Research Paper
Preeclampsia and Its Associated Risk Factors: A Case-control Study in Qazvin Province

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ABSTRACT

Background: Preeclampsia is one of the common disorders in pregnancy. It is characterized by hypertension and proteinuria in the second half of pregnancy. It is also one of the three main causes of death in pregnant women.

Objective: This study investigated the risk factors of preeclampsia in women referred to Kowsar Hospital in Qazvin Province, Iran.

Methods: In this case-control study, after reviewing 7855 cases of pregnant women referred to Kowsar Hospital in 2016, 171 hospitalized patients with severe preeclampsia were put in the case group, and 171 patients with delivery problems were in the control group. Then, we compared the collected data about risk factors, such as a history of preeclampsia, hypertension, smoking, diabetes mellitus, infertility, twin, and body mass index, in both groups.

Results: The Mean±SD age of the pregnant women with preeclampsia was 31.19±6.42 years with an interquartile interval of 26-35 years. History of preeclampsia (P=0.02), hypertension (P=0.001), and body mass index (P=0.001) were significantly higher in the preeclampsia group than in the control group. Also, there was no significant relationship between a history of diabetes mellitus, infertility, or twin with preeclampsia (P<0.05).

Conclusion: This study showed that the risk factors of a history of preeclampsia, hypertension, and body mass index significantly differed between the case and control groups.

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1. Introduction

Preeclampsia is one of the complications of pregnancy which is presented by high blood pressure and proteinuria in the second trimester [1, 2]. This disease has a key role in the mortality of pregnant women, and its prevalence was reported to be between 2% and 8% [3]. This complication is responsible for 15% of the deaths of pregnant women [4].

The World Health Organization (WHO) estimates that more than 100000 women expire because of preeclampsia all over the world every year. The prevalence of this disease is between 5% and 8% in Iran [5].

The diagnostic criteria of this complication include blood pressure≥140/90 mmHg after 20 weeks of gestation and proteinuria≥300 mg in 24 hours urine test or more than 30 mg/dL proteinuria in random urine test. The other criteria include a platelet count of less than 100000 platelets per μL, rise of lactate dehydrogenase levels, rise of liver function tests levels, persistent headache, blurred vision, and persistent epigastric pain [6].

The exact pathophysiology of preeclampsia has not been known yet, and various causes have been reported for this complication. Some of these causes are cytokines, vitamins and minerals deficiency, infections, atherosclerosis, loss of the placental barrier, entry of trophoblasts into the bloodstream of the mother, and oxidative stress in some races [7, 8].

Despite much research, the etiology of preeclampsia has remained unknown. In the studies on this disease, some risk factors such as nulliparity, race, age, socioeconomic status, multiple pregnancies, hydramnios, hydatidiform mole, diabetes mellitus, cardiovascular disease, renal diseases, and hepatic diseases of the mother have been mentioned. Most complications and some risk factors of this disorder are identifiable and preventable [7, 9].

However, there is no reliable criterion for early diagnosis of preeclampsia. There are several clinical, biophysical, and biochemical tests to identify women at risk of preeclampsia, but the results of studies reveal that their predictive value is low in the early diagnosis of preeclampsia [10]. One study also showed that low pregnancy-associated plasma protein-A might be used to predict preeclampsia [11].

Although the definite treatment for preeclampsia is the termination of pregnancy, careful prenatal care and appropriate treatment of the risk factors can improve the condition, and the outcome will be satisfactory for both mother and fetus [2].

Based on what was discussed, a lack of previous studies and data about preeclampsia and its risk factors in Qazvin Province, Iran, this study was performed to investigate the preeclampsia and risk factors in the women referred to Kowsar Hospital in Qazvin Province, Iran in 2016.

2. Materials and Methods

Patients

This case-control study was conducted in Kowsar Hospital in Qazvin, Iran, in 2016. This hospital is a referral hospital for obstetrical and gynecological diseases in Qazvin Province and can cover a significant population, and the study population is the total number of referrals to this center from the whole province. The archived records in the hospital archive were investigated for data collection. The sampling method was based on complete enumeration. In this study, cases without delivery problems were put in the control group, and 171 pregnant women diagnosed with severe preeclampsia were put in the case group.

The inclusion criteria were based on the patients admitted to Kowsar Hospital with a diagnosis of severe preeclampsia and terminated their pregnancies. The exclusion criteria were women with fetus complications such as intrauterine fetal demise and incomplete achieved records. The data collection tool was a checklist, including demographic characteristics such as height, age, weight, and gravidity. In addition, risk factors such as maternal records in previous pregnancies (diabetes mellitus, hypertension, infertility, multiple pregnancies) were included in the checklist.

Preeclampsia is detected when the blood pressure exceeds 140/90 mmHg after the 20th week of pregnancy, along with proteinuria≥300 mg in the 24 hour urine sample or ≥n +1 in the urine dipstick [11].

After data collection, they were analyzed by SPSS software version 22 (IBM Corp., Armonk, NY, USA). We used the Kolmogorov-Smirnov test to check the normal distribution of data. The t-test and Chi-square parametric tests were used to compare the data. P<0.05 was considered significant.

Table 1. Comparing the demographic characteristics between the case and control groups

Characteristics	Mean±SD		P*
	Case	Control	
Age (y)	31.19±6.42	30.64±7.57	0.98
Height (cm)	160.77±5.3	159.04±5.88	0.01
Weight (kg)	83.45±15.06	76.13±11.94	0.001
Body mass index (kg/m²)	32.46±5.16	30±3.97	0.001

* P<0.05 was considered significant.

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3. Results

In the present study, the percentage of preeclampsia in pregnant women referred to Kowsar Hospital in 2016 was 2.17% (171 women with severe preeclampsia from 7855 births in one year). Their mean age was 31.19±6.42 years with a mid-quartile range of 26-35 years. About 90% of pregnant women (n=153) with preeclampsia were under 40 years old.

