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The Status of Dental Caries and Some Acting Factors in a Sample of Iranian Women with Pregnancy

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Abstract: Pregnant women are more susceptible to periodontal disease like gingivitis. Periodontal disease may be associated with adverse pregnancy outcomes. There is no published literature on dental health in pregnant women in Arak city in Iran. This was a cross-sectional descriptive and analytical study conducted at the 340 pregnant women. The sampling procedure used was a stratified cluster sampling technique. Subjects were randomly selected and questionnaire was given to women in 15 health centers. The level of knowledge, attitude and practice of oral health behavior were recorded. Results revealed that: The mean knowledge of the women is 43.2 ±9.8 and the mean DMFT is 5.4±2.83 for the sample and 21-25, 26-30 and 31-35 year-olds were 2.9, 5.6 and 5.9, respectively. The knowledge related to dental care was also poor among the pregnant women. Though the majority of them (82%) agreed that women should have a dental check-up during pregnancy, only 46% actually practiced this. Significant positive correlations existed between the participant's age and DMFT (r=0.44), DT (r= 0.36) and FT scores (r= 0.41), respectively. In conclusions: This study highlights important gaps in dental knowledge and practices related to oral and dental healthcare among pregnant women. More intense dental health education, including oral health promotion in maternal child health centers can lead to improved oral and dental health and ultimately pregnancy outcomes.

Key words: Dental Carries · DMFT · Pregnancy · Women · Iran

INTRODUCTION

Oral health plays an important role in maintaining a healthy human body. Good oral health enhances our ability to perform a variety of oral and ingestive functions, such as speaking, chewing and swallowing; however, oral diseases, ranging from untreated dental caries (tooth decay) to oral cancer, cause pain and disability for millions of human each year [1]. In addition, poor oral health is associated with chronic diseases and ill health, such as cardiovascular disease and low-birth weight [2-4]. Dental caries is considered a major public health problem globally due to its high prevalence and significant social impact [5]. Pregnant women are more susceptible to periodontal disease because of female reproductive hormonal influences. A few studies have demonstrated that periodontal disease may be associated with adverse pregnancy outcomes, such as premature birth and low birth weight [4,5].

The CDC's Pregnancy Risk Assessment Monitoring System (PRAMS) reported that only 23–43% of pregnant women receive dental care during their pregnancies at a rate only half to two-thirds of US women's overall use of dental services (67%) [6]. The old saying "for every child a tooth" indicates that historical mothers expected to lose a tooth with each pregnancy. Such dire consequences are not inevitable but many factors do seem to contribute to an increased incidence of dental health problem during pregnancy [7, 8]. The Commonwealth of Kentucky exceeds the U.S. average for dental health problems as 13% of adults aged over 18 years are missing all of their teeth, compared to 6% nationally [9].

In another study in Iran, Haji Kazemy *et al*. [10] showed that majority (70%) of pregnant women has negative attitude regarding the performance of oral and dental care during pregnancy. Moreover Fazel *et al*. [11] showed that among 757 individuals subjected to an oral examination only 8.7% were free of any oral/dental

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disease. They added that an estimated 1000 to 1500 women in the Arak city become pregnant each year. Khosravi *et al*. [12] stated that despite a general reduction in dental caries in all ages, studies showed that it remains high during pregnancy since approximately 40 to 90 percent of women with pregnancy suffer from dental caries in developing countries. Indeed the Eastern Mediterranean region, which also includes Iran, has the high mean for decayed, missing and filled teeth (DMFT). Pakshir [13] reported that the level of oral health in Iran is low, as there is a high rate of untreated caries among pregnant women. Unfortunately there is a lack of systematic data in Iran, preventing any measure of long-term oral health status and oral diseases. Moreover Clinicians and public health care providers who care for women during pregnancy need new practical information concerning factors that affect dental care use to allow development and implementation of oral health counseling, screening and referral strategies. It is therefore crucial that the oral health knowledge and status of dental caries women with pregnancy in Iran be assessed as they are an important and high-risk group. Moreover, non-compliance oral health during pregnancy can affect the health of the fetus. Prevention of oral and dental problems and their complications during pregnancy is possible through having pregnant women expressing appropriate knowledge, attitude and practice. This study provides a small insight into the country's current situation on oral and dental healthcare among pregnant women and it will raise awareness on the importance of good oral and dental healthcare not only in pregnant women, but also in the general public.

