



Preeklampsia: Maternal Risk Faktörleri ve Perinatal Sonuçlar

Preeclampsia: Maternal Risk Factors & Perinatal Outcomes

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ÖZ

Amaç: Preeklampsia (PE) gebelikte en sık görülen hipertansif hastalıktır. Preeklampsinin olumsuz maternal ve perinatal sonuçları, ulusal sağlık sistemi üzerindeki büyük yükü temsil etmektedir. Gebelerde preeklampsinin maternal risk faktörlerini belirlemek ve bu problemin maternal ve perinatal sonuçlarını bulmak.

Metodlar: Diyala ili / Irak'ta El-Mukaradia Bölgesi'ndeki Kadın Hastalıkları ve Doğum Kliniği (ZMPH)'de 1 Şubat 2017 - 31 Ocak 2018 tarihleri arasında prospektif bir izlem çalışması yapıldı. Çalışma örnekleminde preeklampsili 60 gebe ve kontrol grubu olarak 60 normal gebe alındı. PE tanısı, Amerikan Kadın Doğum Kliniği ve Jinekologlar Koleji (ACOG) PE tanı kriterlerine göre kondu.

Bulgular: Kontrole kıyasla preeklampsiyile anlamlı derecede ilişkili anne risk faktörleri, kadının yaşı, şişmanlığı ve primigravidesinde artış idi. Sezaryen doğum oranları ile preeklampsia arasında oldukça anlamlı bir ilişki vardı. Preeklampatik kadınların yenidoğanları ile düşük doğum ağırlıklı erken doğum, 1 dakikada düşük Apgar skoru, düşük 5 dakika Apgar skoru ve yenidoğan bakım ünitesine yatış arasında anlamlı bir ilişki gözlemlendi.

Sonuç: Preeklampsia için ana maternal risk faktörleri ileri derecede üreme yaşı, obezite ve primigravite iken, ortak ters maternal sonuç sezaryendir. PE'nin sık görülen perinatal sonuçları düşük doğum ağırlığı, prematürite, 1-5 dakikada düşük Apgar skorları ve yüksek NICU kabulüdür.

Anahtar Kelimeler: Preeklampsia, Obezite, Perinatal sonuç, Prematüre

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ABSTRACT

Background: Pre-eclampsia (PE) is the commonest hypertensive disorder in pregnancy. Adverse maternal and perinatal outcomes of pre-eclampsia are representing the big burden on national health system. The objectives of the study is to identify the maternal risk factors of pre-eclampsia among pregnant women as well as to find out the maternal and perinatal outcomes of this problem.

Methods: A prospective follow up study was conducted in Obstetrics & Gynecology Department (OGD) of Al-Zahraa Maternity and Pediatric Hospital (ZMPH) in Al-Muqdadia District in Diyala province/Iraq from the period 1st of February 2017 to 31st of January 2018. The study sample comprised of 60 pregnant women with pre-eclampsia and 60 healthy pregnant women as controls. The diagnosis of PE was established according to American College of Obstetricians and Gynecologists (ACOG) diagnostic criteria of PE.

Results: Maternal risk factors related significantly to pre-eclampsia in comparison to control were increased woman's age, obesity and primigravidity. There was a highly significant association between cesarean section delivery rates and pre-eclampsia. A significant association was observed between neonates of pre-eclampsia women and low birth weight preterm birth, low Apgar score at 1 minute, low Apgar score at 5 minutes and admission to neonatal care unit.

Conclusion: The main maternal risk factors for pre-eclampsia are advanced reproductive age, obesity and primigravidity, while the common adverse maternal outcome is the cesarean section. The common perinatal outcomes of PE are low birth weight, prematurity, low Apgar scores at 1 & 5 minutes and high NICU admission.

