

# Oral and Dental Health Status of Pregnant Women Referred to Perinatal Clinics in Southeastern Iran

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## Abstract

**Background and Aim:** As maternal periodontal disease can increase the risk of preterm birth and low birth weight, this study aimed to investigate the oral health status of pregnant women considering the circumstances during pregnancy and the necessity to keep the mother and baby healthy.

**Materials and Methods:** This cross-sectional study was conducted on 200 pregnant women referred to perinatal clinics in Kerman city. The participants' oral health behavior, decayed, missing, and filled teeth (DMFT) score, plaque index (PI) and community periodontal index (CPI) were assessed. Data were analyzed by the Chi-square test and multivariate linear regression model.

**Results:** Of all, 39.5% had dental problems during pregnancy. Only 5.4% of them presented to a dentist. The participants' concerns regarding the risks of dental procedures during pregnancy was the most common reason for not seeking dental treatment. The mean PI and DMFT were  $0.75 \pm 0.48$  and  $11.29 \pm 3.88$ , respectively. Multivariate analysis showed that the DMFT index score had a significant correlation with age ( $P=0.001$ ) and educational level ( $P=0.03$ ). The CPI and gestational age (in weeks) were also significantly correlated ( $P=0.005$ ).

**Conclusion:** Due to poor oral health of pregnant women, healthcare planners should provide inter-professional, community-based, and preventive oral health interventions before and during pregnancy.

**Key Words:** Oral Health; Pregnancy; Pregnant Women

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## Introduction

Currently, achieving and maintaining excellent oral and dental health during pregnancy is an essential factor with immediate and long-term effects on maternal and child's health [1]. High levels of estrogen and progesterone increase the levels of inflammatory mediators and immune

responses [2]. Along with these hormonal changes, possible changes in oral and dental hygiene habits, lifestyle, and mothers' nutrition during pregnancy predispose them to a higher risk of periodontal disease [3, 4]. A relationship has been shown between periodontal disease and premature birth and low birth weight [5]. On the other hand, recent studies declared that

reducing the mothers' oral Streptococcus count decreased the risk of contamination and early childhood caries in babies [6-8]. A direct relationship has been found between the mothers' oral health status and their quality of life during and after pregnancy [2, 9, 10].

Therefore, special conditions during pregnancy necessitate better oral healthcare during this period, and failure to pay attention to this matter may cause oral and dental problems and compromise the mother's general health and subsequently the baby's health. One reason for this negligence is that dental practitioners, physicians, gynecologists, and mothers either do not have sufficient knowledge or do not pay enough attention to dental treatments during pregnancy. Another reason may be social or financial problems of the parents [4,7,8,11-14]. Studies in developed and developing countries show that less than half of pregnant women are examined by a dentist during pregnancy [15, 16].

Researchers in different parts of the world have conducted epidemiological studies to assess the oral and dental health status of pregnant women so that the results can be used for large-scale planning in the field of prevention and treatment [11, 17-19].

To the best of the authors' knowledge, there is no recent study conducted on oral and dental health status of pregnant women in southeast Iran conducted in the past 15 years. The population of pregnant women and their economic situation have drastically changed since then, which highlights the need for further investigations in this regard. This study aimed to investigate the oral health status of pregnant women referred to perinatal clinics in Kerman city in the southeast Iran.

## Materials and Methods

In this descriptive cross-sectional study, 200 pregnant women referred to perinatal clinics (Afzalipour Obstetrics and Gynecology Hospital and several private clinics) in Kerman, Iran in 2017 were selected by simple random

sampling. The sample size was calculated based on previous studies [3,4] using the sample size calculation formula ( $Z=1.96$ ,  $P=0.25$ ,  $Q=0.75$ ,  $D=0.06$ ,  $N=P*Q*Z*Z/D*D$ ). The Research Ethics Committee of Kerman University of Medical Sciences approved this study (IR.KMU.REC.1395.529).

The inclusion criteria were signing informed consent forms, voluntary participation in the study, and not wearing a denture. Uncontrolled systemic diseases, history of periodontal disease, and severe gag reflex were the exclusion criteria.