The aim of this study was described status of dental caries and some acting factors in a sample of Iranian women with pregnancy.

MATERIALS AND METHODS

A self–administered survey was created to assess access to dental care issues, oral health knowledge, attitude and practice. This study that was carried out on 340 pregnant women in Arak city, located in the Markazi Province of Iran, ethical clearance was obtained from the institutional ethical committee and Medical and Health Research Ethics Committee at the Ministry of Health in Iran and Arak university of medical sciences.

The sampling procedure used was a stratified cluster sampling technique incorporating 3 stratified zones, for each of which a cluster of women with pregnancy were recruited from randomly (with serial number cards) selected in 15 health centers.

In this study inclusion criteria included consent women with pregnancy for the study and without oral diseases. Exclusion criteria were lack of interest or the mother has advanced dental disease. The women agreed to participate and complete a questionnaire. All women gave their informed consent. Women participation was voluntary and anonymous using self-administered data collection procedures. The study was approved by both the Ethics Committee of Tarbiat Modares University (Tehran-Iran) and the health center of Arak province.

Measurements: A self-administered questionnaire was used and it was pre-tested and validated prior to the commencement of the study. The questionnaire was broadly divided into four parts: (1) socio-demographic data consisting of age, education and job status; (2) knowledge; (3) attitude and (4) practice of pregnant women on oral and dental health.

Knowledge questionnaire includes 15 item multiple choice questions that correct answer score=1 and incorrect answer score=0 then total score based on 100 score and level of knowledge; low (0-30) moderate (31-60) and high (61-100) was calculated.

Survey sections which evaluated access to dental care issues and oral health attitude contained Likert–type scale questions to measure the level of agreement with each statement. The responses included "strongly agree," "agree", "don't know/ not sure," "disagree" and "strongly disagree." Summary scores were calculated to identify subjects with poor access to dental care, low oral health knowledge and practice of oral health. A value of 5 was assigned for responses of "strongly agree", value of 4 was "agree", value of 3 was "don't know/not sure", value 2 was " disagree" and value 1 was " strongly disagree".

Internal reliability analysis was conducted on all of the knowledge Cronbach's alpha scores were moderately high for knowledge (knowledge = .81).

In this study 340 subjects were divided into 3 age groups of 21-25, 26-30 and 31-35 year-old.

The monthly family income was measured using a three-point scale of low, moderate and high. The frequency of tooth brushing was assessed on a six-point scale (1 = never, 2 = less than a month, 3 = less than a week, 4= once a week, 5=once a day and 6= twice a day). The use of dental floss was measured using a five-point scale (1 = never, 2 =less than a month, 3 = less than a week, 4= once a week and 5 = once a day). Furthermore, women with pregnancy were asked to indicate their oral health status using a three point scale (1 = poor, 2 = average and 3 = good). A history of dental visits was

taken based on three categories (1= never been to a dentist, 2= more than 12 months ago and 3= within the last 12 months). Finally, the nature or type of the last dental visit made by women was noted according to a two category system (1= planned visit and 2= acute visit).

Dental caries status was assessed in terms of decayed teeth (DT), filled teeth (FT) and decayed, missing and filled teeth (DMFT). A clinical examination for caries was done using the DMFT index. DMFT in the subjects was assessed by a single examiner and the intra-examiner reliability for caries status (Kappa statistic) was 0.89. The clinical dental examination was conducted in the health centers on a comfortable chair with the aid of a headlamp and mouth mirror.

Statistical Analysis: The questionnaires were reviewed and entered into a database constructed using the program SPSS (16), which was used to perform the statistical analysis. Descriptive variables were expressed as frequency, mean and overall range. The 95% CI was calculated for the precision of prevalence estimates. Pearson chi-square tests were conducted to assess associations between quality personal items and oral health status, in this part, variables that had more than two categorical response choices were recoded into dichotomized variables.

