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Prevalence and Risk Factors of Preeclampsia in Iraqi Deliveries

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Abstract*: This retrospective study showed that preeclampsia (PE) was prevalent in 4.4% of deliveries (pregnant women referred for obstetrics) in Najaf, Iraq. The study associated PE with a number of clinical and biochemical factors, such as high blood pressure (systolic blood pressure (154.68 ± 19.362) and diastolic blood pressure (100.48 ± 11.281)), high blood sugar levels (139.503 ± 45.9697), elevated liver enzymes (aspartate aminotransferase (AST) (63.2423 ± 45.74961), alanine aminotransferase (ALT) (76.4910 ± 64.01945), alkaline phosphatase (ALP) (223.7148 ± 81.74938)), low red blood cell count (3.9265 ± 0.76012) and platelet count (198.081 ± (86.8427)), and high protein in urine (1-4) ($p < 0.01$).*

The study also showed that deliveries aged 26 to 35 years, nulliparous women (58.1%), singleton pregnant women (93.5%), and women with a previous abortion (12.9%) were more likely to develop PE. These women were also more likely to undergo cesarean section (80.6%) and to recover longer (2.35 ± 0.709). The study also included a significant increase in maternal complications in the PE group: gestational diabetes; infection; renal disease and chronic hypertension. As for neonatal outcomes, preterm birth (67.7%), low birth weight babies (38.7%), and still birth (9.7%) were significantly higher in the PE group. In conclusion, this study aimed to investigate the prevalence of PE among deliveries in Iraq, and to compare the maternal clinical and biochemical parameters, obstetric outcomes and neonatal outcomes between deliveries with and without PE. Early identification of these risk factors and taking appropriate preventive measures are crucial to improving maternal and fetal health.

Keywords: *Preeclampsia, Prevalence, Risk Factors, Deliveries, Iraq.*

I. Introduction

Preeclampsia (PE) is a human phenomenon that usually begins after 20 weeks of gestation and is characterized by hypertension with proteinuria and is a leading cause of maternal and neonatal mortality. The clinical syndrome of this disease begins with abnormal placental formation, which leads to the secretion of antiangiogenic factors such soluble endoglin (sEng) and soluble fms-like tyrosine kinase-1 (sFlt-1). These factors impair endothelial function, cause endothelial constriction, and affect the immune system, leading to serious complications in various maternal organ system and the fetus [1,2,3]. such as placental abruption, disseminated intravascular coagulation, cerebrovascular and cardiovascular disease, renal and liver failure, hemolysis, elevated liver enzymes, and low platelet levels (HELLP syndrome) [4]. In addition, placental insufficiency and generalized endothelial dysfunction can result in neonatal morbidity and mortality such as non-reassuring fetal status, fetal growth restriction with oligohydramnios, low birth weight, preterm birth, severe birth asphyxia, intrapartum death, and stillbirth. However, the pathophysiology is not yet known [5,6]. Therefore, we attempted to conduct this study in a resource-limited setting in Iraq to explore the prevalence of preeclampsia, in addition to some clinical parameters such as platelet count, red blood cell count, liver enzymes, systolic and diastolic blood pressure with proteinuria and maternal outcomes including maternal age, parity, type of pregnancy and mode of

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delivery by cesarean section, recovery time, and neonatal outcomes including low birth weight, stillbirth, and preterm birth. Maternal complications included gestational diabetes; infection; renal disease and chronic hypertension.

II. Methods

2.1. Study design and participants

A retrospective descriptive study was conducted in Al-Zahraa Teaching Hospital and some private clinics in Najaf Governorate, Iraq. Deliveries women were diagnosed with PE from 2012 to 2016. Data were collected and examined from medical records. The collected information was divided into three categories. The first category was sociodemographic characteristics which included maternal age (year), gestational age (week), number of parities, systolic blood pressure (SBP: mmHg), diastolic blood pressure (DBP: mmHg), weight (kg) and height (cm). The second category was collected clinical features including platelet count (PLT), red blood cell count (RBC), liver functions (aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP)), blood sugar levels, and urine protein by tape measure. Perinatal outcomes were recorded after delivery in the third category, including mode of delivery (vaginal delivery and cesarean section); recovery time; previous abortion (categorized as yes or no); maternal complications such as infection (yes or no); gestational diabetes (yes or no); chronic hypertension (yes or no) and renal disease (yes or no); neonatal outcomes such as stillbirth (yes and no), and baby weight (kg).

2.2. Statistical analysis:

Data were analyzed using SPSS version 26. Continuous variables were presented as median and mean ± SD used an independent t-test. Categorical variables were presented as number, and percentage used crosstabs/ Chi-square test. Results with $p < 0.05$ were considered significant.