A researcher-made questionnaire was used to collect the data. Seven oral medicine specialists verified the validity of the questionnaire, and its content validity index was found to be favorable ( $>0.78$ ). The intraclass correlation coefficient was high (0.84) as confirmed by the test-retest reliability assessment.

The questionnaire had 19 questions and three charts. The first part of the questionnaire asked for the participants' name, age, educational level, order of pregnancy, gestational age in weeks, and stage of pregnancy. The following questions were also asked: previous pregnancies (such as history of miscarriage, C-section or preterm delivery), history of diseases (cardiac, pulmonary, digestive system, renal, mental or other types of diseases) and the medications used by the participants. Pregnant women were asked to self-evaluate their oral health status. The remaining questions were about the women's oral health behaviors, history of having dental problems and visiting a dentist, receipt of dental treatments, and referral to a dentist by a midwife or obstetrician before or during pregnancy. They were also asked about the prescribed medications during pregnancy for dental problems, the women's concerns about receiving dental treatments during pregnancy, and whether their pregnancy was planned or not. Three charts at the end of the questionnaire were used to assess the

community periodontal index (CPI), plaque index (PI) and decayed, missing, and filled teeth (DMFT) index of the participants.

All indices were recorded by a trained dental student after obtaining the required calibration score with a trainee (dental public health specialist). Dental examinations were performed on a chair under a headlight using a flat dental mirror and a CPI-probe (or WHO-probe that has a black band from 3.5 to 5.5 mm, and two black rings at 8.5 and 11.5 mm from its round ball shape tip) [20]. To calculate the CPI, periodontal conditions including gingival bleeding, subgingival calculus, and depth of periodontal pockets were evaluated in teeth #16-17, 11, 26-27, 36-37, 31 and 46-47. According to the CPI criteria, each patient received a code from 0 to 4 (code 0: healthy periodontium; code 1: gingival bleeding on probing; code 2: calculus and bleeding; code 3: periodontal pocket by 4-5 mm; and code 4: periodontal pocket  $\geq$  6 mm) [20]. For each tooth, the biggest number was considered and the frequency of each code in all participants was reported.

According to the World Health Organization, for DMFT Index, dental examinations were performed visually for carious, filled, and missing teeth [20]. If a filled tooth had caries, it was classified as a decayed tooth. The DMFT score for each tooth ranged from 0 to 6 (code 0: sound tooth, code 1: decayed tooth, code 2: filled tooth with recurrent caries, code 3: filled tooth with no caries, code 4: missed tooth due to caries, code 5: missed tooth due to other reasons, code 6: unerupted tooth). For DMFT index score, all codes for each participant were summed and divided by the number of teeth. The Silness and Loe standard index and visual examination were used to evaluate the presence of dental plaque [20]. PI was calculated for teeth #12, 16, 24, 32, 36, and 44. The PI for each tooth ranged from 0 to 3 (code 0: no observable plaque, code 1: a thin film of plaque is detected at the gingival margin by

running a probe or explorer across the tooth surfaces, code 2: a moderate amount of plaque is detected along the gingival margin and plaque is visible clinically, code 3: heavy plaque accumulation is detected at the gingival margin and in interdental spaces. All codes for each participant were summed and divided by the number of assessed teeth. If the overall score was zero, oral hygiene was excellent. If it was 0.1- 0.9, 1-1.9, and 2-3 it was considered as good, moderate, and poor oral hygiene, respectively.

In addition to descriptive statistics (frequency, percentage, mean, and standard deviation), the Pearson's correlation coefficient was applied to analyze the relationship of DMFT and dental PI with gestational age in weeks. The Spearman's correlation coefficient was used to assess the relationship of CPI and gestational age in weeks. The Chi-square test was applied to analyze the correlation of CPI with current pregnancy order, educational level, and underlying diseases. The multivariate linear regression was used to analyze the cumulative effect of the variables. The level of significance was set at 0.05.

## Results

A total of 200 pregnant women participated in this study with an age range of 17-38 years (mean age of  $27.93 \pm 4.64$  years), and gestational age of 9-41 weeks (mean of  $26.85 \pm 6.89$  weeks). Table 1 shows the demographic characteristics of the participants.

