

## Risk Factors Associated with Preeclamptic Women: A Case- Control Study in Dhaka Medical College and Hospital (DMCH)

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DOI: [10.36348/sijog.2023.v06i08.002](https://doi.org/10.36348/sijog.2023.v06i08.002)

Received: 08.07.2023 | Accepted: 13.08.2023 | Published: 18.08.2023

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### Abstract

**Introduction:** Preeclampsia, a dangerous condition characterized by high blood pressure during pregnancy, poses risks to both mothers and infants. Understanding the risk factors associated with preeclampsia is essential for effective prevention and management. This study aims to identify and investigate the potential risk factors contributing to preeclampsia in women, with the goal of improving the health outcomes of expectant mothers and their babies. **Methods:** This study was a case-control study conducted in the department of Obstetrics and Gynaecology at Dhaka Medical College Hospital (DMCH). The study period spans from 1st July 2019 to 31st December 2019. The study population consists of 100 participants, including 50 pregnant normotensive women as the control group and 50 pregnant women diagnosed with preeclampsia as the case group. The Ethical clearance of this study was obtained from the Institutional Review Board of Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh. **Results:** Out of 100 patients, the control group consisted of 30% individuals aged 21-25 years, while the case group had 32% individuals aged 16-20 years. The mean age for the control group was 23.11 years (SD 5.9), and for the case group, it was 24.5 years (SD 6.3). The distribution of study patients based on risk factors reveals statistically significant differences between the control and case groups for the variables "gravity" and "antenatal care" ( $p < 0.05$ ). The case group had a higher proportion of primigravida (first-time pregnancy) and irregular or no antenatal care. However, no significant differences were observed for the variables "family history of hypertension" and "gestational age" ( $p > 0.05$ ). In terms of clinical parameters, the case group exhibited significantly higher prevalence of proteinuria at all levels (1+, 2+, and 3+) compared to the control group. The blood pressure readings, both systolic and diastolic, were also significantly higher in the case group. Moreover, the case group had significantly lower serum calcium levels than the control group. These differences were statistically significant with p-values indicating  $p < 0.01$  or  $p < 0.001$ . Basis on the results the significant risks factors associated with Preeclampsia were observed, Gravity ( $p=0.05$ ), Antenatal care ( $p=0.05$ ), Proteinuria ( $p=0.001$ ), Blood Pressure-Systolic(mmHg)( $p=0.001$ ), Blood Pressuredystonic (mmHg) ( $p=0.001$ ), Serum Calcium Level (mg/dl) ( $p=0.001$ ). **Conclusion:** The study observed Gravity, Antenatal care Proteinuria, Blood Pressure - Systolic (mmHg), Blood Pressure - dystonic (mmHg), Serum Calcium Level (mg/dl) were the significant factors associated with the Preeclamptic Women in Bangladesh.

**Keywords:** Risk Factors, Associated, Preeclamptic, Women.

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### INTRODUCTION

Pregnancy-induced hypertension (PIH) poses a significant health concern for pregnant women and can lead to adverse outcomes for both the mother and the baby. Advanced maternal age was associated with an

increased risk of gestational hypertension [1]. Specifically, mothers aged 35.0-39.9 years had a 1.22 times higher risk of gestational hypertension, while mothers aged 40.0-44.9 years had a 1.63 times higher risk compared to those aged 25.0-29.9 years [1]. This suggests that as maternal age advances, the risk of

gestational hypertension rises. Additionally, a meta-analysis of 44 randomized controlled trials indicated that dietary interventions can reduce maternal gestational weight gain and improve pregnancy outcomes, potentially impacting the risk of PIH [2]. Furthermore, engaging in exercise during pregnancy was found to decrease the risk of gestational hypertension and preeclampsia by approximately 30% and 40%, respectively [2]. These lifestyle factors, when considered alongside maternal age, may have an influence on the risk of PIH. Examining the risks of chronic hypertension, pregnancy-induced hypertension, and preeclampsia in relation to maternal age, another study revealed a gradual increase in the risks of chronic hypertension and pregnancy-induced hypertension with advancing age [3]. The risk of preeclampsia and severe preeclampsia followed a U-shaped distribution, with the lowest risk observed in the 25-29 age group and the highest risk in the  $\geq 40$  age group [3]. These findings potential risk factors of preeclampsia in women. Furthermore, the interpregnancy interval (IPI) and its interaction with maternal age have been explored in terms of the risk of hypertensive disorders of pregnancy. Both short and long IPIs have been linked to an increased risk of these disorders, but the modification of this association by maternal age requires further investigation [4]. Understanding how maternal age and IPI interact can provide crucial insights into the risk assessment and management of hypertensive disorders during pregnancy. In Ireland, the trend of increasing maternal age at childbirth is notable, and this demographic shift may contribute to a higher prevalence of hypertensive disorders of pregnancy [5]. The association between hypertension and advancing age has the potential to elevate the risk of adverse outcomes for pregnant women and their babies. Consequently, it is crucial to further investigate and address this relationship to ensure the well-being of expectant mothers and their infants. Therefore, the aim

of the study was to investigate and identify the potential risk factors associated with preeclampsia in women.