2.3. Definitions

According to gynecological guidelines, PE is diagnosed as new-onset hypertension (SBP ≥140 mmHg or DBP ≥90 mmHg on 2 occasions at least 4 hours apart) after 20 weeks of gestation with or without proteinuria (≥300 mg per 24-hour urine collection, protein/creatinine ratio ≥.3, or dipstick reading of 1+). Delivery of a live neonate before full 37 gestational weeks was considered as preterm delivery. Low baby weight was concluded when it was <2500 g at delivery. Maternal age was categorized into 3 groups; Teenagers (≤25 years), younger (26- 35 years), and elderly (> 35 years).

1. Results

A total of 700 deliveries (aged 18-59) were enrolled in the study. The total deliveries with PE were 31 (4.4%). Table 1 presents the clinical and biochemical parameters of deliveries with or without PE. These criteria, such as high blood pressure (SBP (154.68 ± 19.362), DBP (100.48 ± 11.281)), high blood sugar levels (139.503 ± 45.9697), elevated liver enzymes (AST (63.2423 ± 45.74961), ALT (76.4910 ± 64.01945), ALP (223.7148 ± 81.74938)), low RBC count (3.9265 ± 0.76012) and platelet count (198.081 ± (86.8427)), and high protein in urine. (1-4) ($p < 0.01$) in the PE group.

Table 1: Clinical and biochemical parameters of PE and non-PE group

Variables	Non-PE group n= 669 (95.6%)	PE group n= 31(4.4%)	*P*-Value
RBC	4.4594±0.41697	3.9265±0.76012	<0.001**
Plat, 10^9/L	246.868±36.4435	198.081±86.8427	<0.001**
AST, IU/L	19.3479±4.15955	63.2423±45.74961	<0.001**
ALT, IU/L	38.2221±8.20977	76.4910±64.01945	<0.001**
ALP	58.9056±46.98768	223.7148±81.74938	<0.001**

SBP	120.30±8.251	154.68±19.362	<0.001**
DBP	79.55±5.649	100.48±11.281	<0.001**
Gluc GP (mg/dl)	93.805±10.1301	139.503±45.9697	<0.001**
Median Urine protein,+	0(0-2)	2(1-4)	<0.001**

Our results (Table 2) comparing obstetric outcomes between deliveries with PE and non-PE showed significant differences. Deliveries with a PE (51.6%) were younger (26-35 years), 58.1% more likely to have a nulliparous woman, 93.5% more likely to have a Singleton pregnancy, and 12.9% more likely to have a previous abortion. They were also 80.6% more likely to have a cesarean section, had a longer hospital stay of 2.35 ± 0.709 days, and develop pregnancy complications such as infections (87.1% vs. 3.1%), gestational diabetes (48.4% vs. 1.0%), renal disease (29.0% vs. 0.4%), and chronic Hypertension (6.5% vs. 0.0%) compared to non-PE.

Table 2: Obstetric outcomes of PE and non-PE group

Obstetric outcomes		PE group n= 31(4.4%)	Non-PE group n= 669 (95.6%)	p-value
Maternal age (y) (n/%)	≤ 25	10 (32.3%)	294 (47.4%)	0.02*
	26 - 35	16 (51.6%)	302 (48.7%)	
	> 35	5 (16.1%)	24 (3.9%)	
Parity (n/%)	Nulliparity	18 (58.1%)	224 (33.5%)	0.009*
	Multiparity	13(41.9%)	445(66.5%)	
Pregnancy Type (n/%)	Twin	2 (6.5%)	1(0.1%)	<0.001**
	Singleton	29(93.5%)	668(99.9%)	
Previous Abortion (n/%)	yes	4(12.9%)	1(0.7%)	0.003*
Delivery Modes (n/%)	Cesarean section	25 (80.6%)	350 (52.3%)	0.004*
	Vaginal delivery	6(19.4%)	319(47.7%)	
Recovery time (M±SD)		2.35±0.709	1.52±0.500	<0.001**
Complications during delivery				
Infection n (%)	yes	27(87.1%)	21(3.1%)	<0.001**
Gestational diabetes- n (%)	yes	15(48.4%)	7(1.0%)	<0.001**
Renal disease– n (%)	yes	9(29.0%)	3(0.4%)	<0.001**
Chronic Hypertension-n (%)	yes	2(6.5%)	0(0.0%)	<0.001**

The results in Table 3 also showed a strong association between PE and an increased risk of perinatal outcomes. Babies born to deliveries with PE (38.7%) were significantly more likely to be born with low birth weight (<2500 g), 67.7% more likely to be born preterm, and a significantly increased rate of stillbirth (9.7%) compared to those non-PE.