In order to compare two groups a mother with and non coverage insurance unpaired t-test was used. If there were more than two groups, a one-way ANOVA followed by a Tukey test was performed for assessment of group comparisons. A Spearman correlation was used to assess any correlation between the SES information provided by the women and the SES classification used in the sample selection process. For all comparisons, statistical hypotheses were tested using the two-tailed tests; *p*-values <0.05 were considered statistically significant.

RESULTS

In this study of 340 women, 212 were in the first trimester and the majority brushed their teeth once a day (43.4%) and most of them did not use dental floss (41%). The variables of socio-demographic characters included age, education and job status are illustrated in Table 1.

Results revealed that the mean knowledge is 43.2 ±9.8 about oral health and 22% of the subjects has high awareness toward oral health, whereas 48 and 30% of the women has moderate and low level of awareness respectively. The mean DMFT is 5.4±2.83 for the sample and 21-25, 26-30 and 31-35 year-olds were 2.9, 5.6 and 5.9, respectively. The knowledge related to dental care was also poor among the pregnant women. Though the majority of them (82%) agreed that women should have a dental check-up during pregnancy, only 46% actually practiced. This raises serious concern since pregnant women may need extra oral and dental care due to susceptibility to gum diseases during pregnancy, which may contribute to low birth weight babies and premature births.

Table 1: Contains demographic information of the survey population

	No. (%)	
Demographic characteristics		No. (%)
Level of education	Elementary school	19 (6)
	Middle school	137 (40)
	High school	131 (38)
	College or university	53 (16)
Coverage insurance	Yes	255(75%)
	No	85(25%)
Tooth brushing	Twice a day	65(19.1%)
	Once a day	148(43.4%)
	Once a week	50(14.8%)
	less than a week	38(11.2%)
	Less than a month	24(7%)
	Never	15(4.5%)
Dental flossing	Once a day	49(14.2%)
	Once a week	63(18.4%)
	less than once a week	47(13.6%)
	Less than once a month	38(11.1%)
	Never	143(41.7%)
Monthly family income	0-500$(low)	98(29%)
	500-800$(moderate)	160(47%)
	>800$(high)	82(24%)

Regarding factors involved in caries as main factors 17% expressed microbial activity¡ 40% consumption of sugar food in this period and 43% lack of hygiene. Comparing their awareness of fluoride role and using dental floss instead of string with regard to their education (X^2=3.228 p=0.048). It should be noted that an increase level of education enhance the mother knowledge.

In this study the majority of respondents had knowledge about fluoride use, daily flossing and dietary considerations for oral health. However, many did not know that oral disease may affect the heart, pregnancy and diabetes.

The results from the responses to the questions concerning knowledge and practice related to oral and dental healthcare indicate that the knowledge related to oral and dental treatment during pregnancy was

