The relationship between pre-eclampsia and periodontal infection in pregnant women

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Abstract

Pre-eclampsia is a common problem among pregnant women, and is associated with many complications such as preterm labor, spontaneous abortion, etc. Knowledge of how this phenomenon occurs and identifying its most common factors are essential to planning preventive measures. The present study was designed and conducted with the aim to determine the relationship between periodontal infections and pre-eclampsia in pregnant women. In this case-control study, 30 pregnant women in their 20- 40 gestational weeks, hospitalized with pre-eclampsia in of Gonabad were selected as the case group and the same number of healthy women who were matched to the women in the case group for age, number of pregnancies, and education level were selected as the control group. Both groups were referred to the dentist for dental examinations and were examined for periodontal infections. Data were analyzed in SPSS-16 software using Chi-square test. The two case and control groups were similar in terms of demographic and obstetrics parameters, but in terms of prevalence of periodontal diseases, there was a significant difference between them. Since no significant correlation was found between other studied variablesand pre-eclampsia, a larger sample size is recommended for future studies.

Keywords: Periodontal Disease, Pre-Eclampsia, Pregnancy

Introduction

Pre-eclampsia is a pregnancy-specific syndrome, in which organ perfusion is reduced due to vasoconstrictionand endothelial activation, and is characterized by proteinuria and hypertension. Pre-eclampsia occurs in at least 3 to 5% of pregnancies, causing increased mortality rate worldwide [1]. Women with pre-eclampsia have abnormal levels of IL-6, IL-10, and TNF cytokines in their blood that could have been induced by another infectious disease. This causes inflammatory damage to blood vessels and eventually leads to pre-eclampsia [2]. Infections undetectable with clinical examinations may be associated with onset and development of systemic and vascular diseases. Such diseases have a high prevalence among women with pre-eclampsia. One of the chronic diseases is periodontal diseases that expose their hosts to changes in antigenicand inflammatory indicators [3]. Periodontitis is a chronic bacterial infection [4,5] that is caused by Gram-negative bacteria; in other words, it is the widest spread chronic disease across the world [6]. Recent studies have demonstrated that periodontitis can affect the public health [7]. Tooth infections during pregnancy can lead to preterm labor, low birth weight, spontaneous abortion, and/

or pre-eclampsia [8]. Most relevant studies cite the relationship between periodontal diseases and pregnancy complications, and that women with poor oral hygiene are more exposed to risk of preterm labor [9,10]. Yet, in a number of studies conducted in Britain, despite significant a relationship found between dental diseases and spontaneous abortion during weeks 12 to 24, no relationship was observed between dental diseases and preterm birth or low birth weight [11]. In a review study aiming to investigate the relationship between periodontal infection and pregnancy outcomes, it was shown that dental diseases can potentially cause such outcomes as low birth weight, pre-eclampsia, preterm birth, intrauterine growth retardation, and spontaneous abortion. However, to determine the precise relationship between periodontal infections and pregnancy outcomes, further studies are needed [12]. Another prospective study showed that maternal oral status and its effect on pregnancy is due to increased serum c-reactive proteins, which lead to increased incidence of pre-eclampsia in pregnant women [13]. In a review article on 12 studies, it was found that 8 articles had cited positive effects of periodontal infections in creating pre-eclampsia, but in 4 articles, no positive effect was reported. According to the conclusions drawn in this review study, these differences could have been due to such reasons as differences in periodontal diseases and pregnancy pre-eclampsia definitions, oral and dental examination time, and lack of control over confounding variables. Therefore, this question still remains unanswered whether oral and dental diseases cause pregnancy pre-eclampsia or not [14]. Given conflicting results of previous studies in the relationship between periodontal infection and pre-eclampsia, and considering pregnancy complications induced by periodontal infection and role of prevention of these disorders in incidence of pre-eclampsia, this study aims to investigate the relationship between periodontal infection and incidence of pre-eclampsia during pregnancy.

Method
This was a case-control study in which the effect of periodontal infection on incidence rate of pre-eclampsia in pregnant women was examined. In this study, 30 pregnant women (gestational age of 20- 40 weeks) with pre-eclampsia referred Hospital in Gonabad were selected as the case group and the same number of healthy women with similar age range, number of pregnancies, gestational age, education level, economic status to the case group were enrolled in this study as the control group. Study inclusion criteria included lack of any other systemic diseases like chronic hypertension, urinary tract infection, rupture of membranesor any other systemic diseases. After obtaining necessary permissions, researchers attended the study setting. Convenient sampling was used. Patients attending the obstetrics and gynecology clinic who met inclusion criteria were referred to the gynecologistto examine their pregnancystatusand to the dentist to examine their oral health. Demographic characteristics and obstetricscheck list of research units were used to collect information from the subjects. Diagnostic criteria for periodontal infection were classified in relevant forms by the group's dentist and required data were collected. Pregnancy status of each subject was assessed by the gynecologist and necessary data were recorded. Pre-eclampsia was defined as proteinuria criteria, hypertension based on systolic pressure over 140 mmHg and diastolic pressure over 90 women who had normal blood pressure before the 20th gestational week. Proteinuria was determined by two random urine samples with minimum 4 hours interval. Values greater than 30 mg/dl or more than +1 with the tape test was considered proteinuria. Teeth status was examined in terms of plaque index, gingival index, bleeding gums, and loss of teeth. Analysis of data was performed in the form of descriptive statistics (mean and standard deviation) and analytical statistics (Chi-square, paired t) using SPSS-16 software.

