



PREDICTION OF PREECLAMPSIA IN PREGNANT WOMEN DURING SIX TO TWENTY WEEKS OF PREGNANCY AT SMS MEDICAL COLLEGE, JAIPUR

Obstetrics & Gynaecology

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ABSTRACT

Background: Preeclampsia is a hypertensive disorder of pregnancy that poses significant risks to both maternal and fetal health. Early prediction of preeclampsia can greatly enhance patient care by enabling timely interventions. This study aimed to predict the development of preeclampsia in pregnant women between 6 to 20 weeks of gestation at SMS Medical College, Jaipur, using clinical and biochemical markers. **Methodology:** A total of 250 pregnant women between 6 to 20 weeks gestation were enrolled in this prospective observational study on a first-come-first-serve basis, conducted in the Department of Obstetrics and Gynecology, SMS Medical College, Jaipur. Following initial assessments, participants underwent routine antenatal investigations, including complete blood count, blood grouping, HIV, HbsAg, VDRL, serum TSH, DIPSI, serum creatinine, and a complete urine test. Women with pre-existing conditions such as hypertension, thyroid dysfunction, or diabetes were excluded. Cell-free fetal hemoglobin levels were measured using ELISA for early prediction of preeclampsia. All participants were followed until delivery, with blood pressure monitoring and urine tests for microalbuminuria at each visit. Preeclampsia was diagnosed according to the International Society for the Study of Hypertension in Pregnancy (ISSHP) 2018 criteria. Out of 250 enrolled participants, 213 women were analyzed, with some lost to follow-up or due to early pregnancy loss. **Results:** The study found that 8% of the participants (n=17) developed preeclampsia during the course of their pregnancy. The majority of the participants were between 23-27 years of age, and 76.5% of the women who developed preeclampsia were in this age group. There was no significant association between occupation, religion, age at marriage, or gravidity and the development of preeclampsia. However, the incidence of preeclampsia was higher among homemakers (76.47%). Statistical analysis revealed no significant predictors among the demographic and clinical variables. **Conclusion:** The study highlights the incidence of preeclampsia in early pregnancy and the potential role of cell-free fetal hemoglobin as a predictor. While no significant demographic associations were identified, the need for ongoing monitoring and larger studies to further investigate biochemical markers for early prediction of preeclampsia remains crucial for improving maternal outcomes.

KEYWORDS

Preeclampsia, pregnancy, cell-free fetal hemoglobin, prediction, antenatal care, hypertensive disorders of pregnancy.

INTRODUCTION

Preeclampsia is a hypertensive disorder of pregnancy that remains a leading cause of maternal and neonatal morbidity and mortality worldwide.¹ Its onset usually occurs after 20 weeks of gestation, with symptoms like hypertension, proteinuria, and end-organ damage.²⁻³ Early prediction and timely management of preeclampsia can significantly improve maternal and fetal outcomes. This study aims to predict the onset of preeclampsia in pregnant women between six and twenty weeks of gestation at SMS Medical College, Jaipur, using maternal demographic, clinical, and laboratory data.

METHODOLOGY

This is a prospective observational study conducted in the Department of Obstetrics and Gynecology, SMS Medical College, Jaipur. A total of 250 eligible pregnant women between 6h to 19th weeks of gestation were included on a first-come, first-served basis. The study protocol adhered to ethical guidelines, and informed consent was obtained from all participants.

Inclusion Criteria

- Pregnant women attending the antenatal clinic or gynecology OPD between 6 and 20 weeks of pregnancy.
- Singleton pregnancies.

Exclusion Criteria

- Women with pre-existing hypothyroidism, hyperthyroidism, essential hypertension, or a history of preeclampsia/eclampsia in a previous pregnancy.
- Those with type I or type II diabetes mellitus, gestational diabetes, or multiple gestations.

Investigations

On the first visit, participants underwent a comprehensive workup, including:

- Complete blood count (CBC)
- Blood grouping
- HIV, HbsAg, and VDRL screening
- Serum TSH, DIPSI, serum creatinine
- Urine examination (for protein and microalbuminuria)
- Cell-free fetal hemoglobin via ELISA for early prediction of preeclampsia.

Participants were followed up until delivery, with regular monitoring of blood pressure and urine protein levels. Preeclampsia was

diagnosed based on the International Society for the Study of Hypertension in Pregnancy (ISSHP) classification (2018).

Sample Size and Data Analysis

Of the initial 250 women enrolled, 213 were included in the final analysis after accounting for losses due to early pregnancy loss or loss to follow-up. Statistical analysis was performed using chi-square and t-tests to assess the association between maternal factors and the development of preeclampsia.