Table 2: Mean caries indices in relation to some acting factors

		DT	MT	FT	DMFT
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Age	21-25 (n=47)	2.8(1.03)	.86(.28)	1.87(.63)	2.19(1.72)
	26-30(n=135)	3.1(1.2)	.94(.33)	2.14(1.12)	5.6(2.62)
	31-35(n=158)	4.5(1.6)	.98(.35)	2.6(1.7)	5.9(2.85)
	ANOVA	0.001	0.03	.114	0.001
Monthly family income	Low(n=98)	3.2(1.71)	2.3(1.14)	1.2(.84)	5.8(2.32)
	Moderate (n=160)	2.8(1.68)	2.1(1.18)	2.3(1.07)	5.3(2.03)
	High(n=82)	2.6(1.43)	1.8(1.15)	2.9(1.11)	4.6(1.27)
	ANOVA	0.068	0.787	0.023	0.047
SES zones	Zone1(n=114)	4.4(1.2)	2.4(1.47)	1.6(.84)	4.6(1.78)
	Zone2(n=113)	4.1(1.28)	2.1(1.18)	2.02(1.07)	3.7(1.11)
	Zone3(n=113)	2.6(1.1)	1.6(1.03)	2.9(1.17)	2.9(1.21)
	ANOVA	0.036	0.711	0.021	0.011
Coverage insurance	Yes (n=255)	3.12(1.88)	2.3(.94)	2.84(1.28)	5.8(2.34)
	No (n=85)	3.19(1.68)	2.7(1.12)	1.1(.83)	5.6(2.08)
	T-test	0.286	0.721	0.018	0.412
Tooth brushing	Twice a day (n=65)	2.9(1.93)	1.43(.71)	1.76(.63)	4.7(2.8)
	Once a day (n=148)	3.3(1.8)	1.61(.83)	1.81(.75)	4.9(2.5)
	Once a week(n=50)	4.1(2.8)	1.83(.93)	1.9(.73)	5.2(2.6)
	less than a week (n=38)	4.5(2.1)	2.4(1.34)	2.4(1.21)	5.5(2.41)
	Less than a month (n=24)	5.8(3.3)	2.5(1.3)	2.91(1.43)	5.6(2.32)
	Never (n=15)	6.8(3.2)	2.8(1.4)	3.1(1.5)	6.4(2.91)
	ANOVA	0.001	0.052	0.018	0.028
Dental flossing	Once a day(n=49)	1.8(.91)	1.21(.43)	1.4(.37)	2.53(1.28)
	Once a week (n=63)	2.4(1.1)	1.28(.58)	1.7(.31)	2.68(1.12)
	less than once a week (n=47)	2.5(1.03)	1.43(.63)	2.1(1.07)	3.43(1.39)
	Less than once a month (n=38)	3.2(1.91)	1.91(.86)	2.5(1.81)	4.1(2.3)
	Never(n=143)	3.8(2.08)	2.4(1.31)	3.11(1.75)	4.6(2.5)
	ANOVA	0.001	0.241	0.0121	0.001
Self-assessment of oral Health	Good(n=103)	2.2(1.01)	1.9(.83)	1.1(.48)	2.6(1.87)
	Average(n=185)	2.6(1.3)	2.4(1.08)	2.3(1.21)	3.3(1.41)
	Poor(n=52)	3.4(1.9)	2.9(1.3)	3.1(1.13)	3.9(1.71)
	ANOVA	0.043	0.087	0.0198	0.0357
Time since last visit	Within the last12months (n=68)	2.1(1.1)	1.9(0.98)	3.4(1.3)	3.6(1.07)
	More than 12 months ago (n=108)	2.6(1.41)	2.3(1.48)	3.5(1.45)	3.9(1.18)
	Never been to a dentist(n=164)	3.2(1.81)	3.8(1.53)	3.8(1.23)	4.9(1.72)
	ANOVA	0.187	0.038	0.541	0.048
Type of visits	Planned visits (n=83)	2.14(1.08)	2.1(1.3)	3.5(1.81)	3.1(1.28)
	Acute visits (n=257)	3.9(1.70)	2.91(1.38)	3.7(1.76)	4.5(1.31)
	T-test	0.029	0.835	0.186	0.019

significantly associated with educational level and job status. Knowledge related to the frequency of brushing, flossing and brushing times was significantly associated with their practice (all *p*-values <0.05). Those with less than a high school education had significantly less oral health knowledge than those with at least some college education (p=0.01). There was not a significant association between low oral health knowledge and poor access to dental care (r=0.18, p=0. 24).

Table 2 compares the DMFT values of the women with respect to their insurance coverage. There wasn't a significant difference between the two status of coverage insurance (P=0.412). Indeed prevalence of fillings (FT) was higher in women with coverage insurance (OR 1.68, 95% CI, 1.26-2.43).