Table 3: Neonatal outcomes of PE and non-PE group

Perinatal outcomes		PE group n= 31(4.4%)	Non-PE group n= 669 (95.6%)	p-value
Low Birth weight (g) (n/%)	<2500	12 (38.7%)	33 (4.9%)	<0.001**
	>2500	19(61.3%)	636(95.1%)	
Still births (n/%)	yes	3(9.7%)	13(1.9%)	0.028*
Preterm birth (n/%)	yes	21(67.7%)	55(8.2%)	<0.001**

III. Discussion

Our study showed that the prevalence of PE (4.4%) was higher than some states such as Jordan (1.3%) [7], Niger (1.08%) and Angola (0.85%) [8] and lower than other countries such as Brazil (8.23%), Mexico (7.29%) and China (15%) [8, 9]. Previous studies suggest that these differences may be due to factors such as maternal health status, education level and genetic factors [8].

We also showed a significant increase in mean systolic and diastolic blood pressure in PE deliveries. In addition, a significant increase in median urine protein was found, and this result was consistent with the result of [1], which showed that PE is characterized by hypertension with proteinuria. Recent evidence also suggests that placental antiangiogenic factors in PE contribute to glomerular endothelium, proteinuria, and hypertension during the course of the disease [10].

The study showed a close association between PE and decreased RBC and platelet counts and increased levels of liver enzymes such as AST, ALT, and ALP in serum, which is consistent with previous studies [11, 12] that showed a significant decrease in platelet count in the PE case, as well as a previous study that observed a significant increase in serum ALP levels in the PE case [13]. The decrease in platelet count is attributed to abnormal activation of the coagulation system and its increased consumption, while the increase in maternal liver enzymes is attributed to damage to the cells that nourish the fetus as a result of changes in placental blood flow [14]. All of these pathological changes are very similar to those that occur in Hemolytic erythropoietic leukemia, elevated liver enzymes, and low platelets (HELLP) syndrome, a dangerous condition that affects some pregnant women and overlaps with PE [15].

Our results showed an unexpected association in the incidence of PE among deliveries aged 25–36 years. This finding was in contrast to previous studies [16] that reported that PE was usually associated with advanced maternal age (>35 years). Another study reported that poor pregnancy outcomes were associated with marriage before the age of 16 years [17]. Factors other than age, such as underlying medical conditions, environmental exposures, or lifestyle habits, may play an important role in the occurrence of PE in deliveries in this age group. Understanding this condition requires further research to investigate these factors and assess their impact on maternal and fetal health.

Our study results showed that nulliparous women (58.1%) were more likely to develop PE than women with multiparity (41.9%). However, we did not find a strong association between multiple pregnancy (twins) and PE in this study. On the one hand, our results are consistent with those of Lee et al. [18], who showed that nulliparous women were more likely to develop PE. On the other hand, our results contradict their results [18], who indicated an association between multiple pregnancy (twins) and the risk of PE. These results suggest that factors other than the number of fetuses may play a greater role in increasing the risk of PE in nulliparous women.

Surgical delivery by cesarean section was significantly higher in the PE group (80.6%) compared to non-PE (52.3%). This is accepted by other scholars who found that the cesarean delivery rate was higher in the PE group even with medical reasons to reduce complications [21] [20]. Many studies revealed the same result where they found that intervention by induction of labor and elective cesarean delivery was associated with lower morbidity and improved maternal and fetal outcomes [22]. Regarding recovery from illness, there was a difference in hospital discharge times between the two groups, with a mean of about two days (2.35±0.709). This suggests that preeclampsia itself plays a role in recovery rate. While other factors can affect the length of hospital stay such as

the severity of preeclampsia, complications during delivery, the presence of comorbidities, or social factors, regardless of the underlying illness.

As for neonatal outcomes, low birth weight was significantly higher in deliveries with PE when compared to deliveries without PE (38.7% vs. 4.9%, respectively). Our finding was consistent with others [19, 20] who demonstrated a significant association between PE and low birth weight. Preterm birth was also more pronounced in PE (67.7%) than in non- PE (8.2%). This is consistent with previous findings [19,23-25] that have confirmed an association between preterm birth and the risk of PE. Stillbirth, the final outcome in our study, was approximately 9.7% compared to that in [24], which reported a fetal death rate of 2.8%. Another study reported that the increased risk of stillbirth and neonatal death was higher among women with PE than among those without PE [19] This difference may be due to differences in the approach to monitoring and managing PE. Pregnant women with PE tend to have adverse antenatal outcomes.

Our study also included a significant increase in maternal complications in the PE group: gestational diabetes, infection, kidney disease, and chronic hypertension. Our study supports the finding [24] that showed an increased incidence of kidney disease in women with PE. Our study also supports previous findings [26, 27] that showed an association between chronic hypertension, diabetes, and the development of PE. In addition, we found an increase in mean blood sugar level in the PE group, which is consistent with another study [27].

IV. Conclusion

The study showed a significant increase in cases of early PE among women in the middle age group. These results also indicate that low platelet and red blood cell counts and elevated liver enzymes may be risk factors for PE. High blood pressure, protein in the urine, and pregnancy outcomes such as premature birth and low birth weight were also observed in deliveries with PE, which emphasizes the importance of early detection of this condition and close medical follow-up to reduce its risks to the mother and fetus.

V. References

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