Oriental Renaissance: Innovative, educational, natural and social sciences
SJIF 2023 = 6.131 / ASI Factor = 1.7
(E)ISSN:2181-1784
www.oriens.uz
3(1), Jan., 2023

PROTEINURIA AND ADVERSE MATERNAL AND NEONATAL OUTCOMES IN PRE-ECLAMPSIA

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ABSTRACT

Objective: *to investigate whether or whether there is a correlation between proteinuria and the maternal and neonatal outcomes of pre-eclamptic conditions in pregnant women.*

Patients who were beyond 20 weeks of gestation and had been diagnosed with pre-eclampsia were included in this retrospective analysis. These patients had been admitted to the department of obstetrics and gynecology No1.

A total of 265 patients were enrolled, 203 of whom were diagnosed with pre-eclampsia and were included in the final analysis. These 203 patients were split into two groups: patients who had proteinuria (n = 183, 90.3%), and patients who did not have proteinuria (n = 20, 9.7%). 5-minute old infant When compared with the group that did not have proteinuria, the group that did have proteinuria had significantly lower Apgar scores (9.39 versus 9.91). Patients who had proteinuria had a significantly higher rate of births before 37 weeks of gestation (50.80% versus 30.0%), but the incidence of preterm membrane rupture was significantly lower (3.8% versus 25.0%). Patients who did not have proteinuria had a significantly lower rate of births before 37 weeks of gestation.

Keywords: *pre-eclampsia, proteinuria, adverse, outcomes, neonatal.*

INTRODUCTION

After 20 weeks of gestation, pre-eclampsia is diagnosed when there is a sudden start of high blood pressure together with either proteinuria or end-organ failure. This condition is a leading cause of mortality and morbidity in both the mother and the newborn. 12 Approximately 4.6% of pregnancies across the world are connected with pre-eclampsia3, and the diagnosis of pre-eclampsia has traditionally hinged on hypertension and consequent proteinuria in the pregnant woman. In a pregnancy that is complicated by pre-eclampsia, the mother's organs, including the lungs, liver, kidneys, heart, and even the systemic vasculature and coagulation, are more likely to be damaged by inflammation and endothelial dysfunction. 4 The clinical manifestations of pre-eclampsia vary from person to person. For instance, some

patients have the clinical features of isolated gestational proteinuria with an absence of hypertension. Other patients, on the other hand, who initially exhibit proteinuria either go on to develop hypertension later on or exhibit both hypertension and proteinuria at the same time. 4 After the placenta is delivered, the majority of the difficulties that are connected with pre-eclampsia disappear. This is a cause for celebration. 5

Urinary protein excretion does not alter considerably throughout a normal pregnancy. Urinary protein excretion is deemed abnormal during pregnancy when it is greater than 300 mg per day or when a positive dipstick test result is obtained at a 1+ level. 6

Prior to 2013, pre-eclampsia was categorized as either moderate or severe depending on the degree of proteinuria and hypertension that were present. In addition, a proteinuria score of greater than 5g/24 hours was considered to be diagnostic of severe pre-eclampsia. [7] Proteinuria was previously considered an important diagnostic criteria for pre-eclampsia; however, in 2013, the American College of Obstetricians and Gynecologists decided to eliminate this need. 7,9 Proteinuria and foetal growth restriction cannot be considered as an indication of the outcome of a pregnancy according to the most recent national and international recommendations. This is the case even if the presence of both conditions is necessary for the diagnosis of pre-eclampsia. [10] According to the International Society for the Study of Hypertension in Pregnancy (ISSHP), the current criteria for the diagnosis of pre-eclampsia are as follows: systolic blood pressure >140 mmHg or diastolic blood pressure >90 mmHg with one or more new onset conditions after 20 weeks' gestation, such as proteinuria (>0.3g/day), other maternal organ dysfunction (renal insufficiency, liver involvement, neurological complications, and (foetal growth restriction). 10 The association between proteinuria and the outcomes associated with pregnancy when pre-eclampsia is present is, to the best of the current writers' knowledge and understanding, still unclear.

In pregnant women who were diagnosed with pre-eclampsia, the purpose of this study was to investigate whether or not there was a connection between proteinuria and maternal or newborn outcomes.

Patients and methods

Study population

Patients who were admitted to the department of obstetrics and gynecology №1 between January 2016 and January 2021 were included in this retrospective study. These patients had pre-eclampsia diagnosed in accordance with ISSHP criteria, and they were pregnant for more than 20 weeks at the time of the study. Patients were

enrolled one after the other, and the following criteria served as the clinical inclusion standards: (1) having reached the age of 18; (2) having a pregnancy that was at least 18 weeks along; and (3) having satisfied the requirements for a diagnosis of pre-eclampsia. Patients were not considered for the study if they had serious difficulties related to pregnancy, as well as severe issues related to their heart, liver, or kidneys. The protocol for the study was given its stamp of approval by the Ethics Committee of Samarkand State Medical university (EC.og-2015-002), and each patient gave their written informed permission for the study.