One way ANOVA showed that the age of the women has a significant effect on the DMFT value, Tuky test showed that with increasing age the DMFT

Table 3: Odds ratios for untreated dental caries (n=340)

Variables	Odds Ratio, 95% CI	P-Value
Age, years (ref. 21-25)		
25 to 30	1.32 [1.02, 1.7]	0.045
31 to 35	1.88 [1.17, 2.91]	0.01
Level of education (ref. Elementary school)		
Middle school	1.51 [1.12, 1.75]	0.611
High school	1.38 [0.83, 1.21]	0.038
College or university	1.16 [1.04, 1.41]	0.01
Coverage insurance (ref. no insurance)		
Coverage insurance	0.82 [0.51, 0.98]	0.417
Tooth brushing (ref. Twice a day)		
Once a day	1.1 6[0.83, 1.46]	0.112
Once a week	1.7 9[1.35, 2.03]	0.01
less than a week	2.12[1.11, 2.68]	0.01

Note: Values in the parentheses are 95% confidence interval.

Missing data were excluded.

value increases (P<0.001). The odds of experiencing caries (DMFT, DT, FT) increased with increase in participant's age. Significant positive correlations existed between the participant's age and DMFT (r=0.44), DT (r= 0.36) and FT scores (r= 0.41), respectively. Prevalence of subjects with DT>5 was higher in women with low income family (OR 1.84, 95% CI, 1.35-2.14).

Plaque index (PI) among women with high level of education (58% VS 83%) for those with a low level of education (p<0.001). There was a significant difference in the plaque accumulation on the denture surface with oral health behaviors (p<0/001).

The odds ratios (OR) for pregnant women's caries status are summarized in Table 3. The oldest group is more likely to have untreated dental caries, compared to the youngest group (OR 1.88, 95% CI [1.17, 2.91]). There is no coverage insurance differences in the likelihood of having untreated dental caries. Women who had private insurance are similar likely to have untreated dental caries compared to women who had no insurance (OR 0.82, 95% CI [0.51, 0.98]).

Women with low level of education are more likely to have untreated dental caries compared to women with high level of education (OR 1.88, 95% CI [1.14, 1.98]). Women with tooth brushing twice a day less likely to have untreated dental caries compared to women with less than a week (OR 0.73, 95% CI [0.42, 0.91]).

In this study 73% of women had never been advised by their doctor or midwife to see a dentist and 77% replied that they would be willing to attend for dental examination as part of prenatal care (X^2= 2.51 df= 1, p=0.001). Access to dental care was affected by cost, an inability to miss work and dental fear. Many also reported that it was too far to travel to visit a dentist or could not find a dentist to take care of them.

DISCUSSION

The purpose of this study was to assess status of dental caries knowledge and oral health behavior. There was evidence of low oral health knowledge regarding the link between oral and systemic disease among pregnant women. Although subjects had a level of knowledge about oral health topics, such as daily flossing and fluoridated toothpaste and its positive effect on oral health, many had low knowledge about oral health and its relationship with systemic diseases like diabetes. Even though recent research shows a significant relationship between periodontal disease and adverse pregnancy outcomes, many of the female participants in this study did not know that oral health may affect pregnancy outcomes.

The knowledge related to dental care such as brushing at least twice daily, use of floss daily, brushing after meals and dental checkup at least twice a year was found to be poor among the pregnant women. Knowledge intervention in this area might be necessary. In comparison with a postnatal survey conducted in Australia, 26.4% of pregnant women did not receive dental care at least twice yearly [14].

Majority of the pregnant women (82%) agreed that women should have a dental checkup during pregnancy, but only 46% had done it for the current pregnancy. In the postnatal survey done in Australia, only 30% (*n*=116) of the women attended a dental clinic during pregnancy. This raises serious concerns as pregnant women may need extra oral and dental care due to susceptibility to gum disease during pregnancy. Studies have shown that gum disease may contribute towards the birth of low birth weight babies and premature births [15-17].

The four most common perceived barriers against having a checkup as expressed by pregnant women were; low knowledge oral health, long waiting time at the health centers, distance from home to the clinics and negative attitudes of medical workers. Other studies have reported the failure rate of attendance in dental clinics mainly due to work commitment[17-18]. However, majority of them had positive attitude towards having a checkup soon. This is in contrast to a similar study done in Iran, [10] were 70% (*n*=224) of pregnant women had negative attitude of having a dental check-up in the future.

