Assessment of the Community Periodontal Index of Treatment Needs (CPITN) in Pregnant Women Referring to the Health Centers in Arak, Iran

Saeid Bashirian[1-a], Maryam Barati[2-b]*, Majid Barati[1-c], Salman Khazaei[3-d], Leila Gholami[4-e], Ensiyeh Jenabi[5-f], Samane Shirahmadi[6-g]

[1]Social Determinants of Health Research Center, Hamadan University of Medical Sciences, Hamadan, Iran.
[2]Department of Public Health, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran.
[3]Department of Epidemiology, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran.
[4]Department of Periodontics, Dental Research Center, Hamadan University of Medical Sciences, Hamadan, Iran.
[5]Autism Spectrum Disorders Research Center, Hamadan University of Medical Sciences, Hamadan, Iran.
[6]Department of Community Oral Health, School of Dentistry, Hamadan University of Medical Sciences, Hamadan, Iran
*Corresponding author

Research Article

ABSTRACT

Objectives: : Oral health during pregnancy is very important because of the immediate and long-term impact on women and children's health. The present study aimed at assessing the Community Periodontal Index of Treatment Needs (CPITN) in Pregnant Women Referring to the health centers in Arak, Iran.

Materials and methods: This is a cross-sectional, descriptive-analytical study that was conducted among 275 pregnant women visiting the health centers in Arak, Iran, in 2021. Cluster random sampling method was used to select the samples. The demographic information was gathered and oral examination was performed to determine the Community Periodontal Index of Treatment Needs (CPITN). The data were analysed by SPSS18 software, using multinomial logistic regression analysis.

Results: According to the results, the normal gingival status (code 0), Bleeding on probing (code1), dental calculus (code2), and periodontal pocket depth between 4 and 5 millimeters (code3) were observed of 44.7%, 17.5%, 36.4%, 5.1% of women, respectively. No periodontal pocket deeper than 6 millimeters (code4) was observed. Overall, 17.5% of these women needed oral health education, and 37.9% required scaling as well as oral health education; however, there were no pregnant women who required specialized treatment.

Conclusions: According to the CPITN measurement, pregnant women were not in good health condition in terms of gingival and periodontal disease and more than half of them required oral health education or treatment. The results of the present study provide experimental evidence that can be helpful in planning and identifying the priorities to promote oral health in pregnant women.

Keywords: Pregnancy, CPITN index, Periodontal Diseases, Brushing Frequency, Bleeding on probing.

a ✉ s_bashirian@yahoo.com   https://orcid.org/0000-0003-2133-087X
c ✉ barati@umsha.ac.ir   https://orcid.org/0000-0002-5152-1928
e ✉ l.gholami@hotmail.com   https://orcid.org/0000-0001-5287-1754
g ✉ shirahmadi_s@yahoo.com   https://orcid.org/0000-0002-3008-6613
b ✉ barati85@gmail.com   https://orcid.org/0000-0002-8174-2190
d ✉ salmankhazaei61@gmail.com   https://orcid.org/0000-0001-5918-2310
f ✉ en.jenabi@yahoo.com   https://orcid.org/0000-0001-6111-1538
  https://orcid.org/0000-0001-6386-8892

Introduction

Oral health during pregnancy is very important because of the immediate and long-term impact on women and children's health.[1] Various conditions during pregnancy, such as vomiting and reflux, dryness in the mouth, and poor washing effect of the saliva can lead to an increase in tooth decay, and nausea, fatigue, and physical weakness may lead to poor oral hygiene during pregnancy.[2] Moreover, the gums undergo some changes during pregnancy due to hormones where the risk of suffering periodontal diseases increases.[2-5] The periodontal disease during pregnancy is considered to be significant because not only does it affect the tissues supporting the teeth, but also it is connected with systemic conditions such as adverse pregnancy outcomes (e.g., preeclampsia, eclampsia, abortion, preterm birth, low birth weight).[6-14] However, it is clear that the pregnant woman oral health is related to her general health.[15] In addition, poor oral hygiene and the quantity of