Thirty-five participants (17.5%) had a history of systemic conditions. Twenty-eight (14%) pregnant women took medications during pregnancy, and the most commonly used medication was levothyroxine, followed by insulin.

Nineteen participants (9.5%) had a history of abortion, and 4 (2%) of them had experienced premature delivery (childbirth before the 37<sup>th</sup> week of gestational age). Oral

**Table 1.** General characteristics of the study population

Variables	Frequency (%)	
Age groups (yrs.)	23-17	35(17.5)
	30-24	103(51.5)
	38-31	62(31)
Educational level	High-school diploma and under	92(46)
	Two-year university degree	43(21.5)
	Bachelor's degree and higher	65(32.5)
Stage of pregnancy	First trimester	12(6)
	Second trimester	105(52.5)
	Third trimester	83(41.5)
Current pregnancy order	First	92(46)
	Second	74(37)
	Third	27(13.5)
	Fourth or higher	7(3.5)

health self-assessment showed that 43.5% of pregnant women believed that their oral health status was moderate. Pregnant women's oral health behaviors before and during pregnancy including toothbrushing, and using dental floss, toothpicks, mouthwashes, and saline solution are shown in Tables 2 and 3. Figure 1 shows all dental treatments that participants received during pregnancy.

About 153 (76.5%) pregnant mothers had a history of dental procedures such as restorative treatments, periodontal treatment, root canal therapy, tooth extraction, and dental surgery, before pregnancy.

A total of 127 participants (63.5%) had planned their pregnancy. Only three pregnant women (1.5%) confirmed that they had been referred for dental examination before pregnancy by their gynecologist. During pregnancy, 79 women (39.5%) suffered from oral and dental problems and pain, and the rest had no problems. Twelve (15/2%) women with oral and dental problems had visited a dentist, but only 9 (5.4%) of them had been referred to a dentist by their obstetrician or midwife.

Of those visiting a dentist, 5 (6.3%) received medications for pain and infection control (three received analgesics, one received antibiotics, and one received both); 5 (6.3%) underwent restorative procedures, 1 (1.2%) had root canal therapy, and 1 (1.2%) underwent tooth extraction (Figure 1).

In participants with oral and dental problems during pregnancy, 61 (77.2%) pregnant women did not seek dental treatment due to their concerns about dental procedures during pregnancy.

The PI ranged from 0 to 2.5 ( $0.75 \pm 0.48$ ). PI was not significantly correlated with any of the variables such as age, education level, gestational age in weeks, current pregnancy order, and underlying conditions ( $P > 0.05$ ).

The CPI index ranged from 0–4, and the highest frequency belonged to bleeding on probing (42.5%). CPI showed a significant correlation with gestational age in weeks ( $P = 0.005$ ).