Keywords: Pre-eclampsia, Obesity, Perinatal outcome, Prematurity

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Introduction

The pre-eclampsia (PE) affects about 2–5% of women during their gestation and it is responsible for high rates of co-morbidities and death among mothers and neonates. (1,2) Worldwide, the maternal mortality rate of PE and eclampsia is reaching 14%. (3) In Iraq, 13.6% of women death at delivery is related to PE and its complications (4). In low income countries, the PE is the cause of 1 in 4 perinatal deaths. (5) The perinatal death in Iraq is high and approximating half of mortalities for under 5 years old children, and the PE is responsible of 10.3% of perinatal death. (6) In addition to its early effect, the PE has late effect on the cardiovascular system of both mothers and offspring. (7). The main adverse maternal outcomes of PE were abruptio placentae, acute renal failure and cerebral hemorrhage and main perinatal outcomes of PE were premature birth, infection, meconium aspiration, low birth weight and low Apgar scores. (8,9). Primigravidity, high parity, younger or older women, poor nutrition, obesity, bad socioeconomic status, chronic medical illnesses and family history are the frequent risk factors for PE. (10, 11) Common risk factors associated with PE in Iraq are gestational age, family history, multiple pregnancy, abortion history, chronic diseases and poor socioeconomic conditions. (12) Globally many studies showed different maternal risk factors which increase the incidence of PE in pregnant women like (maternal age, obesity, poverty, hypertension pre pregnancy, westernization of lifestyle, and younger age at marriage) lead to higher PE incidence (4, 12). Because of great burden of PE on society by mothers loss or neonatal morbidity and mortality and on national health system in addition to scarcity of literatures on the risk factors and outcomes of PE in our country and especially Diyala province, we conducted this study. The aim of our study is to identify the maternal risk factors for pre-eclampsia among pregnant women and to find out the maternal and perinatal outcomes associated with this problem.

Patients and Methods

This study is a prospective follow up study conducted in Obstetrics & Gynecology department of Al-Zahraa Maternity and Children Hospital in Al-Muqdadia District/Diyala province/ Iraq during the period from 1st of February 2017 to 31st of January 2018. All pregnant women with symptoms and signs of pre-eclampsia (PE) admitted to Obstetric & Gynecological department comprised the study population. The exclusion criteria include multiple pregnancy, congenital anomalies and HELLP syndrome. A sample of 60 PE pregnant women was included in the study, in addition to a sample of 60 healthy pregnant women presented to the same hospital as outpatients for minor consultations as controls. An informed oral consent was obtained from each woman before enrolling in the study and an ethical agreement was taken from administration of the hospital in addition to treatment maintenance and consultation for selected women by the authors.

The data was collected through fulfilling a prepared questionnaires designed by the authors, it included maternal age, BMI, gestational history, past medical history, past surgical history, mode of delivery, birth weight, gestational age, neonatal status, neonatal gender, Apgar scores at 1 & 5 minutes and neonatal intensive care unit (NICU) admission.

The diagnosis of PE was done according to American College of Obstetricians and Gynecologists (ACOG) diagnostic criteria of PE (hypertension in pregnancy, proteinuria or in absence of proteinuria, thrombocytopenia, renal insufficiency, impaired liver function, pulmonary edema and cerebral or visual symptoms (1). The blood pressure was measured by the obstetrician using mercury sphygmomanometer. All pregnant women with PE had high blood pressure with mean of 172/114.8 mmHg and high albumin in urine with more than 300 mg/24 hrs. Body weights and heights of eligible women were measured in the hospital by the authors. The body mass index was classified according to WHO classification; Normal BMI is $<25(\text{Kg}/\text{m}^2)$, overweight $25\text{--}29.9(\text{Kg}/\text{m}^2)$ and obese $\geq 30(\text{Kg}/\text{m}^2)$. The pregnant women of both study

groups were followed up until their delivery through direct interview and by phone calling. The neonates were first examined and assessed by Pediatricians (the co-authors), second; the neonates with deteriorated status were referred to NICU of Al-Batool Teaching hospital in Baaqubah city /Diyala province The birth weight was measured at labor room directly after the delivery using the UNICEF weighing scale. The Apgar score was assessed by the Pediatricians at 1 and 5 minutes. All premature neonates were admitted to NICU.