plaque accumulation aggravates gingivitis. Bacterial plaque is a necessary primary etiology for gingivitis. In the absence of bacterial challenge, gingival tissues can remain in a healthy state during pregnancy.[16,17] whereas, some studies have shown that 36-53% of pregnant women receive dental care.[18-21] Therefore, providing data about periodontal status and treatment needs among pregnant women to those planning the oral health programs during pregnancy seems necessary. The prevalence of periodontal diseases in pregnant women has been determined in different populations worldwide, ranging from 3% to 90%. For example, the same rate is about 3.1% in the USA,[22] and it varied in African countries from 14.2% in Tanzania to 89% in Ghana[14,23-25], 73% in Indonesia, and it was 76% and 83.5% in Pakistan and Egypt respectively.[26,27] However, it should be considered that periodontitis includes a wide range of clinical symptoms from mild to severe, which can

eventually lead to gum destruction and tooth loss. Therefore, various methods such as the presence of subgingival calculus to radiographic evidence of alveolar bone loss are used to diagnose periodontal diseases in different stages of development. Thus, the prevalence estimates vary across studies. In Iran, oral and gingival health status was examined in a national survey in 2018[28]; however, there is limited information on periodontal disease in pregnant women in Iran.[29-31] Therefore, the present study aimed at assessing the Community Periodontal Index of Treatment Needs (CPITN) in Pregnant Women Referring to the health centers in Arak, Iran.

Material and Methods

This is a cross-sectional (descriptive-analytical) study that was conducted on 275 pregnant women visiting health centers in Arak, Iran, over July to September 2021. Cluster random sampling method was used to select the samples. As Arak is divided into five municipal districts, its health centers were divided based on the five districts. A number of health centers were randomly selected from among the health centers of each district (18 health centers out of the 50 centers: 4 centers in Region 1, 2 centers in Region 2, 5 centers in Region 3, one center in Region 4, and 6 centers in Region 5) using cluster sampling method and considering the population of that district. The total number of pregnant women covered by the selected health centers were extracted from the sib website (https://sib.iums.ac.ir) and the sample size allocated to each health center was selected using simple sampling method. The sampling chart is presented in Figure 1.

Inclusion and exclusion criteria:

The inclusion criterion was having a pregnancy record in one of the health centers of Arak. The exclusion criteria were wearing fixed or removable braces, having complicated problems during pregnancy, being under 18, or not having enough teeth to determine the index. women should be systemically healthy.

In the present study, the demographic information including age, education, number of children, gestational age, insurance status, and pregnant woman's job, and brushings frequency was collected by the questionnaire. Oral examination was performed to assessing periodontal status. In this study, the Community Periodontal Index of Treatment Needs (CPITN) proposed by WHO was used to determine gingival health.[32]

An oral hygienist performed all the examinations based on WHO recommendations for determining the CPI. He was calibrated by the dental clinic of Arak health center at the Arak University of Medical Sciences. The oral hygienist had worked in the dental clinic of Arak health center for 2 years and performed oral examinations for different groups, including pregnant women. The Kappa agreement between the examiner and dental clinic were 0.91.

The objectives of the study were explained. If pregnant women consented to participate in the study, they were included in the study. Informed consent was completed by all participants. The oral hygienist performed all the examinations at the health centers and in a separate room. Each pregnant woman sat on a chair and a headlamp was used as a light source. Each examination lasted about 10 minutes and the scores determined for each tooth were announced by the oral hygienist while being registered by the oral hygienist's assistance in the table of any given person. After completing the questionnaire and oral examination, they were educated about the importance of oral hygiene during pregnancy.

