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Prevalence of Preeclampsia with Associated Risk Factors Among Pregnant Women

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ABSTRACT

Background: *Preeclampsia is a major global health issue, contributing significantly to maternal morbidity and mortality. Annually, about 300,000 women die from pregnancy-related complications, with preeclampsia affecting 5% to 10% of pregnancies. It typically occurs after 20 weeks of gestation, marked by hypertension and proteinuria. In severe cases, it can lead to eclampsia, a life-threatening condition. Preeclampsia accounts for a substantial proportion of maternal deaths, particularly in developing countries, where women are 14 times more likely to die from obstetric complications.*

Aim of the study: *This study aims to address this gap by investigating the prevalence of preeclampsia and the associated risk factors among pregnant women in Bangladesh.*

Methods: *This cross-sectional study was conducted by the Department of Gynecology and Obstetrics in Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU) and private chamber, Dhaka, Bangladesh, from January 2013 to December 2013. It included 134 pregnant women attending antenatal visits with a gestational age of 20 weeks or more based on their last menstrual period (LMP) or ultrasound estimates. Data collected via questionnaires and medical records were analyzed using SPSS version 20. Ethical approval was obtained, and all participants gave informed consent.*

Result: *The study population had an average age of 28.88 years. On average, women attended 7.65 antenatal visits and gained 15.8 kg during pregnancy, with a pregestational weight of 58.4 kg. The average gestational age at delivery was 36.65 weeks, with 35.82% experiencing preterm delivery. Newborns weighing 2500 grams or more comprised 61.94%, while 38.06% were under 2500 grams. Cesarean deliveries occurred in 61.19% of cases. Apgar scores less than seven were seen in 11.94% at 1 minute and 5.97% at 5 minutes. Most participants (72.39%) were aged 20-34 years, with 64.18% being nulliparous. Chronic hypertension was reported by 6.72%, and 2.24% had diabetes.*

Conclusion: *The study found a high prevalence of preeclampsia among pregnant women, especially those over 35, nulliparous, or with chronic hypertension or obesity. Many women began antenatal care late, delaying complication management. Common issues included preterm delivery and cesarean sections, underscoring the need for early, consistent antenatal care to improve outcomes.*

Keywords: *Prevalence, preeclampsia, risk factors and pregnant women.*

I. INTRODUCTION

Preeclampsia is a significant global health concern, contributing to a substantial proportion of maternal morbidity and mortality [1]. Every year, approximately 300,000 women worldwide die from pregnancy-related complications, with 60% to 80% of these deaths resulting from five major causes: postpartum hemorrhage, puerperal sepsis, preeclampsia, unsafe abortion, and obstructed labor [2]. Among these, preeclampsia is a prevalent obstetric complication, affecting 5% to 10% of pregnancies, and poses a threat to both maternal and fetal health in both developed and developing nations [1]. It is the second leading cause of direct maternal and fetal deaths. Preeclampsia typically manifests after 20 weeks of gestation and is characterized by hypertension (blood pressure >140/90 mmHg) and proteinuria in women who were previously normotensive [3]. In the absence of proteinuria, the condition can still be diagnosed in conjunction with symptoms such as liver dysfunction, thrombocytopenia, pulmonary edema, or the onset of renal, cerebral, or visual disturbances [4]. Preeclampsia can lead to severe complications, including maternal and fetal morbidity, chronic disabilities, and even death. Moreover, long-term consequences include an increased risk of cardiovascular disease and type 2 diabetes in mothers later in life [2,4]. The burden of preeclampsia is disproportionately higher in developing countries, where women are 14 times more likely to die from obstetric complications than their counterparts in developed countries

[5]. Pregnancy-related complications claimed the lives of approximately 289,000 women globally, with 99% of these deaths occurring in low-resource settings. Preeclampsia alone accounts for about 12% of these maternal deaths [6]. According to the World Health Organization (WHO), the prevalence of preeclampsia is seven times higher in developing countries than in developed nations [7]. Preeclampsia accounts for 25.7% of maternal deaths in Latin America and the Caribbean and 9.1% in Asian and African countries [8,9]. Worldwide, >300 million women and children are estimated to be at increased risk of chronic health problems due to previous exposure to preeclampsia [10]. Despite its significant impact, the exact etiology and pathogenesis of preeclampsia remain poorly understood [11,12]. However, abnormal placental implantation is believed to play a central role, leading to reduced placental perfusion, hypoxia, oxidative stress, and the release of anti-angiogenic proteins and inflammatory mediators into the maternal circulation [12,13]. If unmanaged, preeclampsia can impair blood and oxygen flow to the fetus, potentially causing maternal liver and kidney damage and, in severe cases, progressing to eclampsia, a life-threatening condition characterized by seizures [14]. There is no definitive cure for preeclampsia other than the delivery of the fetus and placenta. However, early detection through antenatal care and vigilant monitoring can help manage the condition and mitigate its risks [15]. Developed countries have significantly reduced the incidence of eclampsia and related maternal deaths by nearly 90%, thanks to improved antenatal screening and hospital care [15]. Despite this progress, the prevalence of preeclampsia remains underreported in many developing regions, including Bangladesh, where comprehensive data on the condition and its associated risk factors are scarce. This study aims to address this gap by investigating the prevalence of preeclampsia and the associated risk factors among pregnant women in Bangladesh.

