



Iraqi Women with Preeclampsia: Maternal and Neonatal Outcomes

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Abstract

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BACKGROUND: Preeclampsia (PE) is a possible etiology of obstetrical and neonatal complications which are increased in resource-limited settings and developing countries.

AIM: We aimed to find out the prevalence of PE in Iraqi ladies and specific outcomes, including gestational weight gain (GWG), cesarean section (CS), preterm delivery (PD), and low birth weight (LBW).

METHODS: All singleton pregnant women visiting our tertiary center for delivery were involved over 3 years. PE women were compared with non-PE ladies. Complete history and examination were done during pregnancy and after delivery by the attending obstetrician and neonatologist with full documentation in medical records.

RESULTS: PE prevalence was 4.79%, and the affected women had significant ($p < 0.05$) higher age, body mass index, and GWG, but lower gestational age at delivery. The mean significant difference of GWG in PE and non-PE patients was 1.82 kg. PD and LBW had significant higher frequencies in PE. After considering several confounding factors, crude and adjusted odds ratio (OR) of PE with 95% confidence interval (95% CI) were significant in CS (crude OR = 2.25 and 95% CI = 1.42-2.87 while adjusted OR = 2.89 and 95% CI = 1.43-3.06) and PD (crude OR = 2.41 and 95% CI = 1.73-2.46 while adjusted OR = 3.96 and 95% CI = 2.65-6.37). On the other hand, only the crude model touched significance in LBW (crude OR = 3.67 and 95% CI = 2.51-4.99).

CONCLUSIONS: Prevalence of PE in Iraqi pregnant females was higher than other neighboring developing countries. In PE ladies, maternal parameters, including GWG and operative delivery, and neonatal complications, including PD and LBW, were significantly higher than pregnant women without PE.

Introduction

Preeclampsia (PE) is a human phenomenon that occurred during pregnancy after 20 weeks of gestation and characterized by elevated blood pressure and presence of protein in urine. It carries a significant impact on maternal and neonatal health [1].

On an annual basis, it is estimated that PE results in up to one million maternal deaths and half a million fetal and early newborn deaths. PE affects people differently with various geographical locations ranging from 3% in the United States till 58% in Zimbabwe [2], [3], [4].

The abnormal placental tissue development is the main pathology behind PE especially if it occurred before 34 gestational weeks [5].

Many risk factors are associated with PE such as previous PE history, family history of pregnancy hypertensive disorders, multiple pregnancy, nullipara, advanced maternal weight and age, donor pregnancy (oocyte), and history of pre-pregnancy diabetes mellitus, hypertension, and renal disorders [6].

Exaggerated weight gain during pregnancy, increased risk of operative delivery, obstetrical bleeding problems, and increased maternal mortality are the main maternal PE complications, while fetal and neonatal adverse events include perinatal death, intrauterine growth limitation, and premature birth [7], [8].

Most papers concerned about PE came from high-income countries. In fact, some additional factors in low-income environments may affect PE and its adverse obstetrical and neonatal outcomes such as maternal anemia, recurrent infections, and poor education level [9], [10].

Insufficient health system in developing countries regarding prenatal care and absence of effective management plans of obstetrical diseases like PE may increase subsequent complications [11].

Therefore, we tried to conduct this study in a resource-limited setting in Iraq to explore the prevalence of PE, in addition to certain maternal outcomes, including gestational weight gain (GWG) and operative delivery by cesarean section (CS), and neonatal outcomes, including preterm delivery (PD) and low birth weight (LBW).

Methods

Patients and basic characteristics

This is a cross-sectional (population-based) study took place at the Center of Obstetrics and Gynecology in Medical City Hospital, Baghdad, Iraq, from the start of March 2017 till February 29, 2020. This tertiary hospital used to receive cases referred from various parts of the country, especially Baghdad which is the capital of Iraq.

All singleton pregnant ladies who had been diagnosed with PE visiting our center for delivery were involved and compared with healthy pregnant women without PE. Full medical history and examination, including body weight before pregnancy and at delivery, and the decision of delivery mode (vaginal or operative by CS) were made by the attending obstetrician and put down in the hospital files. The targeted neonatal outcomes (PD and LBW) were observed by the attending neonatologist and documented in the records.