Ethical consent:

The study protocol and the questionnaires were carried out according to principles of the Declaration of Helsinki, as well as reviewed and approved by the College Ethical Research Committee at College of Medicine University of Diyala /Iraq. Verbal consents were also taken from the pregnant women involved in the study.

Statistical analysis The data were processed and analyzed using the Statistical Package for Social Sciences version 22 (SPSS Inc., Chicago, IL, USA). The Chi-square test and Fischer's exact test were used for statistical analysis as appropriate. P value less than 0.05 was considered statistically significant.

Results

A total of 60 pregnant women with PE were included in this study with mean age 26.7 years, predominant age group was 20-29 years (51.6%). The mean BMI of pregnant women with PE was 33.4 Kg/m², 96.7% of them were obese. Primigravidity and nulliparity were prevalent among pregnant women with PE (51.7% and 60%, respectively) and abortion history was positive for 7 (11.7%) pregnant women. Past medical history was positive among 15% of pregnant women with PE and past surgical history was positive among 21.7% of them. (Table 1)

Table (2) showed that 28.3% of pregnant women with PE were delivered by normal vaginal delivery, while 71.7% of them were delivered by cesarean section. The birth weight of neonates of pregnant women with PE was low in 76.7% of them and 65% of them were preterm. The male neonates of pregnant women with PE were weighting less than females (48.3% vs. 51.7%). All neonates of

women with PE were alive. The Apgar score at 1 minute was low in 40% of PE women neonates and the Apgar score at 5 minutes was low in 25% of those neonates. About two thirds (65%) of neonates were admitted to NICU.

Table 1. General characteristics of sixty pregnant women with PE.

Variable	No. (%)
Age of women mean± SD (26.7±7.3 years)	
<20 years	10 (16.7)
20-29 years	31 (51.6)
30-39 years	16 (26.7)
≥40 years	3 (5.0)
BMI mean± SD (33.4±3.1 Kg/m ²)	
Overweight	2 (3.3)
Obese	58 (96.7)
Gravidity	
Primigravida	31 (51.7)
2-4	26 (43.3)
>4	3 (5.0)
Parity	
Nulliparous	36 (60.0)
1-3	21 (35.0)
>3	3 (5.0)
Abortion	
No	53 (88.3)
Yes	7 (11.7)
Past medical history of *.....	
Positive	9 (15.0)
Negative	51 (85.0)
Past surgical history of **	
Positive	13 (21.7)
Negative	47 (78.3)
Total	60 (100.0)

*- diabetes mellitus, hypertension, asthma, thyroid disease, cardiac disease, ...

**-. caesarian section, GIT surgery, Renal surgery, CNS surgery, ...

Table 2. Perinatal outcome of sixty pregnant women with PE.

Variable	No. (%)
Mode of delivery	
Vaginal	17 (28.3)
CS	43 (71.7)
Birth weight	
Low	46 (76.7)
Normal	14 (23.3)
Gestational age	
Preterm	39 (65.0)
Term	21 (35.0)
Neonatal gender	
Male	29 (48.3)
Female	31 (51.7)
Neonatal status	
Alive	60 (100.0)
Dead	0 (-)
Apgar score at 1 minute	
Low	24 (40.0)
Normal	36 (60.0)
Apgar score at 5 minutes	
Low	15 (25.0)
Normal	45 (75.0)
NICU admission	
Yes	39 (65.0)
No	21 (35.0)
Total	60 (100.0)

Table 3. General characteristics among controls and PE women (n=60, for each group).