The CPI index was measured in 10 index teeth (17,16,11,26,27,47,46,31,36,37) and six sextants (17–14, 13–23, 24–27, 37–34, 33–43, 44–47). The probing was carried out around the tooth and in 6 parts, including buccal, mesiobuccal, distobuccal, lingual, mesiolingual, and distolingual, using WHO CPI probe, and a dental mirror. CPI probe has a 0.5-mm ball tip, and a black ring at a distance of 3.5 millimeters and 5.5 millimeters, and also in the 8.5 millimeters to 11.5 millimeters. After 30 seconds of probing each part, the bleeding or non-bleeding in each part was registered.
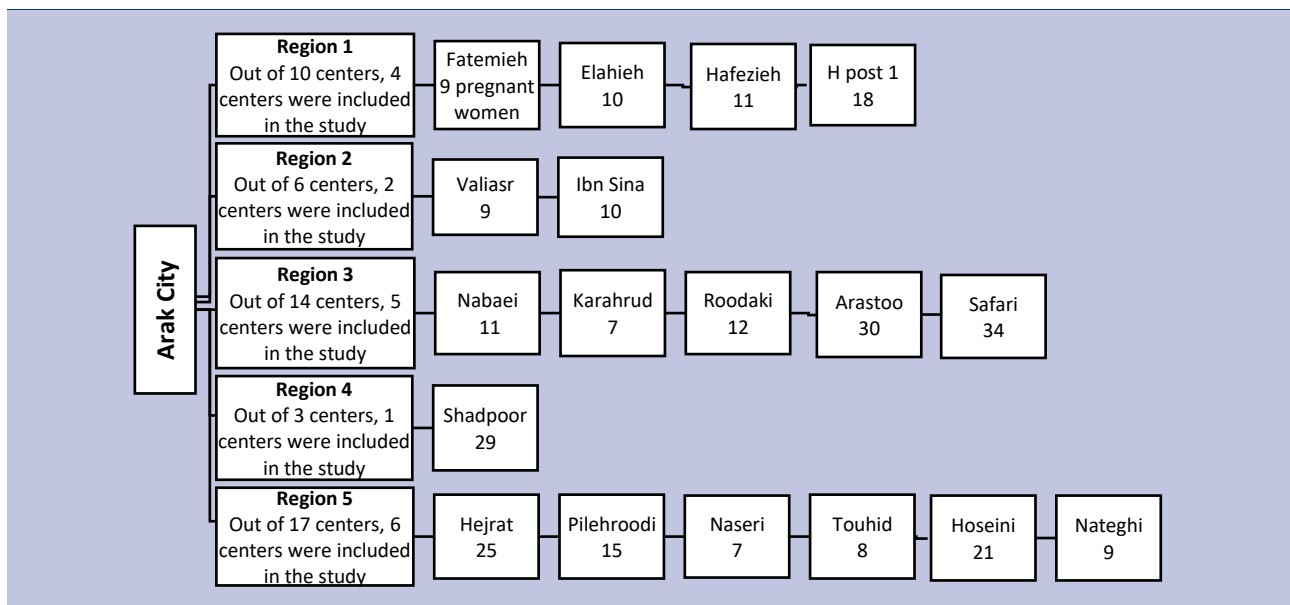

Figure 1. Multistage sampling strategy across five districts in Arak

The scores of each tooth were registered, and the highest score for each sextant was considered. Then, the highest registered code was considered the index for each person. There had to be at least two teeth to determine the index in each sextant. If none of the index teeth were present, all the teeth in the sextant were examined. In this index, code 0 indicates that the gum is healthy and that it required no treatment, code 1 indicate bleeding after probe and the depth less than 3 mm requiring education about oral health, code 2 indicates dental plaque and dental calculus observed or felt by probing requiring education about oral health and scaling, code 3 indicates pathological pocket deeper than 3 millimeters and less than 6 millimeters requiring education about oral health and also scaling. Code 4 indicates the pathological pockets that are 6 millimeters or deeper, requiring education about oral health, scaling and also advanced periodontal treatments.[33]

The Ethics Committee of Hamadan University of Medical Sciences approved this study (approval code: IR.UMSHA.REC.1399.863) (approval date: 2021 January 9). All methods were performed in accordance with the relevant guidelines and regulations. Informed consent was completed by all participants.