Definitions

PE was diagnosed when blood pressure exceeded 140/90 mmHg and presence of more than 0.3 g/day of urinary protein later in pregnancy after 20 weeks' gestation [12]. Body mass index (BMI) was estimated according to the following equation: Body weight (kg)/height (m²) [13]. Delivery of a live neonate before full 37 gestational weeks was considered as PD [12]. LBW was concluded when it was <2500 g at delivery [14].

Maternal age, parity, gravidity, occupation, educational status, pre-gestation BMI, previous abortions, and gestational age at delivery were considered as confounding factors that were adjusted using logistic regression analysis.

Ethical approval

All participants gave their consent to be part of this study which was conducted according to the Helsinki Declaration and approved by the ethical and scientific committees of the College of Medicine and Al-Kindy College of Medicine at University of Baghdad.

Statistical analysis

Stata statistical software (Stata Corp LP, College Station, TX Stata) was used to complete the statistical analysis. Frequencies (%) represented categorical data, while continuous variables were presented as mean \pm standard deviation (SD). p value (two-sided) < 0.05 was assumed significant. The association between PE and the targeted outcomes of this study which were GWG, operative delivery by

CS, PD, and LBW was assessed using odds ratio (OR) in crude and adjusted forms. Logistic regression approaches (univariate and multiple) were performed in the analysis. The fitness of models of logistic regression was examined through applying Akaike Information Criterion (AIC). The best model was accompanied with the lowest AIC [15].

Results

Of 24,783 total involved ladies, 1186 pregnant women had PE representing a prevalence of 4.97%.

Table 1 shows the general characteristics of our sample of women with and without PE. Older mean age was significantly ($p < 0.05$) found in PE than non-PE women (29.47 ± 6.32 years and 28.14 ± 6.85 years, respectively). PE ladies had significant lower gestational age at delivery. BMI before pregnancy was significantly higher in PE versus non-PE group (29.05 ± 6.11 vs. 26.34 ± 5.63) and GWG during pregnancy did the same (13.67 ± 5.81 kg vs. 11.44 ± 4.79 kg).

Table 1: General features of involved cases

Maternal variable	PE women, n = 1186	Non-PE women, n = 24,783	p-value
Age (years), mean \pm SD	29.47 \pm 6.32	28.14 \pm 6.85	< 0.05
Gravidity, mean \pm SD	4.67 \pm 2.74	4.96 \pm 3.03	0.72
Parity, mean \pm SD	3.81 \pm 1.46	3.6 \pm 1.57	0.54
Previous spontaneous abortions, n (%)	0.89 \pm 0.57	0.83 \pm 0.49	0.26
Occupation, n (%)			
Employed	177 (14.92)	3941 (15.90)	0.63
Housewife	1009 (85.08)	20842 (84.10)	
Education, n (%)			
Literate	892 (75.21)	19089 (77.02)	0.38
Illiterate	294 (24.79)	5694 (22.98)	
Pre-pregnancy BMI, mean \pm SD	29.05 \pm 6.11	26.34 \pm 5.63	< 0.05
Gestational age at delivery (weeks), mean \pm SD	36.52 \pm 3.45	38.13 \pm 5.34	< 0.05
GWG in kg, mean \pm SD	13.67 \pm 5.81	11.44 \pm 4.79	< 0.05
Mode of delivery, n (%)			
Vaginal	240 (20.24)	11892 (47.98)	< 0.05
CS	946 (79.76)	12891 (52.02)	

PE: Preeclampsia, SD: Standard deviation, BMI: Body mass index, GWG: Gestational weight gain, CS: Cesarean section.

Multiple logistic regression analysis was applied to adjust the confounding factors, including maternal age, parity, gravidity, previous spontaneous abortions, education, occupation, BMI (pre-pregnancy), and gestational age at delivery. The result revealed a mean difference of (1.82 kg) of GWG in PE and non-PE patients. Furthermore, mean GWG in PE pregnant ladies was significantly higher ($p < 0.05$) than non-PE women (difference mean = 1.82 kg, 95% confidence interval [CI]: 0.69-13.21 kg)

PD was significantly occurred in a higher percentage in PE than non-PE patients (232 [19.56%] vs. 2059 [8.31%], respectively). This was also applied to LBW (193 [16.27%] vs. 1273 [5.14%], respectively), as illustrated in Table 2.

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

Outcome	PE women, n = 1186	Non-PE women, n = 24783	p-value
PD, n (%)	232 (19.56)	2059 (8.31)	<0.05
LBW, n (%)	193 (16.27)	1273 (5.14)	<0.05

LBW: Low birth weight, PD: Preterm delivery.

