

The Effect of Season on the Prevalence of Preeclampsia

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Abstract

Background: Preeclampsia can be defined as a pregnancy-specific syndrome that a group of pathological signs and symptoms occur simultaneously without known causes. This study aimed to determine the effect of season on the prevalence of preeclampsia in pregnant women referring to Sanandaj Besat Hospital during 2013 - 2014.

Methods: This descriptive study was conducted on 363 pregnant women referring to Sanandaj Besat Hospital during 2013 - 2014. Data were collected from medical records of pregnant women who were hospitalized because of preeclampsia and analyzed with STATA-11 and Chi-square test.

Results: The results showed that the mean age of women diagnosed with preeclampsia was 30.5 ± 6.60 years. The prevalence of preeclampsia in urban and rural pregnant women was 10% and 4%, respectively. The incidence of preeclampsia was 30% during the winter months. There was no statistically significant relationship between the season of conception and the month of preeclampsia ($P = 0.67$).

Conclusions: Based on the findings of this study, it can be said that the risk of preeclampsia in cold seasons is more than warmer seasons and its incidence is lower in urban multiparous women.

Keywords: Preeclampsia; Pregnant women; Seasons; Prevalence

Introduction

Preeclampsia can be defined as a pregnancy-specific syndrome in which a group of clinical symptoms occur simultaneously

with unclear etiologies. Decreased perfusion secondary to vascular spasm, endothelial dysfunction and ischemia are among possible factors affecting preeclampsia. This complication appeared in early pregnancy and the pathophysiological changes begin from the moment of conception [1, 2]. Its clinical symptoms are hypertension and proteinuria during the second half of pregnancy because the chief target organ is the kidney (glomerular endotheliosis) [3, 4]. This complication affects 5-10% of all pregnancies and also 20% of first pregnancies and involves more than 40% of premature birth resulting from treatment [5].

The incidence of preeclampsia is affected by various factors including parity, African American race, ethnicity, genetics, age over 35 years, and systemic diseases (hypertension, diabetes, chronic kidney disease, and endocrine disorders) [1, 2]. There are also many environmental factors such as living at high altitudes, obesity, and multiple births [6]. Based on recent studies, there is the probability of a significant relationship between the incidence of preeclampsia and eclampsia with the change of seasons [7-12].

Majority of published studies indicate increased incidence of preeclampsia in cold and wet seasons of the year. Since the pathophysiology of preeclampsia is vasoconstriction, the increasing incidence in cold and wet seasons could be due to the effect of temperature and humidity on vasoconstriction and secretion of vasoactive substances. On the other hand, dry and rainy seasons may be effective on the type of infection that affects the mother during pregnancy and consequently be involved in the pathophysiology of preeclampsia [7, 8, 12].

Considering that preeclampsia is a major complication of pregnancy and also one of the three main causes of maternal mortality and so far this has not been studied in Kurdistan Province, Iran, this study aimed to determine the effect of season on the prevalence of preeclampsia in pregnant women referring to Sanandaj Besat Hospital during 2013 - 2014.

Sanandaj City, Kurdistan Province, Iran, is located on the geographic coordinates of $35^{\circ}20'$ north latitude and $47^{\circ}18'$ east longitude of the prime meridian. Height average of Sanandaj is 1,535 m above sea level (the lowest and highest points are 600 and 2,550 m, respectively). The city has a semi-arid Mediterranean climate.

Materials and Methods

This descriptive study was conducted on 363 pregnant women

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Table 1. Demographic Characteristics of the Pregnant Women

Variable	No.	Percent
Residence		
Urban	209	57.6
Rural	154	42.4
Age group		
Below 20 years	14	3.9
20 - 35 years	246	67.8
More than 35 years	103	28.4
Parity		
1	152	41.9
2	103	28.4
3	52	14.3
4	56	15.4
Season of preeclampsia		
Spring	89	24.5
Summer	72	19.8
Fall	93	25.6
Winter	109	30
Education		
Illiterate	25	7
High school diploma	126	35
Academic	26	7
Unknown	186	51
Family history of preeclampsia		
Yes	7	1.9
No	5	1.4
Unknown	351	96.7
Multiple pregnancies		
Singleton	344	94.8
Twin	18	4.9
Triplets and more	1	0.3

referring to Sanandaj Besat Hospital during 2013 - 2014. The data were collected using a questionnaire with three parts. The first part included demographic information, the second part included information on the underlying disease, such as diabetes, hypertension, endocrine disorders, kidney disease, connective tissue disease, and infertility history, and the third part included information on pregnancy, such as use or non-use of assisted reproductive techniques, singleton or multiple pregnancy, gravidity, history of gestational diabetes, history of gestational hypertension, infectious disease during pregnancy, months and seasons of conception, and months and seasons of incidence of preeclampsia. Data were obtained from medical records of pregnant women who were hospitalized because of preeclampsia and analyzed with STATA-11 and Chi-square test.