II. METHODOLOGY & MATERIALS

This hospital-based cross-sectional study was conducted the Department of Gynecology and Obstetrics in Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU) and private chamber, Dhaka, Bangladesh, from January 2013 to December 2013. The study included all pregnant women who attended antenatal visits at the hospital during this period. A total of 134 pregnant women were enrolled. Participants with a gestational age of 20 weeks or greater were included, with gestational age determined based on the women's recall of their last menstrual period (LMP). Ultrasound estimates were used when LMP recall was unavailable, but ultrasound evaluations had been conducted.

Inclusion Criteria:

- Pregnant women with a gestational age of 20 weeks or greater.
- Pregnant women diagnosed with preeclampsia.

Exclusion Criteria:

- Pregnancies complicated by chromosomal or structural anomalies.
- Cases where gestational age estimation was not possible due to misclassification.

The sample size was estimated using a single proportion formula. Data were collected using a pretested and structured questionnaire administered via face-to-face interviews. Four medical students were involved in the data collection process. Medical records were reviewed for clinical and laboratory results, including proteinuria. All data collectors received two days of training on interviewing techniques. Ethical clearance was obtained from the institutional ethical committee.

Data Analysis

All participants provided informed consent. Data were entered into Excel and then exported to SPSS version 20 for further analysis. Descriptive statistics were used to explore the data in relation to relevant variables.

III. RESULT

The study population had an average age of 28.88 years. On average, the women attended 7.65 antenatal care visits. The average total weight gain during pregnancy was 15.8 kg, while the pregestational body weight was 58.4 kg (Table 1). The average gestational age at delivery was 36.65 weeks, with 35.82% of the women experiencing preterm delivery. The majority of newborns (61.94%) had a birth weight of 2500 grams or more, and 38.06% were under 2500 grams. Cesarean delivery was more common, occurring in 61.19% of the cases, compared to 38.81% for vaginal delivery. Apgar scores showed that 11.94% of the newborns had a score of less than seven at 1 minute, and 5.97% had a score of less than seven at 5 minutes (Table 2). Table 3 shows that most of the participants (72.39%) were aged 20-34 years, with 23.13% aged over 35. Nulliparity was more common, with 64.18% of women being first-time mothers. A previous abortion was reported by 21.64% of the participants. 6.72% had a history of chronic hypertension. Nearly all participants (99.25%) had a positive Rh factor, and most pregnancies were single (93.28%). While 97.76% had no diabetes, 2.24% had gestational or pregestational

diabetes. Calcium supplementation was used by 8.21%, and 4.48% had a history of preeclampsia in a previous pregnancy. A family history of diabetes was noted in 18.66%, and hypertension in 19.40% (Table 3).

Table 1: Maternal characteristics of the study population.

Characteristic	Mean±SD
Age (years)	28.88 ± 5.75
Total antenatal care visit (times)	7.65 ± 4.3
Total weight gain (kg)	15.8 ± 9.65
Pregestational BW (kg)	58.4 ± 12.87

Table 2: Perinatal characteristic of the study.

Characteristic	Frequency (n)	Percentage (%)
Gestational age at delivery (weeks)	36.65 ± 3.25	
Preterm delivery		
Yes	48	35.82
No	86	64.18
Birth weight		
<2500 gm	51	38.06
≥2500 gm	83	61.94
Mode delivery		
Cesarean delivery	82	61.19
Vaginal delivery	52	38.81
Apgar scores		
At 1 min (Score <7)	16	11.94
At 5 min (Score <7	8	5.97

Table 3: Associated risk factors for preeclampsia.