## METHODS

This case-control study was conducted at the Department of Obstetrics and Gynaecology in Dhaka Medical College Hospital (DMCH). The study period spans from 1st July 2019 to 31st December 2019. The study population consists of 100 participants, including 50 pregnant normotensive women as the control group and 50 pregnant women diagnosed with preeclampsia or eclampsia as the case group. The participants were randomly selected to ensure unbiased representation. Data collection involved direct visits and examinations of the patients. Data was collected through history taking, clinical examinations, relevant biochemical tests, close monitoring, and recording of parameters, using pre-designed questionnaires as the data collection instrument. The collected data were processed, edited and analyzed using Statistical Package for Social Sciences (SPSS) software, version-23.0. Chi-square tests and Student's Unpaired t tests were performed to determine the association between the study variables of the groups, where  $p < 0.05$  considered the level of significance with 95% CI. The Ethical clearance of this study was obtained from the Institutional Review Board of Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh.

### Inclusion Criteria:

- 28 to 42 weeks of singleton gestation.

### Exclusion Criteria:

- History of hypertension with or without proteinuria before conception or before 20 weeks of gestation

## RESULTS

**Table 1: Distribution of the study patients according to their Age, (N=100)**

| Age group     | Frequency       |                |
|---------------|-----------------|----------------|
|               | Control(N=50)   | Case (N=50)    |
| 16-20         | 12(24%)         | 16(32%)        |
| 21-25         | 15(30%)         | 13(26%)        |
| 26-30         | 11(22%)         | 9(18%)         |
| 31-35         | 8(16%)          | 10(20%)        |
| >35           | 4(8%)           | 2(4%)          |
| Mean $\pm$ SD | 23.11 $\pm$ 5.9 | 24.5 $\pm$ 6.3 |

According to Table 1, it was observed that 30% of the control group belonged to the age group of 21-25 years, while among the cases, 32% belonged to

the age group of 16-20 years. In case of control mean (SD) age was 23.11 $\pm$ 5.9 years and for the case group mean age was (SD) 24.5 $\pm$ 6.3 years.

**Table 2: Clinical characteristics of the studied patients (N=100)**

| Variable                              | Control(n=50)<br>No (%) | Case(n=50)<br>No (%) | P value  |
|---------------------------------------|-------------------------|----------------------|----------|
| <b>Gravidity</b>                      |                         |                      |          |
| Primi                                 | 22(44)                  | 35(70)               | <0.05s   |
| Multi                                 | 28(56)                  | 15(30)               |          |
| <b>Family history of Hypertension</b> |                         |                      |          |
| Present                               | 14(28)                  | 18(36)               | >0.10 ns |
| Absent                                | 36(36)                  | 32(64)               |          |
| <b>Antenatal care</b>                 |                         |                      |          |
| Regular                               | 34(68)                  | 4(8)                 | <0.05s   |
| Irregular                             | 7(14)                   | 10(20)               |          |
| None                                  | 9(18)                   | 36(72)               |          |
| <b>Gestational age</b>                |                         |                      |          |
| Mean±SD                               | 35.4±2.67               | 34.57±3.19           | >0.30 ns |
| Range                                 | (29.0-40.0)             | (28.0-40.0)          |          |

In terms of the variable's "gravidity" and "antenatal care" show statistically significant differences between the control and case groups, as indicated by the P values (<0.05). Specifically, a higher proportion of primi gravidity (first-time pregnancy) and

irregular or no antenatal care is observed in the case group. On the other hand, the variables "family history of hypertension" and "gestational age" do not show statistically significant differences between the two groups, with P values (>0.05).