Variable	Control No. (%)	PE No. (%)	P value
Age			0.04*
<20 years	9 (15.0)	10 (16.7)	
20-29 years	22 (36.7)	31 (51.6)	
30-39 years	29 (48.3)	16 (26.7)	
≥40 years	0 (-)	3 (5.0)	
BMI			<0.001*
Overweight	39 (65.0)	2 (3.3)	<i>OR=53.8</i>
Obese	21 (35.0)	58 (96.7)	<i>{CI=11.8-242.9}</i>
Gravidity			0.01*
Primigravida	21 (35.0)	31 (51.7)	
2-4	25 (41.7)	26 (43.3)	
>4	14 (23.3)	3 (5.0)	
Parity			0.1**
Nulliparous	26 (43.3)	36 (60.0)	
1-3	26 (43.3)	21 (35.0)	
>3	8 (13.4)	3 (5.0)	
Abortion			0.1**
No	47 (78.3)	53 (88.3)	
Yes	13 (21.7)	7 (11.7)	
Past medical history			0.1**
Positive	4 (6.7)	9 (15.0)	
Negative	56 (93.3)	51 (85.0)	
Past surgical history			0.2**
Positive	18 (30.0)	13 (21.7)	
Negative	42 (70.0)	47 (78.3)	

* Significant, ** Not significant.

There was a significant association between increased age of pregnant women and PE (p=0.04). The obesity was significantly higher among pregnant women with PE (p<0.001; OR=53.8). A significant association was observed between primigravidity of women and PE (p=0.01). No significant differences were observed between controls and PE pregnant women regarding parity (p=0.1), abortion history (p=0.1), past medical history (p=0.1) and past surgical history (p=0.2). (Table 3). There was a highly significant association between CS delivery mode and PE (p<0.001; OR=9.1). The low birth weight was significantly higher among pregnant women with PE (p<0.001; OR=0.02). No significant differences were observed between controls and PE pregnant women regarding neonatal gender (p=0.8). A highly significant association was observed between

prematurity of neonates and PE (p<0.001). The Apgar scores at 1 & 5 minutes were significantly lower among neonates of women with PE (p=0.002, p=0.006, respectively). The NICU admission was significantly higher for neonates of women with PE (p<0.001). (Table 4)

Table 4. Maternal and perinatal outcomes among controls and PE women (n=60, for each group).

Variable	Control No. (%)	PE No. (%)	P value
Mode of delivery			<0.001*
Vaginal	47 (78.3)	17 (28.3)	<i>OR=9.1</i>
CS	13 (21.3)	43 (71.7)	<i>{CI=3.9-21}</i>
Birth weight			<0.001*
Low	4 (6.7)	46 (76.7)	<i>OR=0.02</i>
Normal	56 (93.3)	14 (23.3)	<i>{CI=0.01-0.07}</i>
Neonatal gender			0.8**
Male	30 (50.0)	29 (48.3)	
Female	30 (50.0)	31 (51.7)	
Gestational age			<0.001*
Preterm	17 (28.3)	39 (65.0)	<i>OR=0.2</i>
Term	43 (71.7)	21 (35.0)	<i>{CI=0.1-0.4}</i>
Apgar score at 1 minute			0.002*
Low	9 (15.0)	24 (40.0)	<i>OR=0.2</i>
Normal	51 (85.0)	36 (60.0)	<i>{CI=0.1-0.6}</i>
Apgar score at 5 minutes			0.006*
Low	4 (6.7)	15 (25.0)	<i>OR=0.2</i>
Normal	56 (93.3)	45 (75.0)	<i>{CI=0.09-0.8}</i>
NICU admission			<0.001*
Yes	17 (28.3)	39 (65.0)	<i>OR=0.2</i>
No	43 (71.7)	21 (35.0)	<i>{CI=0.1-0.4}</i>

* Significant, ** Not significant.