Risk factors	Frequency (n)	Percentage (%)
Age (years)		
< 20	6	4.48
20-34	97	72.39
≥ 35	31	23.13
Parity		
Multiparity	48	35.82
Nulliparity	86	64.18
Previous abortion		
No	105	78.36
Yes	29	21.64
History of chronic hypertension		
No	125	93.28
Yes	9	6.72
Mother's Rh		
Positive	133	99.25
Negative	1	0.75
Gestational age at first ANC (weeks)		
1-13	53	39.55
14-26	38	28.36
≥ 27	43	32.09
Pregnancy BMI (kg/m2)		
< 20	24	17.91
20-24.9	65	48.51
25-29.9	28	20.90
≥ 30	17	12.69
Multiplicity of pregnancy		
Single	125	93.28
Multiple	9	6.72
Diabetes mellitus		

No	131	97.76
GDM/Pregestational DM	3	2.24
Calcium used		
No	123	91.79
Yes	11	8.21
History of preeclampsia in previous pregnancy		
No	128	95.52
Yes	6	4.48
Family history of DM		
No	109	81.34
Yes	25	18.66
Family history of HT		
No	108	80.60
Yes	26	19.40

IV. DISCUSSION

The maternal characteristics of the study population show that the average age of participants was 28.88 years. On average, women attended 7.65 antenatal care visits. The mean total weight gain during pregnancy was 15.8 kg. Additionally, the average pregestational body weight was 58.4 kg. The results of our study are consistent with those of Luealon et al. [16]. The average gestational age at delivery was 36.65 weeks, with 35.82% of deliveries being preterm, suggesting a notable proportion of early births. Most newborns (61.94%) had a birth weight of 2500 grams or more, indicating a significant rate of low-birth-weight infants. Cesarean delivery was more common compared to vaginal deliveries. Apgar scores at 1 minute showed that 11.94% of newborns had scores below 7, decreasing to 5.97% at 5 minutes, suggesting some immediate post-delivery challenges in neonatal health. These findings highlight the importance of monitoring both delivery outcomes and newborn health in assessing maternal and perinatal risk factors. Luealon et al. also found similar results [16]. The results of this present study demonstrate that maternal age >35 years is associated with a significantly increased risk of preeclampsia. This was consistent with previous studies [17-19]. This could be explained as a woman gets older, she is more likely to have cardiovascular problems. This would particularly happen due to the gradual loss of compliance of the cardiovascular vessels, which is mainly associated with the ageing of uterine blood vessels and arterial stiffness. In addition, when a woman gets older, the hemodynamic adaptation during pregnancy becomes more difficult [20]. In contrast, some previous studies did not find maternal age >35 years as an increased risk of developing preeclampsia [21]. This may reflect confounding factors due to the association of advanced maternal age with increased prevalence of essential hypertension [22]. Nulliparity was associated with a significantly increased risk of preeclampsia in the present study. This was consistent with previous studies [17,19,23]. It is believed that this is related to the maternal first exposure to trophoblasts, which are of fetal origin [24]. Previous abortion was found in 21.64% of cases in our study, which is similar to the study of Luealon et al. [16]. A small percentage had a history of chronic hypertension, a known risk factor for adverse pregnancy outcomes. Nearly all mothers had a positive Rh factor. Regarding antenatal care (ANC), 39.55% of women initiated their first visit in the first trimester (1-13 weeks). In comparison, a considerable portion delayed their first visit until the second (28.36%) or third trimester (32.09%), which could affect early detection and management of complications such as preeclampsia. All of the findings are comparable with another study [16]. Obesity (prepregnancy body mass index > 30 kg/m2) was associated with a significantly increased risk of preeclampsia in the present study. This was consistent with previous studies [19,23]. A prepregnancy body mass index < 20 kg/m2 was found to be a protective factor against the development of preeclampsia, as in a previous study [18]. The reason for obesity being associated with an increased risk of preeclampsia was explained by increased levels of serum triglycerides, very low-density lipoproteins, and the formation of small, dense, low-density lipoprotein particles in obese women [25]. This lipid profile was also found in women with preeclampsia [26]. These lipid alterations have been suggested to promote oxidative stress caused by ischemia-reperfusion mechanism or activated neutrophils, which leads to endothelial cell dysfunction [1,27,28]. Nulliparity, multifetal pregnancy, history of preeclampsia in a previous pregnancy and chronic hypertension were associated with a significantly increased risk of preeclampsia in the present study. This was consistent with the hypothesis that immune maladaptation might play a role in triggering the development of preeclampsia [1].

Limitations of the study: The sample size is relatively small, consisting of only 134 participants, which may limit the statistical power of the study. The study also needs a control group, making it easier to establish causality. The exclusion of pregnancies with chromosomal or structural anomalies may overlook important risk factors associated with preeclampsia. Additionally, the study did not account for potential confounding factors such as socioeconomic status or access to healthcare.

V. CONCLUSION AND RECOMMENDATIONS

The study identified a significant prevalence of preeclampsia among pregnant women, particularly affecting those over 35 years, nulliparous women, and those with chronic hypertension or obesity. Early initiation of antenatal care was suboptimal, with many women starting visits in the second or third trimester, potentially delaying the detection and management of complications. Preterm delivery and cesarean sections were common, highlighting the need for improved maternal health monitoring. The study emphasizes the importance of early and consistent antenatal care, especially in resource-limited settings, to manage and reduce the risks associated with preeclampsia, ultimately aiming to improve maternal and neonatal outcomes.

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