and single. Among the participants, the majority, constituting 83%, were married (64 individuals). Additionally, there were small proportions of participants who were widowed (5%, 4 individuals), separated (5%, 4 individuals), divorced (4%, 3 individuals), and single (3%, 2 individuals).

Table III: Parity distribution of participants

Parity	n	%
< 2	12	16%
2–3	30	39%
> 3	35	45%

Table III outlines the parity distribution among participants in the study investigating the prevalence and risk factors of preeclampsia among pregnant women. Parity is categorized into three groups: less than 2, 2–3, and more than 3. Among the participants, 16% had a parity of less than 2 (12 individuals), while the largest proportion, 39%, fell into the 2–3 parity group (30 individuals). Additionally, 45% of participants had a parity of more than 3 (35 individuals).

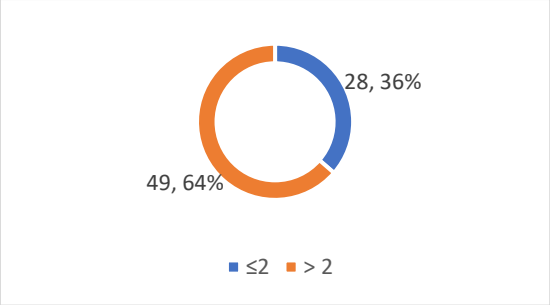

Figure 1: Gravida distribution

Figure 1 outlines the gravida distribution among participants. 36% of the participants had ≤2, while 64% had >2 gravida.

Table IV: Gestational age of participants

Weeks	n	%
<34	11	14%
34–36	10	13%
≥37	56	73%

Table IV presents the distribution of gestational age among participants in the study on the prevalence and risk factors of preeclampsia among pregnant women. Gestational age is divided into three categories: less than 34 weeks, 34–36 weeks, and 37 weeks or more. Among the participants, 14% had a gestational age of less than 34 weeks (11 individuals), while 13% fell into the 34–36 weeks category (10 individuals). The majority of participants, accounting for 73%, had a gestational age of 37 weeks or more (56 individuals).

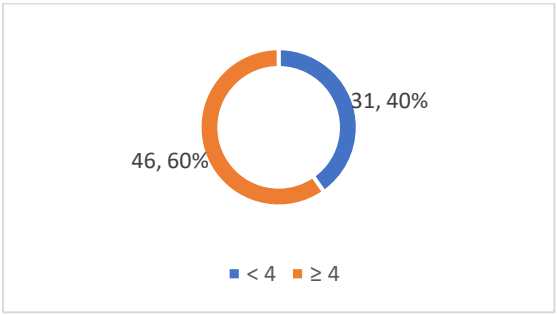

Figure 2: Status of ANC visits

Figure 2 outlines the ANC visit status among the participants. 40% of the participants had <4 ANC visits, while 60% had 4 or higher ANC visits during pregnancy

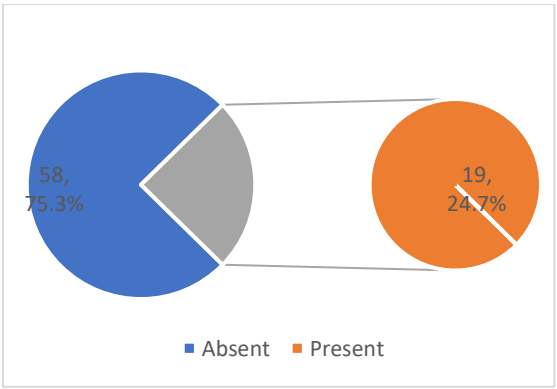

Figure 3: Frequency of preeclampsia

Figure 3 outlines the frequency of preeclampsia among the participants. Preeclampsia was present in 24.7% of participants, while the remaining 75.3% did not have preeclampsia.

Table V: Risk factors of preeclampsia among pregnant women

Variables	Preeclampsia				Odds ratio	95 % CI	z statistic	P-value
	Present (n=19)		Absent (n=58)					
	n	%	n	%				

Family history of high blood pressure								
Yes	12	63	9	15.50%	9.33	2.8902 to 30.1398	3.735	<0.001
No	7	37	49	84.50%				
Household smoking								
Yes	14	73.7	15	25.90%	7.09	2.1727 to 23.1579	3.245	0.001
No	5	26.3	38	65.50%				
Gravidity								
≤2	4	21.1	25	43.10%	0.16	0.0489 to 0.5230	3.033	0.002
>2	15	78.9	33	56.90%				
Antenatal care visit								
< 4	5	26.3	19	32.80%	0.73	0.2300 to 2.3363	0.525	0.6
≥ 4	14	73.7	39	67.20%				
Mean ±SD Serum calcium level (mg/dl)								
Mean ±SD	6.48 ±1.09		9.37 ±1.13					<0.001