Comparing the difference in knowledge of oral and dental treatment during pregnancy, those with higher education and employment expressed better knowledge. It is probable that social communication among them had influenced this increases in knowledge. Only few of pregnant women agreed that oral and dental treatment should not be avoided during pregnancy, while the rest either disagreed or were not sure. Women should not fear any dental intervention during pregnancy; indeed, specialists believe that common treatment during pregnancy is not harmful for pregnant women or the unborn baby [19].

In comparison between knowledge and practice of oral and dental healthcare, knowledge about frequency of brushing, flossing and brushing after meals was significantly associated with practice. This shows that proper education on oral and dental healthcare among the pregnant women may lead to correct practice of oral and dental health. Pregnant women are more susceptible to periodontal disease like gingivitis because of female reproductive hormonal influences [20].

Pregnancy is a time when women may be more motivated to make health changes. Therefore, maintaining good oral health during pregnancy is important, apart from reducing the risk of adverse pregnancy outcomes, but it also improves general health of both the mother and her infants [21].

The present study showed that mean DMFT among a sample of Iranian women with pregnancy is 5.4, which is higher than a DMFT of 2.9 reported by meurman *et al.* [22] among 30 years old Finland women with pregnancy. In accordance with a DMFT of 3.7 reported by Mansory *et al*. [23] among 35-44 year old Iranian women. A study in Iran [24] reported a mean DMFT of 11 among middle age (aged 35 to 44) individuals which is higher than with the mean DMFT of 5.4 observed in the present study.

This difference in the incidence of caries between Finland women and Iran could be attributed to an ever increasing level of sugar consumption in Iran, since the annual sugar consumption per individual has increased from 25.1 kg in 1991 to 30.8 kg in 2005, an increase of some 22% [25].

The present study has observed non significant association between coverage insurance and the incidence of caries, since women with coverage insurance had a same DMFT score with others. It is assumed, however, that all women same are less concerned about oral health related issues. Moreover, these findings are consistent with previous published data [26, 27].

Our results were consistent in all stages of analysis, which indicated that age, tooth brushing, dental flossing and socio-economic status were important factors related to untreated dental caries in pregnant women.

Older women were more likely to have untreated caries than younger women. Health interventionist may use this information to prevent dental problems in older women. It is during pregnancy that habits food begin and need learn good oral habits.

Messages about practicing good oral health habits can be reinforced during Pregnancy through providing dental education regularly. In addition, frequent consumption of sugary foods, along with poor dental hygiene may explain the higher prevalence of untreated dental caries among the older pregnant women. Finally, this study revealed a consistency between DMFT scores and the subjective evaluation of ones own oral health. Similar findings have been reported from studies undertaken in both London and Brazil and other study [28, 29].

The findings indicated that untreated dental caries has a major effect on perceived oral health in Iranian women. The time since subjects last visited a dentist as well as the nature or type of that dental visit had a significant effect on DMFT and its components. This suggests that women who regularly visit a dentist are more sensitive to, or aware of their own oral health and that regular checkups can help to preserve intact teeth from caries attack. The present study indicated impaired oral health status in Iranian women with pregnancy, particularly those of low socio-economic status and educational level.

There were a limitation to this study. There may have been some bias in the survey instrument because the data were self–reported.

CONCLUSION

There is limited information available about dentists' oral health behavior including their preventive oral health practices. This study observed key gaps in knowledge

and practice of oral and dental healthcare among the pregnant women. Low knowledge, long waiting time in the health centers ranked the first perceived barrier against having a dental checkup during pregnancy. Moreover older ages, tooth brushing, dental floss and SES were important factors associated with having untreated dental caries in pregnant women. Coverage insurance were not significant factor associated with untreated dental caries. This information may be useful in planning health centers based dental programs in order to reduce dental caries. Whether more intensive oral and dental health education in pregnancy can lead to improved oral and dental health and ultimately better pregnancy outcomes, would require further study.

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