Study protocol

All of the participants in the study had their basic demographic and clinical data collected from their clinical records. This included their age, gravidity (defined as carrying a pregnancy to a viable gestational age [>24 weeks]), parity (defined as carrying a pregnancy to a parity), body mass index (BMI), newborn weight, and Apgar score. Patients diagnosed with pre-eclampsia were separated into two groups: those patients who had proteinuria and those patients who did not have proteinuria. All of the patients had their pre-eclampsia risk factors and perinatal outcomes analyzed. These factors include nulliparity, age, intrauterine growth restriction, preterm membrane rupture, birth before the 37th week of pregnancy, foetal distress, and transfer to a neonatal intensive care unit.

Statistical analyses

The data are displayed as either n (percentage prevalence), mean standard deviation, or median (range), and all statistical analyses were carried out with R studio version 3.6.2. The Kolmogorov-Smirnov test was utilized in order to determine whether or not the distribution of the continuous variable was normal. The Student's t-test was utilized in the analysis of normally distributed continuous variables, whilst the Mann-Whitney U-test was utilized in the examination of data devoid of normal distribution. The t-test and Fisher's exact test were utilized in order to evaluate the categorical variables. It was determined that statistical significance existed when the P value was less than 0.05.

RESULTS

At the beginning of the study, there were a total of 203 individuals recruited who were diagnosed with pre-eclampsia. Five of these individuals were deemed ineligible for the study (one case had no albuminuria and four cases had no hypertension). Therefore, the final analyses comprised data from 199 pre-eclamptic individuals who satisfied the research's criteria for participation and were included in the study. Among the individuals who were included in the study, 183 (90.3% of the

total) were identified as having proteinuria (the proteinuria group), whereas 20 (9.7% of the total) did not have proteinuria (group without proteinuria).

In Table 1, the demographic and clinical features of both groups are compared and contrasted. There were no statistically significant differences between the groups in terms of BMI, the number of babies born, the amount of time that passed between the diagnosis and delivery, the weight of the newborns, or their first minute Apgar scores. Despite this, there was a statistically significant difference between the groups in terms of maternal age as well as Apgar scores in the fifth minute. Patients who had proteinuria were younger than those who did not have proteinuria (p = 0.001), and the newborn fifth minute Apgar scores were significantly lower in the proteinuria group (P = 0.001), despite the fact that all fifth minute scores were within the clinically normal range (Table 1).

Table 1. Demographic and clinical characteristics

Variable	With proteinuria (n = 183)	Without proteinuria (n = 20)	p-value
Age, years	27.72 ±4.09	32.49 ±4.23	<0.001
Body mass index, kg/m^2	27.18 ±3.1 1	28.24 ±3.37	>0.05
Gravidity, times	33 (31-37)	36 (31-39)	>0.05
Parity, times	0.42 ±0.71	0.55 ±0.60	>0.05
Newborn weight, g	2621.64 ±716.29	2821.13 ±792.44	>0.05
Apgar score 1st min	9.25 ± 1.51	9.51 ± 1.23	>0.05
Apgar score 5th min	9.39 ±0.96	9.91 ±0.42	< 0.001

In Table 2, we compare the pre-eclampsia risk variables and perinatal outcomes of the two patient groups. There were no statistically significant differences between the groups in the rates of nulliparity, age over 40 years, intrauterine growth restriction (in terms of amniotic fluid index 50, and mean values for biparietal diameter and abdominal circumference), as well as the rates of foetal distress and use of neonatal intensive care unit. Therefore, pre-eclampsia with or without proteinuria was shown to be equivalent in terms of the aforementioned risk factors and outcomes in the group that was examined in this study. Patients diagnosed with preeclampsia who also had proteinuria had a substantially greater risk of patients delivering at a gestational age of less than 37 weeks compared to patients diagnosed with preeclampsia who did not have proteinuria (50.8% versus 31.6%, P = 0.024). However, there was a statistically significant difference in the risk of preterm

membrane rupture between those with proteinuria and those who did not have it (3.8% versus 13.2%, P = 0.01).