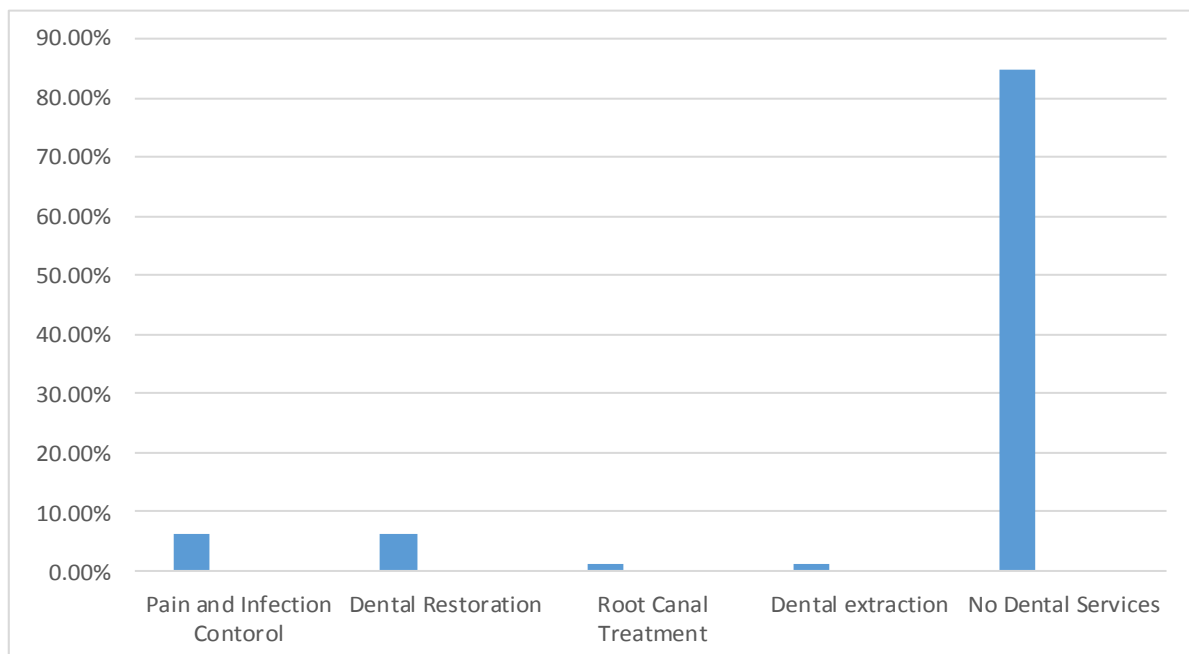
The DMFT index ranged from 0–21 ( $11.29 \pm 3.88$ ). The highest value was related to decayed teeth (D) ( $9.46 \pm 3.41$ ), while the mean and standard error for the teeth lost due to

**Table 2.** Prevalence of oral health behavior among participants before and during pregnancy

Data	Combined methods	None	Tooth brush + toothpick	Tooth brush + dental floss	Salt water rinse	Toothpick	Dental floss	Tooth brush	Total
<b>Before pregnancy</b> N (%)	15(7/5)	8(4)	10(5)	15(7/5)	2(1)	1(0/5)	3(1/5)	146(73)	200(100)
<b>During pregnancy</b> N (%)	6(3)	9(4/5)	7(3/5)	14(7)	5(2/5)	2(1)	3(1/5)	154(77)	200(100)

**Table 3.** Distribution of tooth brushing frequency before and during pregnancy

Variable	None N (%)	Once N (%)	Twice N (%)	Three times N (%)	Total N (%)
<b>Before pregnancy</b>	10(5)	115(57.5)	67(33.5)	8(4)	200(100)
<b>During pregnancy</b>	19(9.5)	117(58.5)	60(30)	4(2)	200(100)

**Figure 1.** Dental services that participants received during pregnancy

caries (M) and filled teeth (F) were  $1.8 \pm 0.18$  and  $3.18 \pm 2.35$ , respectively.

Multivariate analysis showed that the DMFT index had a significant correlation with age ( $P=0.001$ ) and educational level ( $P=0.03$ ). The highest mean DMFT was recorded in participants with older age and lower educational level.

## Discussion

Higher risk for gingival and periodontal disease and dental caries due to hormonal changes and nutritional and hygienic habits during pregnancy can cause premature birth and low birthweight as short-term effects [5]. The long-term effects like transmission of *Streptococcus mutans* from mother to baby can lead to a higher rate of dental caries in children [6-8, 21]. On the other hand, oral health in pregnant women has an established relationship with the mothers' quality of life [2, 9, 10]. Mothers also have a unique role in hygienic habits of other family members, especially children, indicating their significant role in promoting the community's oral health [21]. Nevertheless, worldwide studies have shown unfavorable oral health status of pregnant women [4, 18, 19, 22-26].

Investigating the oral health status of pregnant women in this study showed that the mean of DMFT index was high. The most frequent component of the DMFT index was the D component, and it exhibited a significant relationship with age and educational level of mothers. The pregnant women with lower educational levels had the highest mean DMFT. The results also indicated that only a little more than one-fourth of pregnant women were periodontally healthy.

The mean DMFT score and the PI of 340 pregnant women in Arak, Iran, in 2011 were reported to be  $5.4 \pm 2.83$  and 76%, respectively, in a study by Shamsi et al.

which was in agreement with the present findings [22].