Crude and adjusted OR and 95% CI of CS and PD were appeared significant in PE group, while LBW showed significance in crude forms only of RR and 95% CI. These are clear in Table 3.

Table 3: Relationship between PE and selective obstetrical and neonatal outcomes

Outcome	Crude OR	Estimation 95% CI	p-value	Adjusted OR	Estimation 95% CI	p-value
CS	2.25	1.42–2.87	<0.05	2.89	1.43–3.06	<0.05
PD	2.41	1.73–2.46	<0.05	3.96	2.65–6.37	<0.05
LBW	3.67	2.51–4.99	<0.05	1.23	0.86–2.42	0.49

CI: Confidence interval, LBW: Low birth weight, PD: Preterm delivery, OR: Odds ratio, CS: Cesarean section.

Discussion

The prevalence of PE in our sample was 4.79% which was higher than neighboring countries such as Iran (4%) and Jordan (1.3%) [16], [17]. Furthermore, our prevalence was further higher than other developing countries such as Angola (0.85%) and Niger (1.08%) [9].

Higher prevalence rates than ours were found in Brazil (8.23%), Mexico (7.29), and China (15%) [9], [18].

These differences in prevalence rates might be to maternal anemia, recurrent infections, poor academic level, genetic causes, and racial backgrounds [9], [10].

Maternal age, pre-gravid BMI, and GWG were significantly high in Iraqi PE ladies in consistent with other published materials from the United States and China [19], [20], while some researchers said that larger GWG in PE pregnant women occurred only in singleton rather than twin pregnancies [21].

Here in this study, after adjustment of the above-mentioned confounding factors, mean GWG in PE patients was higher 1.82 kg than healthy pregnant women (non-PE women) which was slightly higher than 1.77 kg found in Iran [22].

Operative delivery by CS was very evident in our PE ladies (79.76%) in comparison to healthy pregnant ladies without PE (52.02%). This is consistent with other Ecuadorian scientists who claimed a high rate of CS in PE women with even iatrogenic causes to decrease complications [23]. Our CS rate in the non-PE group was similar to the local CS prevalence in Iraqi pregnant ladies [24].

When controlling for the above-mentioned confounding risks, OR of operative delivery in our PE women was 3.96. This is much higher than the Iranian figure (1.92) [22].

PD prevalence reached significance in PE with 19.56% versus 8.31% in a healthy pregnancy (without PE) in our study with an adjusted OR of 2.89. In a previous study conducted in Jordan, PD rate was 30.8% during PE and 7% during uneventful pregnancy [17].

Our adjusted OR of PD in PE group after controlling for the confounding factors was 2.89 which

was lower than 4.43 observed in Scotland [25] and 3.49 observed in Iran [26]. In Canada, the relative risk of PD during PE was 16.91, confirming the idea of higher frequencies of prematurity in PE patients [27].

In PE ladies of our sample, LBW was significantly high when compared with non-PE ladies (16.27% vs. 5.14%, respectively). Further higher results were observed in Jordan, including 32.5% for PE and 8.3% for non-PE females [17].

In general, LBW was reported by many precedent works to have a significant link with PE [28], [29].

On the contrary of other studied parameters in this study, adjusted OR of LBW in PE females was 1.23 but failed to touch significance, in contrast to 4.74 of a prior American study which was significant in the involved hyperthyroid pregnant ladies [30].

This study has the power of involving a large sized sample of pregnant women with or without PE over 3 years in a tertiary center of a developing country. Up to our knowledge, it is the biggest study done in Iraq and surrounding countries of the Middle East. Although assessing the effects of confounding factors is a powerful point, a bias of scanty data resulted from small-sized samples of some collections of exposure and outcome measurements could be considered as a limitation aspect of this study. Furthermore, diet policy consumed by recruited pregnant ladies as a confounding factor was not measured, and hemorrhagic obstetrical disorders (anti- and post-partum) as an important PE outcome were not analyzed and may be considered as limitation points.

Conclusions

Iraqi pregnant women had a higher prevalence of PE in comparison with some neighboring developing countries in the Middle East. Ladies diagnosed with PE had significant complications in regard to maternal parameters (GWG and CS) and neonatal outcomes (PD and LBW). ORs of CS, PD, and LBW were significant in crude models and after controlling for confounding factors except in LBW, where the adjusted OR could not reach significance.

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