Data were analyzed by SPSS software version 18 using the descriptive statistics, cross-tabulation, and multinomial logistic regression. Healthy gum (code0) was considered as the reference group, and groups with different demographic characteristics, and tooth brushing frequency were compared with this group (healthy gum) in terms of the possibility of having bleeding on probing and dental calculus. Participants with code 3 (4 participants) and code 2 (100 participants) were combined to perform the analysis. The confidence interval of 95% was considered for the odds ratio.

Results

The mean age of participants was 29.67±5.54 ranging from 18 to 46. One hundred and forty-six of (53.1%) women were in the third trimester, and 123 (44.7%) of women experienced their first pregnancy where most of them (88%) were housewives. The findings indicated that half of the participants brushed once a day (58.5%), and 24% brushed twice or more. The demographic characteristics of the participants and distribution of CPI according to demographic characteristics and daily brushing frequency are provided entirely in Table 1.

The CPITN assessment of pregnant women showed that 17.5% of pregnant women had bleeding on probing (BOP) (code 1). In addition, 36.4% of women had dental calculus (code 2). Most cases of BOP and dental calculus were observed in lower anterior teeth. 1.5% percent of participants had periodontal pocket depth measuring 4mm to 5mm (code 3); however, no pocket deeper than 6mm (code 4) was observed. Overall, 44.7% of the pregnant women had healthy gums requiring no treatment while 17.5% of these women needed education about oral hygiene, and 37.9% required scaling as well as education about oral health; however, there were no people requiring specialized treatment (Table 2).

Table 1. Distribution of CPITN according to demographic characteristics and daily brushing frequency

| Characteristics | Categories | N(%) | CPITN | | | |
			Healthy N (%)	Bleeding on probing N (%)	Calculus with plaque seen or felt by probing N (%)	Pathological pocket (4 – 5 mm) N (%)
Age(year)	Under 25 years	63(22.9)	29(46.03)	17(26.98)	16(25.39)	1(1.58)
	26 to 35 years	168(61.1)	75(44.64)	26(15.47)	64(38.09)	3(1.78)
	More than36 years	44(16)	19(43.18)	5(11.36)	20(45.45)	0(0)
Education	Under diploma	53(19.2)	18(33.96)	12 (22.64)	21(39.62)	2(3.77)
	Diploma	116(42.5)	48(41.37)	17(14.65)	49(42.24)	2(1.8)
	Academic	106(38.5)	57(53.77)	19(17.92)	30(28.03)	0(0)
Number of children	No children	123(44.7)	63(51.21)	24(19.51)	34(27.64)	2(1.62)
	One child	98(35.6)	41(41.83)	17(17.34)	40(40.81)	0(0)
	Two or more children	54(19.6)	19(3.18)	7(12.96)	26(48.14)	2(3.7)
Gestational age	First trimester	26(9.5)	10 (38.46)	1(3.84)	15(57.69)	0(0)
	Second trimester	103(37.5)	50(48.54)	20(19.41)	32(31.06)	1(0.97)
	Third trimester	146(53.1)	63(43.15)	27(18.49)	53(36.30)	3(2.05)
Insurance status	Yes	233(84.7)	106(45.49)	40(17.16)	84(35.5)	3(1.28)
	No	42(15.3)	17(40.47)	8(19.04)	16(38.09)	1(2.38)
Occupation	Housewife	242(88)	104(42.97)	46(19.08)	88(36.36)	4(1.65)
	Employee	33(12)	19(55.57)	2(6.06)	12(36.36)	0(0)
Tooth brushing frequency	Once every two or three days	48(17.45)	10(2.08)	13(27.08)	23(47.91)	2(4.1)
	Once a day	161(58.54)	70(43.47)	26(16.14)	63(39.13)	2(1.24)
	Twice a day or more	66(24)	43(65.15)	9(13.63)	14(21.21)	0(0)

Table 2. CPITN (Community Periodontal Index of Treatment Needs) among studied pregnant women (n=275)