Table 1 presents the demographic characteristics of the case and control groups. Table 2 compares the frequency of each studied risk factor in the case and control groups. In this study, a significant difference was found between the case and control groups regarding the history of hypertension and preeclampsia (P<0.05). In the study of the quantitative variables, the body mass index in the case group was significantly higher than the control group (P=0.001).

Based on the results, there is no significant difference between the two groups in other risk factors such as diabetes mellitus, history of multiple pregnancies, and history of infertility (P>0.05).

Based on the findings of this study, the chances of preeclampsia in pregnant women with a history of hypertension and previous history of preeclampsia were significantly higher than the other pregnant women without a history of these two diseases (P<0.05).

Table 2. Comparing the history of exposure to preeclampsia risk factors between the case and control groups (using the chi-square test) (n=171)

Risk Factor		No. (%)		OR* (95%CI)	P*	OR** (95%CI)	P**
		Case	Control				
Multiple pregnancy	Yes	2(1.2)	2(1.2)	1 (0.13-7.18)	0.98	0.01 (0.11-8.74)	1
	No	169(98.8)	169(98.8)				
History of preeclampsia	Yes	20(11.7)	8(4.7)	2.69 (1.15-6.03)	0.02	2.84 (1.05-8.11)	0.04
	No	151(88.3)	163(95.3)				
Diabetes mellitus	Yes	14(8.2)	6(3.5)	2.45 (0.91-6.54)	0.07	1.22 (0.38-3.09)	0.73
	No	157(91.8)	165(96.5)				
Hypertension	Yes	73(42.7)	19(11.1)	5.95 (3.38-10.48)	0.001	7.53 (3.7-15.3)	0.001
	No	98(57.3)	152(88.9)				
History of Infertility	Yes	18(10.5)	9(5.3)	2.18 (0.92-4.87)	0.07	2.43 (0.85-6.9)	0.09
	No	153(89.5)	162(94.7)				

No: number(%); OR: odds ratio; CI: confidence intervals; *Crude, **Adjusted with age and body mass index.

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4. Discussion

In the present study, the percentage of preeclampsia in pregnant women referred to Kowsar Hospital in 2016 was 2.17%, less than reported in other studies [12, 13]. In this study, about 90% of the patients with preeclampsia were less than 40 years old. This finding showed a lower tendency to become pregnant in women over 40. In this study, the results represented the significant difference in the history of preeclampsia and hypertension between the case and control groups, which are significant risk factors for preeclampsia. We highlighted the effect of BMI on preeclampsia; the average BMI in the study group is 32.3 kg/m^2, and in the control group, it is 29.93 kg/m^2. There is a statistically significant difference in BMI between the case and control groups.

Because of preeclampsia complications, including premature placental abruption, maternal death, and fetal death, further studies should be conducted to determine the importance of the risk factors. Women should change their lifestyle to be reduced the prevalence the preeclampsia. In the study of Rajaee et al., the prevalence of preeclampsia in Hormozgan Province, Iran, was 5.8%, and this prevalence was 5.4% in the study of Safari et al. in Yasuj City, Iran [12, 13].

Our findings about risk factors are consistent with Safari et al. and the study of Bej et al. in Nigeria [12, 14]. Also, in the study of Musa et al. in India and the study of Bilano et al., a history of hypertension has been reported as an important risk factor for preeclampsia, the same as the results of this study [15].

There is a statistically significant difference in body mass index between the case and control groups in our study. The results of Bej et al. are consistent with our findings [14].

This study showed that diabetes mellitus had no important role in the risk factors of preeclampsia, and there was no significant difference between the case and control groups. Our findings are not consistent with the results of Bilano et al. and Safari et al. studies which can be attributed to the high prevalence of diabetes mellitus in our city, Qazvin [12, 16].

According to our findings on the history of infertility, there was no significant relationship between infertility and preeclampsia, which is consistent with the results of Musa et al. It seems that the history of infertility is an unimportant risk factor for preeclampsia [15].

Regarding the history of the multiple pregnancies, we found no significant difference between the case and control groups, which is consistent with the results of research conducted in Yasuj City, Iran [12]. However, the results of the Farzaneh et al. study in Zahedan City, Iran, were different, which could be due to genetic and environmental factors [17].

We observed no history of smoking in any of the women in both case and control groups, which can be due to the cultural background in this region. However, in the study of Kharkiv et al., smoking had a protective effect on the incidence of preeclampsia [18].

Because preeclampsia is one of the three leading causes of maternal and fetal mortality, it is recommended that women with a history of hypertension and previous preeclampsia be monitored regularly to prevent maternal and fetal death by routine follow-up.

One of the limitations of our study was uncompleted data in the hospital archive. Another limitation was the failure to collect maternal education. Also, some mothers could not recall details of past medical history. Data for prenatal care was not complete for the patients because many patients had prenatal care in private clinics and gave birth in Kowsar Hospital because vaginal delivery was free in this governmental hospital. This is a teaching hospital in Qazvin with level 3 healthcare service, so close to all high-risk pregnancies in this province that have been experienced in this Hospital.

5. Conclusion

According to the study, independent risk factors for preeclampsia are a history of hypertension, a history of preeclampsia in previous pregnancies, and a high body mass index. Due to the complications of preeclampsia, it is recommended that pregnant women with at least one of these risk factors during their pregnancies should receive appropriate medical care and follow-up, including regular monitoring of the blood pressure. Early diagnosis can prevent the complications of this disease.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Research Ethics Committee of Qazvin Faculty of Medical Sciences (IR. QUMS.REC.1396.219). All ethical principles and protocols were followed based on the Helsinki Declaration.

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