Table V presents the risk factors associated with preeclampsia among pregnant women, comparing the presence and absence of various variables. The variables examined include family history of high blood pressure, household smoking, gravidity (number of pregnancies), antenatal care visit frequency, and mean serum calcium levels. For each variable, the table displays the number and percentage of participants with and without preeclampsia, along with odds ratios, 95% confidence intervals, z-statistics, and corresponding p-values. Family history of high blood pressure shows a significant association with preeclampsia, with a higher proportion of cases reporting a family history compared to those without (63% vs. 15.50%, $p < 0.001$). Household smoking also demonstrates a strong association, with a higher percentage of cases among smokers compared to non-smokers (73.7% vs. 25.90%, $p = 0.001$). Gravidity, indicating the number of pregnancies, is significantly associated with preeclampsia, with a higher proportion of cases observed in women with more than two pregnancies compared to those with two or fewer (78.9% vs. 43.10%, $p = 0.002$). Antenatal care visit frequency does not show a significant association with preeclampsia ($p = 0.6$). Additionally, the table presents mean serum calcium levels, showing a significant difference between participants with preeclampsia and those without (6.48 ± 1.09 mg/dl vs. 9.37 ± 1.13 mg/dl, $p < 0.001$).

DISCUSSION

This study aimed to assess the prevalence and risk factors of preeclampsia among pregnant women. In this study, the age distribution of participants highlighted that more than one-third of cases (35%) were in the 26-30 years age group. Furthermore, 30%, 25%, and 10% of cases were categorized into the 31-35, 18-25, and >35 years age groups, respectively. Interestingly, a study conducted by Belay, A.S et al. demonstrated similar findings in terms of age distribution [11]. In the context of gravidity, a significant majority of participants (63.6%) exhibited a gravidity of >2, while the remaining participants (36.4%) had a gravidity of ≤2. Turning to the gestational age distribution, the majority of women (73%) were identified as having a gestational age of ≥37 weeks. Additionally, 14% and 13% of cases had gestational ages of <34 weeks and 34–36 weeks, respectively. It is noteworthy that a parallel study reported comparable results

in gestational age distribution, with 77.1% of cases being ≥37 weeks, 12.6% <34 weeks, and 10.3% between 34 and 36 weeks [12,13]. Examining antenatal care (ANC) visit status in this setting, a substantial proportion (60%) of cases had undergone ANC visits ≥4 times during the entire pregnancy period, while the remaining cases (40%) had undergone ANC visits <4 times. A corresponding study shared similar findings about our study [13]. In the analysis of preeclampsia frequency among participants, it was determined that one-fourth of pregnant women (24.7%) experienced preeclampsia. This aligns with a prior study, which reported a prevalence of severe preeclampsia among participants at 26.3% [13]. However, our study's finding contrasts with a study conducted at Mustafa Hospital in Ilam, west of Iran, which reported a lower prevalence of 9.5% [14]. As per the World Health Organization (WHO), hypertensive disorders rank as the second leading cause of maternal mortality on a global scale [15]. In our study, certain variables—family history of high blood pressure, household smoking, gravity >2, and low serum calcium levels (mg/dl)—were found to be statistically significant predictive factors in the analysis of risk factors, with P-values <0.001, 0.001, 0.002, and <0.001, respectively, in Odds ratio calculations and/or Student's T-tests. It's noteworthy to mention that no cases of smoking were found in our study; however, a previous study reported a 7% prevalence of smoking among preeclampsia patients [12]. A parallel study also highlighted paternal age above 45 years and a history of high blood pressure in pregnant women as relevant factors [16]. The insights gained from this current study contribute valuable information for future research in a similar domain.

LIMITATION OF THE STUDY

This study was limited by its single-centered design and a relatively small sample size. Additionally, the short duration of the study may impact the generalizability of its findings. It's important to acknowledge that the results may not accurately represent the overall situation in the entire country. Larger, more diverse studies conducted over an extended period may be needed to obtain a comprehensive understanding of the broader context and to validate the findings of this study.

CONCLUSION

The study reveals a concerning statistic that approximately one-fourth of pregnant women in Bangladesh are at risk of developing preeclampsia. This heightened risk is associated with several potential contributors, including a family history of high blood pressure, and household smoking. Recognizing these factors is crucial for early identification and proactive management of preeclampsia in pregnant women. Implementing targeted interventions and heightened prenatal monitoring for individuals with these risk factors may contribute to reducing the incidence and severity of preeclampsia, ultimately improving maternal and fetal outcomes in the context of pregnancy in Bangladesh.

FUNDING

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CONFLICT OF INTEREST

None declared

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee

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