CPITN	Percentage	Number
No periodontal disease (code 0)	4.7	123
Bleeding on probing (code1)	17.5	48
Calculus with plaque seen or felt by probing (code 2)	36.4	100
Pathological pocket 4 – 5 mm (code 3)	1.5	4
Pathological pocket 6 mm or more (code 4)	0	0

Table 3. Relationship between demographic factors and frequency of tooth brushing with CPI using multinomial logistic regression analysis

Predictor variables		Bleeding on probing		Calculus with plaque seen or felt by probing& Pathological pocket (4 – 5 mm)	
		OR (CI 95%)	P-value	OR (CI 95%)	P-value
Age(year)	Under 25 years	Reference		Reference	
	26 to 35 years	0.45 (0.12-1.70)	0.242	1.60 (0.56-4.50)	0.374
	More than36 years	0.52 (0.21-1.26)	0.148	1.20 (0.55-2.63)	0.637
Education level	Under diploma	1.02 (0.36-2.92)	0.962	1.54(0.62-3.85)	0.353
	Diploma	0.66 (0.28-1.56)	0.348	1.65(0.82-3.29)	0.154
	Academic	Reference		Reference	
Number of children	No children	Reference		Reference	
	One child	1.12 (0.34-3.64)	0.844	1.79(0.74-4.25)	0.187
	Two or more children	1.50(0.66-3.42)	0.331	1.53(0.78-2.97)	0.209
Gestational age	First trimester	Reference		Reference	
	Second trimester	4.79(0.56-40.50)	0.150	0.72 (0.28-1.84)	0.497
	Third trimester	4.32(0.50-37.12)	0.182	0.50(0.18-1.33)	0.167
Insurance status	Yes	Reference		Reference	
	No	1.24 (0.45-3.39)	0.674	1.12(0.50-2.50)	0.780
Occupation	Housewife	3.20(0.66-15.49)	0.148	0.84(0.34-2.08)	0.717
	Employee	Reference		Reference	
Tooth brushing frequency	Once every two or three day	**6.27(1.97-19.94)**	**0.002**	**6.57(2.40-18.01)**	**0.000**
	Once a day	1.71(0.71-4.12)	0.228	**2.57 (1.24-5.33)**	**0.011**
	Twice a day or more	Reference		Reference	

The reference category is: healthy. CI, confidence interval; OR, odds ratio. Significance level P<0.05.

The results of the present study showed that there were no significantly relationships between demographics characteristics and CPI scores. Moreover, the results concerning brushing frequency and CPI showed that pregnant women who brushed their teeth every two or three days, were 6.27 times more likely to have bleeding on probing than the ones who brushed their teeth twice a day (OR: 6.27, 95%CI: 1.97-19.94). Moreover, the results show that women who brushed their teeth every two or three days (OR: 6.57, 95%CI: 2.40-18.01) or once a day (OR: 2.57, 95%CI: 1.24-5.33) were more likely to have dental calculus and periodontal pockets (4-5mm) than the ones who brushed their teeth twice a day (Table 3).

Discussion

The present study aimed at assessing the Community Periodontal Index of Treatment Needs (CPITN) in Pregnant Women Referring to the health centers in Arak, Iran. The measurement of CPITN in the present study showed that 17.5% of pregnant women needed to oral health education for the mild periodontal disease. However,

37.9% of the participants needed professional cleaning and plaque removal in addition to improved personal oral hygiene practices. Many studies have been conducted on this issue in different communities. The results of these studies vary and range from 3.1% to 89%.[5,22-24,34,35] The prevalence of periodontal diseases in Iran varied, from 40% to 70%.[26,30,31,36] The differences could originate from different socio-cultural backgrounds and other indices and definitions for periodontal diseases. In Wandera's study among 713 pregnant women in Uganda using the CPITN index, 67.3% of the participants received a code>0.[24] In Abdal's study, among pregnant women in Ilam, according to the CPTIN index, 70% received code>0 (Healthy gum=30%, bleeding on probing=18%, calculus=36%, and periodontal pocket (4-5mm)=16%).[29] The Gesase's study among 1117 pregnant women in Tanzania showed the 14.2% prevalence of gum disease using CPI (code>0). The low prevalence rate in the Gesase study could have been influenced by the location of the study (in an urban area with good education).[14]