Table 2. History of Disease in Pregnant Women

Variable	No.	Percent
Preeclampsia in a previous pregnancy		
Yes	59	16.3
No	304	83.7
Blood Pressure		
Yes	38	10.5
No	325	89.5
Gestational diabetes		
Yes	81	22.3
No	282	77.7
Diabetes		
Yes	20	5.5
No	343	94.5
Kidney disease		
Yes	18	5.0
No	345	95.0
Thyroid disorder		
Yes	10	2.8
No	353	97.2
PCOS		
Yes	8	2.2
No	355	97.8
Infectious disease		
Yes	39	10.7
No	273	75.3
Unknown	51	14.0

Results

The results showed that the mean age of women diagnosed with preeclampsia was 30.5 ± 6.60 years. A total of 209 (57.6%) women were living in urban and 154 (42.4%) in rural areas, 35% were high school graduates, and 41.9% were primigravida. The prevalence of preeclampsia in urban and rural pregnant women was 10% and 4%, respectively. The incidence of preeclampsia was 30% during the winter months (Table 1).

The mean systolic and diastolic blood pressures were 143.2 ± 15.5 and 86.2 ± 12.2 mg/dL, respectively. A total of 22.3% had history of gestational diabetes, 16.3% had history of preeclampsia and 10.5% had history of hypertension (Table 2).

There was no statistically significant relationship between the season of conception and the month of preeclampsia in pregnant women ($P = 0.67$) (Table 3).

Discussion

In this study, the mean age of women when diagnosed with

Table 3. The Relationship Between Season of Conception and the Month of Preeclampsia in Pregnant Women (P = 0.67)

Season of conception	The first trimester, No. (%)	The second trimester, No. (%)	The third trimester, No. (%)	Total
Spring	6 (6)	20 (18)	85 (76)	111
Summer	2 (2)	22 (25)	65 (73)	89
Fall	1 (1)	21 (30)	49 (69)	71
Winter	3 (3)	19 (21)	70 (76)	92
Total	12	82	269	363

preeclampsia was 30.5 ± 6.6 years. It was 28.61 ± 6.00 and 28 ± 5.7 years, respectively in Shahidifar et al [13] and Ghanbari Homayi study [14]. The results showed that the highest incidence of preeclampsia (67.8%) was in the age group 20 - 35 years. In a study by Kahnouei-Aghdam et al, 42.4% of women had preeclampsia and the highest incidence of preeclampsia was for the age group 25 - 30 years [15] which is consistent with our study.

The results of this study showed that preeclampsia was the most prevalent in winter. In a study by Magnus and Eskild, the highest incidence of preeclampsia was reported in winter [8]. Khojasteh et al have reported the highest incidence of preeclampsia in fall [7]. Shahidifar et al have also reported the highest incidence of preeclampsia in autumn and winter [13]. In a study by Okafor and Ezegwui, the incidence of preeclampsia was higher in wet seasons [9]. The highest incidence of preeclampsia has been reported in spring and lowest in summer by Zahiri Soroori et al [12]. The results of a study by Wellington and Mulla showed that most cases of preeclampsia were in winter [16]. Shental et al also showed that winter has a higher prevalence of preeclampsia [17]. The results of the majority of cited studies were consistent with the present study. However, understanding the relationship between climate patterns and preeclampsia can be useful to determine the risk factors of preeclampsia [18].

It seems that temperature changes plasma volume due to changes in the weather, therefore it has been proposed as mechanism for explaining the seasonal variation in the frequency of preeclampsia [16]. It has been assumed that cold weather could lead to vasospasm that develops a portion of the pathogenesis of preeclampsia [8].

Based on the results of this study, the highest incidence of preeclampsia was associated with conception in the spring. Philips et al concluded that the risks of preeclampsia appear higher for women with conception during the warmest months, and delivery in the coldest months of the year [11]. In a study by Beltran et al, the highest incidence of preeclampsia was associated with conception in the summer months [19]. Mohaddesi and Nanbakhsh showed that preeclampsia incidence increased in cases of conception in warm seasons particularly in summer [20]. These studies are not in consistent with our study.

In this study, there was no statistically significant relationship between the seasons of conception and the month of preeclampsia. This finding is not in consistent with the study by Ghanbari Homayi et al which found a significant association between preeclampsia and season of conception [14].

In the present study, 41.9% of subjects were primigravida.

In a study by Sarwar et al primigravida pregnant women were at higher risk for the development of preeclampsia than the multigravida pregnant women [21]. Sharemi et al also concluded that multiparity had a preventive effect on mild and severe types of preeclampsia [22]. These studies are in consistent with our study.

According to the descriptive results of this study, the incidence of preeclampsia is higher in urban than rural population which is consistent with van Middendorp et al study [23] and is not consistent with the results of study by Sarwar et al [21].

Conclusion

Based on the findings of this study, it can be said that the incidence of preeclampsia is higher in winter than in summer and also its incidence is lower in urban multiparous women.

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