RESULTS

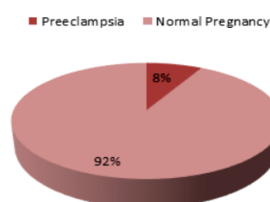
Out of 213 participants, the majority (46%) were in the age group of 23-27 years, followed by 28% in the 19-22 year age group. A significant proportion (84.51%) of the participants were homemakers. The remaining participants were either employed in service (5.63%), self-employed (5.63%), or students (4.23%). The majority (65.26%) of participants were Hindu, while 34.74% were Muslim. The study revealed that 45.54% of participants were gravida 2, followed by 40.38% who were primigravidae. Regarding parity, 48.83% were nulliparous, and 39.44% were para 1.

Table 1 Age Wise Distribution Of Participants

Age Group (Years)	Frequency (n=213)	Percentage (%)
19-22	60	28.17
23-27	98	46.01
28-32	46	21.60
>33	9	4.23

The mean age of participants was 25.2 ± 3.83 years.

Fig 1 Prevalence of preeclampsia



Out of 213 participants, 17 (7.98%) developed preeclampsia, while 196 (92.02%) had a normal pregnancy.

Age and Preeclampsia

Age was not significantly associated with the development of preeclampsia. However, 76.5% of those who developed preeclampsia were in the 23-27 age group.

Table 2 Association of Age with Preeclampsia

Age Group (Years)	Absent (n=196)	Present (n=17)	p-value
19-22	58	3	0.091
23-27	86	13	
28-32	44	1	
≥33	8	0	

While homemakers constituted 76.47% of those who developed preeclampsia, the association between occupation and preeclampsia was not statistically significant.

DISCUSSION

The findings of this study provide important insights into the demographic factors associated with preeclampsia. While the prevalence of preeclampsia was 7.98%, there was no statistically significant association between the development of preeclampsia and factors such as age, occupation, or religion. These results are in line with several studies, but they also highlight some differences when compared to other research.

Age and Preeclampsia

In this study, the majority (76.5%) of participants who developed preeclampsia were within the 23-27 age group, yet no significant association was found between age and preeclampsia ($p = 0.091$). This is consistent with findings from a study by Xiong et al. (2002)⁴, which also reported that preeclampsia can occur in younger women without a statistically significant age-related risk factor. However, contrasting evidence from other studies, such as the work by Hernandez-Diaz et al. (2009)⁵, suggests that advanced maternal age (>35 years) is associated with a higher risk of preeclampsia. The fact that this study did not find a significant association could be due to the limited number of participants over the age of 33 (only 4.23% of the total), which may have underpowered the analysis of age-related effects.

Gravidity and Parity

The present study found that the majority of participants who developed preeclampsia were gravida 2 (45.54%) or primigravidae (40.38%), with no statistically significant association between gravidity, parity, and preeclampsia. These results align with the findings of Getahun et al. (2007)⁶, who also found that primigravidae women are more prone to preeclampsia but noted no strong association between increasing parity and reduced risk. In contrast, some studies, like those by Eskenazi et al. (1991)⁷, suggest that increasing parity may provide a protective effect against preeclampsia, especially in multigravida women. The lack of a significant association in this study might reflect different sociodemographic profiles or healthcare access among participants.

Occupation and Preeclampsia

The occupation of participants in this study (84.51% homemakers) did not show a significant correlation with preeclampsia development, despite 76.47% of those who developed preeclampsia being homemakers. This finding contrasts with the study by Vatten et al. (2002)⁸, which suggested that physically demanding jobs or prolonged standing might increase the risk of preeclampsia. The social and lifestyle factors influencing homemakers, particularly in certain cultural contexts, could involve stress, dietary habits, or healthcare access, which might influence preeclampsia development. However, further studies are required to better understand these connections.

Religion and Preeclampsia

While this study found that most participants were Hindu (65.26%), there was no significant association between religion and preeclampsia development. This aligns with most of the literature, where no direct link between religious affiliation and preeclampsia has been found. However, differences in religious practices that influence diet, stress management, or access to antenatal care could be subtle factors, but these are often not explored in depth in most studies.

Biomarkers and Preeclampsia Prediction

One of the key areas of this study was the potential use of cell-free fetal hemoglobin as an early predictive marker for preeclampsia. This approach aligns with current research efforts, such as studies by

Redman et al. (2005)⁹, which emphasize the need for reliable biomarkers to predict preeclampsia. The findings from this study suggest that fetal hemoglobin could be promising in identifying women at risk, but larger multi-center trials are needed to confirm its utility. Similar sentiments were echoed in the work of Verlohren et al. (2012)¹⁰, where they underscored the need for broader validation of biomarkers across different populations.

CONCLUSION

Preeclampsia remains a complex disorder with multifactorial etiology. Early identification of risk factors, coupled with regular monitoring and timely intervention, can significantly reduce the adverse outcomes associated with this condition. Future research should focus on refining predictive models, including both clinical and biochemical markers, for better risk stratification and management of pregnant women.

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