According to the results of the present study, BOP and dental calculus observed in pregnant women were 17%

and 36.4% respectively, that were consistent with the studies in Iran by Meybodi,[37] Dehghanipour[31], Taheri[30], Abdal[29] and also in other countries.[34,38] However, the rates of BOP in the study by Lasisi[23] in Nigeria and by Wandera[24] in Uganda were significantly lower (5.2% and 3.3%, respectively). As opposed to their low BOP rates, the dental calculus in the mentioned studies were much more than those in the present study (87% and 63%, respectively). Considering that BOP is one of the early symptoms of gingival diseases while the accumulation of dental calculus occurs in the long run, thus the high rates of dental calculus in different societies may indicate the oral health habits of women before pregnancy.

Additionally, the results showed that the odds of having BOP were greater in pregnant women who brushed their teeth once every two or three days than pregnant women who brushed their teeth twice a day. However, the probability of having BOP was not higher in women who brushed their teeth once a day than in women who brushed their teeth twice a day. In the Martinez *et al.* 's study[39] among pregnant women living in southeast Spain showed that the increased frequency of tooth-brushing was associated with lower scores for CPI and BOP. While, in Gil *et al.*'s study[38], among pregnant women, no significant relationship was found between BOP and brushing frequency. Also in Dehghanipour's study,[31] which was conducted among 407 pregnant women in Varamin, the probability of BOP in pregnant women who brushed their teeth less than once a day was not higher than those who brushed their teeth more than once a day. In general, it seems necessary to emphasize daily brushing in the prevention of early symptoms of periodontal diseases.

In addition, the results showed that the odds of having dental calculus and periodontal pockets were greater in pregnant women who brushed their teeth once every two or three days, and once a day than pregnant women who brushed their teeth twice a day or more. In general, in other studies, specifically conducted on pregnant women there were relationship between daily brushing and pregnant women's gingival health.[30,38,40,41] The evidence showed that effective control of dental plaque is critical to gingival health, and the prevalence of gingivitis in women without dental plaque was much lower than those with it.[38,42-44] Therefore, providing instructions about frequency, time, and correct method of tooth brushing can be effective. Comparison of the results of the present study with the results of the previous study in Arak,[45] showed that daily brushing frequency in pregnant women has increased overall. However, as the results of this study indicated, only 24% of pregnant women brushed their teeth twice a day, indicating the need for more oral hygiene education in pregnant women.

As mentioned, periodontal diseases are determined by different methods in different stages of development, but in the studies aiming at examining the periodontal disease status in a large population, the use of CPITN is a cost-effective, simple, and quick screening method and considering the mission to promote public health it seems to be an appropriate method applied to answer the two questions, namely the number of people in the community at the risk of periodontal disease progression, and the treatment they need. Although the original CPI index has limitations, such as evaluating the periodontal pocket and not considering loss of attachment.[46-48]

Since sampling was done from all of the health centers in the city, and health centers cover about 85% of the total pregnant women in the city, the sample size can be representative of the target community, although it is recommended to conduct a study in rural areas with different socio-cultural backgrounds. Also, most of the pregnant women visiting health centers were in the second and third trimesters of pregnancy. Because after the diagnosis of pregnancy, the pregnant women visit the private centers to receive prenatal care. Then they go to health centers in the second and third trimesters to file a pregnancy record or were identified by the health center staff.

Conclusions

In the present study, according to the CPITN measurement, pregnant women were not in good health condition in terms of gingival and periodontal disease and more than half of them required oral health education or treatment. The results of the present study provide experimental evidence that can be helpful in planning and identifying the priorities to promote oral health in pregnant women.

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Conflicts of Interest statement

The authors declare no conflict of interest, financial or otherwise.

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