Original Article

Clinical Manifestations of Preeclamptic Pregnant Women — Study in a Tertiary Care Hospital in Bangladesh

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ABSTRACT

Introduction: *Preeclampsia is a pregnancy-related condition marked by high blood pressure and organ damage, primarily affecting the liver and kidneys. Preeclampsia can progress rapidly, leading to serious complications. Regular prenatal care and timely reporting of symptoms are crucial for early detection and management, safeguarding both maternal and fetal well-being. This study aimed to assess the clinical manifestations of preeclamptic pregnant women.* ***Methods and materials:*** *This prospective observational study was conducted in the Bangabandhu Sheikh Mujib Medical University Hospital and Dhaka Medical College Hospital, Dhaka, Bangladesh from July 2011 to June 2012. The study included 50 pregnant women with preeclampsia, selected through purposive sampling. Data analysis was conducted using MS Office tools.* ***Results:*** *The mean age was 25.8 ± 4.4 years. Majority were preterm (82%), 42% were primigravida, and 58% were multigravida. Proteinuria distribution: 50% mild, 20% moderate, 30% severe. Preeclampsia severity: 64% mild, 36% severe. Mean serum ferritin, hemoglobin, and hematocrit levels were 124.5 ± 24.8 ng/ml, 10.9 ± 0.8 g/dl, and 32.4 ± 1%, respectively. Severe preeclampsia had a mean ferritin of 192.8 ng/ml, mild*

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preeclampsia had 86.1 ng/ml. ***Conclusion:*** *The prevalence of preeclampsia is notably high in preterm pregnancies, with more than one-third of preeclamptic cases progressing to severe forms. Serum ferritin levels may be considered a potential predictor of preeclampsia.*

Keywords: *Clinical manifestations, Preeclampsia, Pregnant women, Preterm, Primigravida*

INTRODUCTION

Preeclampsia (PE) is a hypertensive pregnancy complication with significant risks for both the mother and fetus, remaining the third leading cause of maternal mortality despite medical advancements[1]. In developing countries, it is a major contributor to maternal and prenatal morbidity and mortality. PE affects around 6% of the general population, complicating 5-15% of pregnancies over 20 weeks and contributing to 16% of maternal mortality and 28% of prenatal mortality[2]. Women with PE face increased risks of complications such as abruptio placenta, acute renal failure, cerebral hemorrhage, disseminated intravascular coagulation, pulmonary edema, circulatory collapse, and eclampsia[3]. Preeclampsia (PE) is a complex condition with various implicated factors, including genetic, immunological, circulatory, and endothelial dysfunction[4]. In pregnancies affected by PE, not all placental bed spiral arteries are invaded by trophoblasts. While the first phase of trophoblastic invasion occurs normally, the second phase is absent, leading to retained reactive Musculo-elastic walls in the myometrial portions of the spiral arteries[5]. This qualitative and quantitative restriction of normal physiological changes results in compromised placental blood flow, which becomes increasingly critical with advancing gestation due to the growing demands of the conceptus[6]. Furthermore, the myometrial segments of the spiral arteries in PE cases develop acute arthrosis, which may progress to vessel obliteration and result in placental infarction[7]. The ischemic placenta is responsible for generalized endothelial cell damage, leading to the characteristic symptoms of hypertension, proteinuria, and sudden edema in preeclampsia[8]. The elevated levels of lipid hydroperoxides believed to be present in PE are considered potential agents causing damage to the vascular endothelium[9]. In comparison to normotensive and chronic hypertensive parturient, patients with preeclampsia exhibited a higher serum iron concentration, with a mean of 135 µg/dl. Patients with eclampsia exhibited a mean serum iron of 203 µg/dl, while those with severe preeclampsia had a mean of 137 µg/dl. Additionally, there was a concomitant increase in serum ferritin, with a mean of 59 ng/ml compared to 19 ng/ml for normal cases[10]. Serum ferritin proved to be the most sensitive marker among iron status parameters, reflecting the presence of preeclampsia and supporting the role of iron as a catalyst for oxidative stress and lipid peroxidation in the pathophysiology of preeclampsia[11]. The observed hyperferritinemia in preeclampsia patients is attributed to increased ferritin synthesis and the release of intracellular ferritin from damaged cells[12]. The objective of this study was to assess the clinical manifestations of preeclamptic pregnant women.

METHODS & MATERIALS

This was a prospective observational study that was conducted in the Department of Obstetrics & Gynaecology, Bangabandhu Sheikh Mujib Medical University Hospital

and Dhaka Medical College Hospital, Dhaka, Bangladesh from July 2011 to June 2012. The study included 50 pregnant women with preeclampsia as study subjects, chosen through purposive sampling. Ethical approval was obtained from the hospital's ethics committee, and written consent was obtained from all participants before data collection. Exclusion criteria comprised pregnancies with iron deficiency anemia, hemoglobinopathies, known liver disease, chronic hypertension, renal disease, gestational diabetes, diabetes mellitus, a history of preeclampsia, multiple pregnancies, and those who did not consent. Data processing, analysis, and dissemination were performed using MS Office tools.