**Table 3: Clinical and Laboratory Parameters of the studied patients (N=100)**

| Variables                                | Control (n=50) | Case (n=50) | P value |
|--|----------------|-------------|---------|
| <b>Proteinuria</b>                       |                |             |         |
| - 0 (0.1 g/L)                            | 50 (100.0%)    | 0 (0.0%)    | <0.001s |
| - 1+ (0.3 g/L)                           | 0 (0.0%)       | 9 (18.0%)   |         |
| - 2+ (1.0 g/L)                           | 0 (0.0%)       | 23 (46.0%)  |         |
| - 3+ (3.0 g/L)                           | 0 (0.0%)       | 18 (36.0%)  |         |
| <b>Blood Pressure - Systolic (mmHg)</b>  |                |             |         |
| - Range                                  | 100.0-120.0    | 140.0-200.0 | <0.001s |
| - Mean SD                                | 110.9 7.05     | 159.0 9.08  |         |
| <b>Blood Pressure - Diastolic (mmHg)</b> |                |             |         |
| - Range                                  | 70.0-80.0      | 90.0-120.0  | <0.001s |
| - Mean SD                                | 74.9 5.01      | 103.80 7.39 |         |
| <b>Serum Calcium Level (mg/dl)</b>       |                |             |         |
| - Range                                  | 8.1-10.6       | 5.6-8.0     | <0.001s |
| - Mean SD                                | 9.40 .66       | 6.57 .87    |         |

In terms of proteinuria, the case group showed a significantly higher prevalence at all levels (1+, 2+, and 3+) compared to the control group. The blood pressure readings for the case group were also significantly higher than those of the control group, both in terms of systolic and diastolic measurements. Additionally, the case group had significantly lower serum calcium levels compared to the control group. The p-values indicate that all these differences are statistically significant ( $p < 0.01$  or  $p < 0.001$ ).

## DISCUSSION

Pregnancy-induced hypertension (PIH) is a significant complication of pregnancy that can have adverse effects on both the mother and the fetus. Understanding the factors associated with PIH is crucial for effective management and prevention strategies. The results from the study revealed interesting

observations regarding the association between maternal age and the risk of PIH. Among the study patients, it was observed that 30% of the control group belonged to the age group of 21-25 years, while among the cases, 32% belonged to the age group of 16-20 years. These findings suggest that younger maternal age might be associated with an increased risk of PIH [6, 7]. Previous studies have also reported a higher prevalence of hypertensive disorders in younger pregnant women. For example, another study found that women aged 15-19 years had a significantly higher risk of developing PIH compared to older age groups [8]. Similarly, other study reported that women under the age of 20 had a higher risk of gestational hypertension compared to older women [9]. In addition to maternal age, other risk factors were explored in the study. Primiparity was found to be more prevalent in the case group (70.0%) compared to the control group (44.0%). This finding

aligns with previous research, which has consistently shown that first-time pregnancies are associated with a higher risk of PIH [10, 11]. A positive family history of hypertension was also more common in the case group (36.0%) compared to the controls (28.0%). This suggests a potential genetic predisposition for developing PIH, as supported by previous studies [12, 13]. Antenatal care patterns differed significantly between the two groups, with only 8.0% of cases receiving regular care compared to 68.0% of controls. This highlights the importance of early and regular prenatal care in identifying and managing high-risk pregnancies, including those at risk of developing PIH. Several studies have emphasized the role of antenatal care in preventing or managing hypertensive disorders of pregnancy [13, 14]. Adequate prenatal care allows for the timely detection and management of risk factors, which can help reduce the incidence and severity of PIH. The clinical parameters assessed in the study further support the association between these factors and the development of PIH. Proteinuria, a key diagnostic criterion for PIH, was absent in the control group but observed in the case group, with 46.0% exhibiting 2+ proteinuria and 36.0% showing 3+ proteinuria. These findings align with previous research, which has shown a positive correlation between proteinuria and the development of PIH [15, 16]. Moreover, systolic and diastolic blood pressure were significantly higher in the case group, indicating a higher burden of hypertension in these patients. This observation is consistent with previous studies that have reported elevated blood pressure as a hallmark of PIH [17, 18]. Additionally, the case group had significantly lower serum calcium levels compared to the control group. Low calcium levels have been associated with an increased risk of PIH, although the underlying mechanisms are not yet fully understood [19, 20].

### LIMITATIONS OF THE STUDY

The study may have a relatively small sample size, which can limit the generalizability of the findings. A larger sample size would provide more robust results and allow for better representation of the population.

### CONCLUSION

The study observed Gravidity, Antenatal care, Proteinuria, Blood Pressure - Systolic (mmHg), Blood Pressure - diastolic (mmHg), Serum Calcium Level (mg/dl) were the significant factors associated with the Preeclamptic Women in Bangladesh.

### RECOMMENDATION

To summarize the study's findings, it is recommended to prioritize early and regular prenatal care, with a specific focus on younger pregnant women and first-time mothers. A key recommendation is to implement routine screening for proteinuria and regular monitoring of blood pressure during pregnancy. This

approach enables timely detection and effective management of pregnancy-induced hypertension (PIH). Additionally, providing preconception counseling is crucial, emphasizing the importance of addressing modifiable risk factors and promoting healthy lifestyles to decrease the risk of PIH. These recommendations aim to enhance outcomes and alleviate the burden of PIH on both mothers and infants.

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