Results
Mean age of subjects with pre-eclampsia was 27%, and mean age of healthy subjects was

31%. Demographic details and pregnancy status of participants are presented in Table 1. Sixty pregnant women participated in this study, who were divided into two equal groups of with and without pre-eclampsia. 35% of them were nulliparous, 20% were high school dropouts, most (25%) had high school diploma, and only 15% had university education (B.S.). Both

Table 1 *Participants' demographic details and pregnancy status*

Data/status	Without Pre-eclampsia	With Pre-eclampsia	Sample size (N=60)
Mean age ±SD	27.43± 5.3	27.93± 5.5	27.68± 5.4
1st pregnancy(n%)	12 (40)	9 (30)	21 (35)
2- 4 pregnancies(n%)	18 (60)	18 (60)	36 (60)
Over 5 pregnancies(n%)	0(0)	3 (10)	3 (5.0)
Education level high schooldropout(n%)	9(30)	11(36.7)	20(33.3)
High school diploma (n%)	10(33.3)	15(50)	25(14.7)
Bachelor's (n%)	11(36.7)	4(13.3)	15(25)

groups were similar in terms of data and age. Participants' periodontal disease status is presented in Table 2. Periodontal diseases were more prevalent in the case group compared to the control (P<0.04). 76.7% of the patients with pre-eclampsia and 73% of the patients without pre-eclampsia had periodontal diseases.

Table 2 *Periodontal status in the two groups with and without preeclampsia*

	Without Pre-eclampsia N=30	With Pre-eclampsia N=30	P-value
Periodontal status (bleeding gum) healthy (n%)	15(73.3)	23(76.7)	0.04
Mild (n%)	5(16.7)	2(16.7)	>0.05
Moderate-severe (n%)	0(0)	5(16.7)	0.04
Loss of teeth or having a tooth pulled (n%)	2(6.7)	5(16.7)	>0.05
No tooth pulled (n%)	28(93.3)	25(83.3)	>0.05
With gingival inflammation (n%)	25(83.3)	22(73.3)	>0.05
No gingival inflammation (n%)	5(16.7)	5(16.7)	>0.05
With dental plaque (n%)	22(73.3)	22(73.3)	>0.05
No dental laque (n%)	8(26.7)	8(26.7)	>0.05

Discussion

Results of this case-control study showed that there is a relationship between pre-eclampsia and periodontal status of bleeding gums, yet no other relationship was found with other periodontal states (loss of teeth, teeth inflammation, or gingivitis). This finding is in line with results of a study by Cankiet al. in 2004 on 802 pregnant women. In their study, there was a significant relationship between pre-eclampsia and some of the periodontal states like dental plaque; yet, other factors like loss of teeth had no relationship with pre-eclampsia [15]. A significant difference was found in terms of ranking of periodontal diseases intensity between the two groups. This result is in line with results of a study by Herrera et al. on 398 pregnant women in Cali city in Colombia in the mild case of periodontal disease. In their study, subjects had been divided into pre-eclampsia group (145 women) and control group (253 women). Results showed that in the mild form of the periodontal disease,

no significant difference was observed between the two groups, but in the moderate-severe form of the disease, a significant difference was found between the two groups [16]. Pre-eclampsia could be associated with other diseases like cardiovascular diseases and vascular and inflammatory disorders, which can explain its relationship with periodontal infections [17]. In another study by Canon et al. with a small sample size of 52 (35 healthy and 17 with pre-eclampsia), only severe form of periodontal disease was studied, andthe results showed that prevalence of severe periodontal diseases was higher in the pre-eclampsia group compared to the control group [18]. In another small study by Baloant & Gezdip, only mild periodontal diseases and loss of teeth was investigated in two pre-eclampsia and control groups with 25 subjects in each, and no significant difference was observed between the two groups [19]. In the present study, no significant difference was found in terms of loss of teeth, tooth inflammation, or gingivitis between case and control groups. Some studies reject any relationship between pre-eclampsia and periodontal infections [20,21]. Different results obtained in the present study could be due to the demographic characteristics and other factors such as conditions like healthy or unhealthy lifestyles, support and follow-up by the health care system. Furthermore, the small sample size in this study could be the reason for different results. Generally, it could be argued that although higher prevalence of periodontal diseases (bleeding gums) was observed in women with pre-eclampsia compared to the healthy group in the present study, no significant difference in terms of intensity of periodontal diseases was found between case and control groupsdue to small sample size.

Conclusion

In this study, effect of periodontal infection on incidence of pre-eclampsia in pregnant women was examined.Given the study hypotheses, analysis of data revealed that there is a significant relationship between some periodontal diseases (gum bleeding) and incidence of pre-eclampsia. Thus, it is recommended that this study be conducted with a larger sample size to ascertain the relationship between periodontal diseases intensity and incidence of pre-eclampsia. Since results of this study showed a significant relationship between some periodontal diseases (bleeding gum) and incidence of pre-eclampsia, incidence of pre-eclampsia could be significantly reduced by providing oral health care during pregnancy. Also, it is necessary to emphasize the importance of oral hygiene in prenatal care education for pregnant women to reduce its adverse outcomes.

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