RESULT

Table I: Ages of participants (N=50)

Age (year)	*n*	%
< 20	5	10%
20 – 30	7	14%
> 30	38	76%
Mean ± SD	25.8 ± 4.4	

Over three-quarters (76%) of the participants were over 30 years old, with a mean age of 25.8 ± 4.4 years [**Table I**].

Table II: Distribution of gestational age

Gestational age (weeks)	*n*	%
< 37 (preterm)	41	82%
≥ 37 (term)	9	18%

Regarding the gestational age of participants, the majority of cases (82%) were preterm (gestation < 37 weeks) [**Table II**].

Table III: Gravidity distribution

Gravida	*n*	%
Primigravida	21	42%
Multigravida	29	58%

In this present study, it was observed that 42% of cases were primigravida, and the remaining 58% were multigravida [**Table III**].

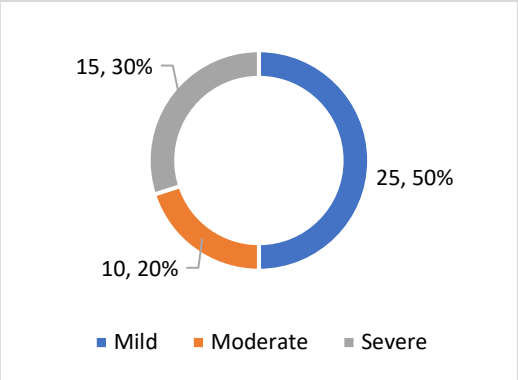

Figure 1: Grading of proteinuria

In the present study, based on the distribution of cases by the grading of proteinuria, out of the 50 cases, 50% had mild proteinuria, 20% had moderate proteinuria, and the remaining 30% had severe proteinuria [**Figure 1**].

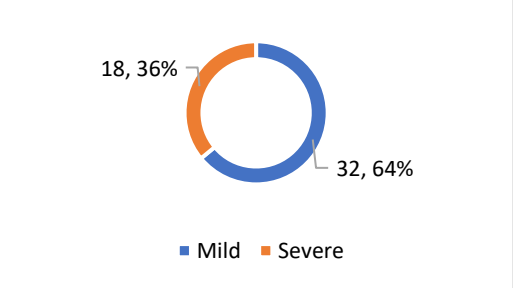

Figure 2: Severity of preeclampsia

Based on the severity, the majority of the cases (64%) were classified as mild preeclampsia, while 36% were categorized as severe preeclampsia [**Figure 2**].

Table IV: Hematological findings

Parameters	Case Mean±SD
Hemoglobin level (g/dl)	10.9±0.8
Hematocrit (%)	32.4±1.8
Serum ferritin (ng/ml)	124.5±24.8

Among the participants, the mean serum ferritin (ng/ml), hemoglobin level (g/dl), and hematocrit (%) were 124.5 ± 24.8, 10.9 ± 0.8, and 32.4 ± 1, respectively [**Table IV**].

Table V: Risk of raised serum ferritin

Parameters	*n*	%
> 20	38	76%
≤ 20	12	24%

Among the total participants, more than three-quarters (76%) of the cases exhibited elevated serum ferritin (>20 ng/ml) [**Table V**].

Table VI: Severity against serum ferritin

Severe preeclampsia	Mild preeclampsia
(*n*=18)	(*n*=32)
Mean	
192.8± 44.7	86.1 ± 27.8

The mean serum ferritin level was 192.8 ng/ml in the severe preeclampsia group and 86.1 ng/ml in the mild preeclampsia group [**Table VI**].

DISCUSSION

In this study, the age distribution of participants revealed that more than three-quarters (76%) of cases were over 30 years old, with a mean age of 25.8 ± 4.4 years. Hubel (1989) also reported a similar finding in their study[13]. Regarding gestational age, the highest number of cases (82%) in this study were preterm (< 37 weeks of gestation. Another study observed that the majority (89.4%) of preeclamptic women had a gestational age <37 weeks (preterm) in the case group and 30 (80.9%) in the control group[14]. Additionally, the current study found that 42% of cases were primigravida, while the remaining 58% were multigravida. This aligns with the findings of Paul et al., who observed that 65.0% had primigravida in the case group and 70.0% in the control group (p>0.05), consistent with the current study[15]. In the present study, the distribution of participants by the grading of proteinuria revealed that out of the 50 cases, 50% had mild proteinuria, 20% had moderate proteinuria, and the remaining 30% had severe proteinuria. In a previous study, it was observed that the majority (94.1%) of patients belonged to the serum ferritin level >120 (ng/ml) category in severe preeclampsia, 63.3% in mild preeclampsia, and 36.2% in the control group[14]. In the current study, based on severity, most cases (64%) were classified as mild preeclampsia, and 36% were classified as severe preeclampsia. The mean serum ferritin (ng/ml), hemoglobin level (g/dl), and hematocrit (%) in the case group were 124.5 ± 24.8, 10.9 ± 0.8, and 32.4 ± 1, respectively. Comparable results were seen in a study conducted by Zafar and Iqbal[16]. In this present study, more than three-quarters (76%) of the participants exhibited elevated serum ferritin (> 20 ng/ml).