The present results indicated that oral health behaviors of pregnant women in Kerman were not favorable; in this context, most of them only brushed their teeth once daily during this period, although they needed to brush their teeth more frequently. Comparing these results with similar studies in developing countries showed that insufficient attention to oral hygiene during pregnancy is a common problem [18]. The situation seems to be more favorable in developed countries; according to some studies, most pregnant women brush their teeth two or three times a day, and the oral health indices are better in these countries [11, 19].

In the present study, 76.5% of the women had a history of dental procedures before pregnancy. The obstetrician or midwives had referred only 1.5% of 63.5% of the participants with pre-planned pregnancy to a dentist for dental examinations and dental treatments.

A study by Odermatt et al. on pregnant and non-pregnant women (control group) in Switzerland in 2017 indicated that the target group had a significantly higher knowledge level about the importance of oral and dental health during pregnancy than the control group. This study also found that an obstetrician informed only one out of four pregnant women (25%) about the importance of periodic dental examinations during pregnancy. Odermatt et al. reported that providing pregnant women with inadequate information by obstetricians is due to insufficient knowledge of obstetricians about periodontal disease [17]. A national survey by Byrd et al. in the United States in 2018 declared that two-thirds of the primary care physicians instructed pregnant women about the importance of oral health during

pregnancy and encouraged them to have periodic dental examinations [14].

Another study on 3,455 pregnant women in 2018 showed that 17.6% of them were referred to a dentist by an obstetrician. Follow-ups and dental procedures in these pregnant women were significantly more common than in those presenting to the dentist without a referral by an obstetrician. This study emphasized on the importance of oral and dental healthcare in this period and the necessity of increasing the obstetricians' involvement in the referral process [27].

In the current study, 79 participants (39.5%) developed oral and dental problems during pregnancy. They did not have a positive attitude towards dental visits, and only 12 women (15.2%) had visited a dentist while only 9 out of 12 had been referred to a dentist by their obstetrician or midwife.

The results of the present study indicated lack of attention of healthcare providers such as midwives and obstetricians to oral health during pregnancy and referral of pregnant women for dental examinations and treatments before and during pregnancy. Therefore, it is necessary to educate obstetricians, midwives, and family physicians about the importance of oral health and the problems that pregnant women may face during pregnancy. On the other hand, attention should be paid to cooperation between these healthcare providers and dentists.

In the present study, obstetricians and midwives referred only 9 participants (4.5%) to dentists for dental examinations and dental treatments. Considering the small number of referrals, it appears that along with other barriers in referring pregnant women to dentists during pregnancy, healthcare providers did not place sufficient emphasis on this matter because of concerns about the

consequences of dental procedures during pregnancy [13].

In line with these findings, Al-Habashneh et al. showed that 88% of physicians recommended pregnant women to postpone oral and dental treatments to the postpartum period. In their study, only 54% of participants believed that dental problems could affect pregnancy outcomes [28].

Other recent studies declared misunderstandings about the safety of dental procedures during pregnancy among healthcare providers and dentists. While, even radiography and extraction can be carried out during this period without any specific problems [24, 26, 27, 29].

As mentioned earlier, 79 participants suffered from oral and dental problems during pregnancy, and 61 of them (77.2%) did not visit a dentist to address their oral and dental issues because they were worried about the consequences of dental treatments. They believed that these procedures might be harmful for the baby. In some studies, poor maternal health awareness was addressed as one of the reasons for this belief. They suggested that healthcare providers should enhance the mothers' knowledge to change their attitude [1, 11, 17, 29]. In addition, due to multiple barriers to deliver dental services to pregnant women, researchers suggest some solutions such as reformed insurance policy, equality in distributing health resources and services, and cost-effective population-level interventions [30].

## Conclusion

The results of this study showed that oral health status in pregnant women in Kerman was not favorable. It seems necessary to inform women of childbearing age and expectant mothers about the importance of oral health, how to maintain oral health, and

treatments that can be done during pregnancy. Therefore, the national health policymakers should develop programs to educate women and refer them to dentists through health service providers, midwives and obstetricians and monitor their effective implementation.

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