Table 2. Pre-eclampsia risk factors and perinatal outcomes in pregnant females

Variable	With proteinuria (n = 183)	Without proteinuria (n = 20)	p-value
Nulliparity	119 (65.0)	10 (50.0)	>0.05
Age, >35 years	6 (3.3)	1 (5.0)	>0.05
Preterm rupture of membrane	7 (3.8)	5 (25.0)	<0.0l
Gestational age at delivery, <37 weeks	93 (50.8)	6 (30.0)	0.024
Fetal distress	26 (14.2)	5(25.0)	>0.05
Neonatal intensive care unit	65 (35.5)	9 (45.0)	>0.05

DISCUSSION

Because placental delivery is still the therapy for pre-eclampsia, it is essential to conduct an accurate assessment of the severity of pre-eclampsia, investigate the variables that will impact the prognosis, and choose the most appropriate moment to deliver the placenta [12,13]. A systemic arteriolar spasm is the pathological change that occurs in pregnant women who have pre-eclampsia. This change can involve any and all organs, but the kidney is the organ that is impacted the majority of the time. As a consequence of renal arteriolar spasm, renal perfusion volume and glomerular filtration rate are both reduced. Additionally, endothelial cells are harmed, the permeability of the glomerular basement membrane is elevated, and selective proteinuria develops [12,13]. Because, in general, an increase in the amount of protein found in the urine indicates a rise in the degree of kidney function impairment, the severity of pre-eclampsia may be regarded to be directly connected with the amount of protein found in the urine if proteinuria is present.

Proteinuria has been linked to poor perinatal outcomes in a number of studies; however, the exact relationship between proteinuria and these outcomes has not been conclusively established. This is despite the fact that these studies have found that high levels of proteinuria are associated with poor perinatal outcomes.

814 Patients diagnosed with pre-eclampsia who participated in the current research were assigned to one of two groups, determined by whether or not they had proteinuria. It was found that patients with pre-eclampsia accompanied by proteinuria were significantly younger than patients without proteinuria, which suggests that age

may be an important factor affecting the presence or absence of proteinuria in pre-eclampsia. Patients with pre-eclampsia without proteinuria were found to be significantly older than patients without proteinuria. Patients with pre-eclampsia who had proteinuria had a considerably greater incidence of preterm membrane rupture when compared to patients who did not have proteinuria. This difference was statistically significant. Therefore, accurate evaluation of the severity of pre-eclampsia, including the presence or absence of proteinuria, may assist obstetricians in developing more effective protocols for patient care.

According to the findings of this particular study, patients who had proteinuria had considerably greater rates of the perinatal unfavorable impact of having their babies delivered before the 37th week of pregnancy. Higher mean levels of proteinuria have been demonstrated to be related with unfavorable effects on the mother,15 maternal proteinuria may be a strong predictor for pre-eclampsia,16 and the risk of severe perinatal outcomes is higher yet in women who have proteinuria. [17] The current study indicated that the fifth minute newborn Apgar scores were statistically different between individuals with pre-eclampsia who had proteinuria and those who did not have proteinuria; nonetheless, the scores were clinically normal in both groups. It has been demonstrated that proteinuria during pregnancy increases the risk of maternal problems, and it has also been reported to be connected with a substantial incidence of infant Apgar scores below 7. [18] When compared with moderate proteinuria, severe and massive proteinuria were shown to be related with a considerably greater prevalence of Apgar scores below 7, but mild proteinuria was not observed to have this association. 19 On the other hand, several research have revealed that there is not a significant link between proteinuria and the result in pregnant women and foetuses. [20-23]

The findings of the current study could be constrained by a number of different reasons. Because the data were collected in a retrospective manner, some relevant variables were not taken into account, and thirdly, the data were not adjusted for two baseline variables. First, the study was a retrospective design, and the single-center setting with a relatively small sample size may limit the wider generalizability of the results. Second, some relevant variables were not taken into account because of the retrospective data collection (maternal age and Apgar score). The adverse prenatal outcomes of proteinuria in pre-eclampsia progression should be investigated in future research using a prospective multi-center study with a larger sample size, a relatively large number of parameters, and the presence of long-term patient outcomes.

CONCLUSION

Although being one of the most prominent signs of pre-eclampsia, proteinuria does not always occur concurrently with hypertension; in fact, there are some instances in which hypertension is the only symptom present. According to the findings of this study, patients who have pre-eclampsia and proteinuria are at an increased risk of having an unfavorable perinatal outcome such as premature delivery before 37 weeks of gestation. Furthermore, the study found that the incidence of preterm membrane rupture was significantly higher in patients who had pre-eclampsia and proteinuria than in patients who did not have proteinuria. The findings indicate that the presence of proteinuria in pregnant women with pre-eclampsia may have a negative impact on the outcomes for both the mother and the newborn.

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