Another study reported that serum iron, ferritin, and transferrin saturation rates are remarkably higher, and TIBC levels are lower than normal subjects[17]. In this study, it was found that the mean serum ferritin level of the severe preeclampsia group was 192.8 ng/ml, and that of the mild preeclampsia group was 86.1 ng/ml. In another study, it showed that the mean serum ferritin level in the case and control groups was 100.03 ± 123.52 µgm/L and 31.53 ± 20.86 µgm/L, respectively, which is highly significant ($p < 0.001$)[18]. All the findings of this current study may be helpful in further similar studies.

Limitation of the study:

This study was conducted at a single center and involved a small sample size. Additionally, the study was conducted over a relatively short period. Therefore, the findings of this study may not accurately represent the overall situation in the entire country.

Conclusion:

The prevalence of preeclampsia is notably high in preterm pregnancies, and over one-third of preeclamptic cases progress to severe forms in this population. Serum ferritin levels may be considered a potential predictor of preeclampsia, suggesting a potential association between elevated serum ferritin and the development or severity of this pregnancy-related condition. Monitoring serum ferritin levels during prenatal care could potentially serve as an early indicator for healthcare providers to identify and manage the risk of preeclampsia, especially in preterm pregnancies. Further research is needed to establish the predictive value of serum ferritin and to elucidate the underlying mechanisms of its association with preeclampsia.

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REFERENCES

1. *Soule L. The Johns Hopkins Manual of Gynecology and Obstetrics, 2nd edition. Philadelphia: Lippincott Williams and Wilkins; 2002. pp 183-193.*
2. *Samsudoin L, Rouf S, Khatun H. Perinatal Outcome of Eclampsia Patients. Bangladesh J. Obstet and Gynaecol. 1995;10(2):65-72.*
3. *Redman CW, Roberts JM. Management of pre-eclampsia. The Lancet. 1993;341(8858):1451-4.*
4. *Sumpaico WW. Management of pregnancy-induced hypertension. In Ratnam S.S, Rao B and Arunlkumasan S. (editors), Obstetrics and Gynaecology for Postgraduates, 2nd Edition vol I Chennai; Orient Longman Ltd; 1999; pp 56-67.*
5. *Greer IA. Pregnancy induced hypertension turnbulls obstetrics 3rd edition. In G. Chamberlin. PJ Streer. 2001;21:33.*
6. *Robertson WB, Khong TY. Pathology of the uteroplacental bed. Hypertension in pregnancy. 1987:101-13.*
7. *ZEEMAN GG, DEKKER GA. Pathogenesis of preeclampsia: a hypothesis. Clinical Obstetrics and Gynecology. 1992 Jun 1;35(2):317-37.*
8. *Roberts JM, Taylor RN, Musci TJ, Rodgers GM, Hubel CA, McLaughlin MK. Preeclampsia: an endothelial cell disorder. American journal of obstetrics and gynecology. 1989 Nov 1;161(5):1200-4.*
9. *Warden M, Euerle B. Preeclampsia (toxemia of pregnancy). E-medicine Journal. 2002;3:203-10.*
10. *Arias F. Preeclampsia and eclampsia. In: Arias F.(editor). Practical Guide to High-Risk Pregnancy an Delivery. 2nd Edition. Bangalore: Harcourt Brace and Company Asia Pvt Ltd; 1997. pp 183-210.*
11. *Milman N, Agger AO, Nielsen OJ. Iron status markers and serum erythropoietin in 120 mothers and newborn infants: effect of iron supplementation in normal pregnancy. Acta obstetricia et gynecologica Scandinavica. 1994 Jan 1;73(3):200-4.*
12. *Nelson-Piercy C. Hypertension in preeclampsia. In: Nelson-Piercy C. (editor) Handbook of*

Obstetric Medicine, 2nd Edition, London, Martin Dunitz Ltd; 2002 • pp.3-21.

13. *Hubel CA, Roberts JM, Taylor RN, Musci TJ, Rogers GM, McLaughlin MK. Lipid peroxidation in pregnancy: new perspectives on preeclampsia. American journal of obstetrics and gynecology. 1989 Oct 1;161(4):1025-34.*
14. *Rifaha D, Akhter N, Rahman MR, Khan NJ, Akter S. Yeasmin Dil Jannat, Zhuma Rani Paul, Tashmin Tamanna (2023). Serum Ferritin and Serum Iron Level in Preeclampsia. Sch Int J Obstet Gynec.;6(5):182-7.*
15. *Paul R, Moonajilin MS, Sarker SK, Paul H, Pal S, Paul S. Association between Serum Ferritin and Pre-eclampsia. Bangladesh Med J [Internet]. 2018:18-24.*
16. *Zafar T, Iqbal Z. Iron status in preeclampsia. The Professional Medical Journal. 2008 Mar 10;15(01):74-80.*
17. *Konjin AM. Iron metabolism in inflammation. Bailliiers clin Haematolog. 1994;7(4):829-49.*
18. *Fatima N, Islam F, Noor L, Das SR, Zeba D, Zesmin F. Serum Ferritin in Preeclampsia and Eclampsia: A Case Control Study.*