Discussion

The preeclampsia is a hazardous obstetrical disease accompanied by high rates of maternal morbidity and mortality especially in developing countries.¹⁴ This study showed that increased age of women was a significant

maternal risk factor for pre-eclampsia ($p=0.04$). Lamminpää et al 15 conducted a registry based study on primiparous women in Finland and revealed that advanced maternal age was a risk factor for pre-eclampsia. Other study carried out in Ireland by English et al 16 found that effective management of pre-eclampsia was achieved for younger age more than older age women in reproductive period. The effect of increased maternal age on pre-eclampsia varies according to conception method and the parity history of women.^{17, 18} Recent study in Japan documented that pregnancy of maternal age more than 40 years is highly accompanied by adverse maternal outcomes like pre-eclampsia, severe eclampsia, cesarean section and placenta previa and age effect differs according to conception way and parity.¹⁹ In present study, the obesity of pregnant women was a significant risk factor for pre-eclampsia ($p<0.001$), with high odds of risk in developing PE reaching about 54 times probability of risk. This finding is consistent with results of Endeshaw et al 20 study in Ethiopia which stated that obesity of young age women is related to high risk of pre-eclampsia development in pregnancy. Other study showed that obesity is a predominant risk factor for pre-eclampsia and cardiovascular diseases among pregnant women in USA.²¹ The obesity role in development of pre-eclampsia is similar to its role in cardiovascular diseases.²² This relation between obesity and PE is an interesting finding denoted to effect of lifestyle and habitual changes of Iraqi society in last years on development of PE among pregnant women. It was recommended that weight reduction before or at beginning of pregnancy is beneficial in prevention of PE.²³ The primigravidity of pregnant women in our study was a significant risk factor for the pre-eclampsia ($p=0.01$). This finding is similar to results of Robb et al 24 study in UK which found that arterial stiffness is increased in women with pre-eclampsia specifically among primigravida women. Current study showed that cesarean section delivery was significantly the most common adverse maternal outcome of pre-eclampsia ($p<0.001$; $OR=9.1$). This finding is in agreement with results of van der Tuuk et al 25 study in

Netherlands which reported that in women with pre-eclampsia, the cesarean section risk is predicted. However, Cho et al 26 study in South Korea stated that the cesarean section in first pregnancy may be risk factor for PE before cesarean section in second pregnancy. The cesarean section is associated with maternal and perinatal co-morbidities that rank it as maternal adverse outcome of PE.²⁷ Despite these findings, the vaginal delivery of majority of women with PE was successful.²⁸ The present study revealed that low birth weight was a significant adverse perinatal outcome of pregnant women with pre-eclampsia ($p<0.001$). Similarly, Backes et al²⁹ documented that adverse neonatal outcomes of pre-eclampsia is not limited to prematurity only, it also included early and late neonatal complications and the low birth weight is most prevalent early neonatal complication of PE. The prematurity of neonates in our study is also a significant adverse perinatal outcome of PE ($p<0.001$). Obaid et al 30 study in Iraq found that the main adverse neonatal outcomes of PE were small for gestational age, preterm birth, respiratory distress syndrome and NICU admission. In our study, the Apgar scores at 1 & 5 minutes were significantly lower among neonates of pre-eclmptic women than controls ($p=0.002$ and $p=0.006$, respectively). These findings are consistent with results of Doddamani study in India.³¹ The NICU admission in present study was significantly higher for neonates of pre-eclamptic women ($p<0.001$). Although this finding is related with preterm infants in our study, it coincides with results of Masoura et al 32 study in Greece. The main limitations in current study were loss of follow up, single center study and inability to study other risk factors and outcomes due to incomplete information.

In conclusion, the main maternal risk factors of pre-eclampsia are advanced reproductive age, obesity and primigravidity, while the common adverse maternal outcome of pre-eclampsia is the cesarean section. The common perinatal outcomes of pre-eclampsia are low birth weight, prematurity, low Apgar scores at 1 & 5 minutes and high neonatal intensive care unit admission.



Recommendations

Weight reduction programs for young women should be incorporated to national maternity health care programs.

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