

Socio-demographic, Behavioral and Subjective Factors Affecting the Knowledge and Attitudes on Periodontal Health Among Turkish Pregnants

Türk Gebelerinin Periodontal Sağlığa İlişkin Bilgi ve Tutumlarını Etkileyen Sosyo-demografik, Davranışsal ve Öznel Faktörler

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Abstract

Objective: This study aimed to assess the knowledge and attitudes toward periodontal health of Turkish women and determine their socio-demographic, behavioral, and subjective factors.

Materials and Methods: The sample of cross-sectional study consisted of 407 pregnant. Data on socio-demographic factors, behavioral patterns, pregnancy-related characteristics, self-reported periodontal health, willingness to initiate the periodontal treatment, and dental care referral and advice from a family doctor/gynecologist, the knowledge and attitudes toward periodontal health were collected using a structured questionnaire.

Results: Oral health knowledge was associated with education level and self-perception of tooth mobility, whereas oral health attitudes were associated with education level, dental flossing, dental check-up during pregnancy, the absence of self-reported gingival bleeding, gum swelling and redness, and tooth mobility among pregnant women. Having a higher education level, using daily flossing, having a check-up during pregnancy, the absence of self-reported gum bleeding and tooth mobility, having a history of premature birth, having longer periods of gestation, and having greater knowledge are predictors of more positive attitudes. Having a higher education level and having more positive attitudes are the predictors of better knowledge.

Conclusion: Most pregnant women have limited knowledge about the effect of periodontal health on birth outcomes; nevertheless, the level of knowledge about the effect of periodontal health on pregnancy is high.

Öz

Amaç: Bu çalışmanın amacı Türkiye'de yaşayan gebelerin, periodontal sağlığına yönelik bilgi ve tutumlarını değerlendirmek ve sosyo-demografik, davranışsal ve subjektif faktörleri belirlemektir.

Gereç ve Yöntemler: Bu kesitsel çalışmaya 407 gebe dahil edildi. Gebenin sosyo-demografik faktörleri, davranış kalıpları, gebelik özellikleri, kendisi tarafından bildirdiği periodontal sağlık durumu, periodontal tedaviyi kabul etme isteği, dental tedaviler için aile hekimi/kadın doğum uzmanı tavsiyesi ile sevk edilmesine ilişkin

verileri ve periodontal sağlığa yönelik bilgi ve tutumlarını içeren soruların bulunduğu anketler katılımcılara uygulandı.

Bulgular: Ağız sağlığı hakkındaki bilgi eğitim düzeyi ve gebenin kendisi tarafından bildirilen diş mobilitesi ile ilişkiyen; ağız sağlığı ile ilgili tutumlar ise eğitim düzeyi, diş ipi kullanımı, gebelikte diş hekimi muayenesi, gebenin kendisinin bildirdiği dişeti kanamasının, diş eti şişliğinin ve diş mobilitesinin olmaması ile ilişkilendirildi. Eğitim düzeyinin yüksek olması, günlük diş ipi kullanımı, gebelikte diş hekimi muayenesi, kendisi tarafından bildiren diş eti kanaması ve diş mobilitesinin olmaması, geçmişte yaşanan erken doğum öyküsüne sahip olma, gebelik süresinin uzun olması ve daha fazla bilgiye sahip olma daha pozitif tutumların prediktörü olarak tespit edildi. Daha yüksek eğitim düzeyine ve daha olumlu bir tutuma sahip olmak da daha iyi bir bilgi seviyesinin prediktörü olarak bulundu.

Sonuç: Bu çalışmanın sonuçlarına göre gebelerin çoğunluğunun periodontal sağlığın doğum sonuçları üzerindeki etkisi hakkında sınırlı bilgileri varken, periodontal sağlığın gebelik üzerindeki etkisine ilişkin bilgi düzeyleri yine de yüksek bulundu.

Introduction

During pregnancy, a woman may be more prone to periodontal diseases due to the hormonal changes and the alteration in the immune system (1). Evidences reported the negative effects of pregnancy on periodontal health and the link between periodontal disease and adverse pregnancy outcomes, including low birth weight, preterm birth, preeclampsia, and miscarriages (2,3). In recent years, recognizing the importance of periodontal health in pregnancy has resulted in increased interest in studying the knowledge and attitudes of pregnant women. Previous studies showed that most pregnant women had limited knowledge about periodontal health and its possible effects on pregnancy and negative attitudes towards the safety of periodontal treatment (4-9).

To improve the oral health of pregnant women and their baby, collaborative oral health promotion strategies between medical and dental health professionals and the antenatal care policy are needed (8,10-13). In recent years, although the importance of dental care attendance and the safety and effectiveness of the preventive, diagnostic and restorative dental treatments during pregnancy has been emphasized in the routine antenatal examination (14,15), the prevalence of dental service usage and the percentage of pregnant women who received oral health counseling during their pregnancy are still low and periodontal health is neglected in oral health education programs (12,16,17).

In Turkey, there are a few studies which examined the awareness, attitudes and knowledge on periodontal diseases among pregnant women according to socio-demographic factors (18-21). Along with clinical factors, the wide range of socio-demographic, psychological, behavioral and subjective

factors which may affect the knowledge and attitudes of pregnant women must be considered when developing culturally sensitive oral health promotion programs (8,11-13,22,23). There is scarcity of studies evaluating the relationship between these factors and the knowledge and attitudes of pregnant women. Therefore, the aims of the study are to assess the knowledge and attitudes towards periodontal health among Turkish pregnant women and to determine the socio-demographic, behavioral and subjective factors affecting their knowledge and attitudes. We hypothesized that significant differences would exist in the knowledge and attitudes of Turkish pregnant women in term of socio-demographic, behavioral, and subjective factors.

Materials and Methods

This study was conducted on a consecutive sample of 407 pregnant women attending antenatal clinic at the Faculty of Medicine of Bolu Abant İzzet Baysal University, Department of Obstetrics and Gynecology, between April 2019 and June 2019.

Based on the reported 39% (p) prevalence of pregnant women who visited a dentist in the last year (24), a desired 95% confidence level, desired precision of 5% (d), considering non response rate of 10%, a minimum sample size of 402 subjects was calculated using the formula $n = z^2 p q / d^2$. All procedures performed in this study were approved by the Clinical Researches Ethics Committee of Bolu Abant İzzet Baysal University (decision no: 2018/221, date: 13.12.2018). Participation was voluntary, and informed written consent was also obtained from each pregnant woman before the start of the study. Inclusion criteria for participation were pregnant women who were healthy and aged 18 years or older. The exclusion criteria were inability or unwillingness to

give informed consent, not speaking/reading/writing Turkish, and a personal history of chronic diseases and psychiatric illness. Eligible pregnant women were recruited in the waiting room by a researcher (Ü.M.U.) and informed written consent was obtained from pregnant women after providing information about the study.

Data Collection

Data on socio-demographic and behavioral factors, pregnancy-related characteristics, self-reported periodontal measure, willingness to initiate the periodontal treatment, and having a dental care referral and advice from family doctor/gynecologist, the knowledge and attitudes towards periodontal health were collected using a structured questionnaires.

Instrument

The Knowledge Scale which consists of 10 items with a 3-point Likert scale (0= disagree, 1= neither agree nor disagree, 2= agree) was used to determine pregnant women's knowledge about dental health, nutrition, smoking, periodontal disease as well as its effect on pregnancy outcomes. This scale scores ranged from 0 to 20, with higher scores indicating a higher level of knowledge.

Pregnant women's attitudes towards healthy eating, periodontal treatment, oral hygiene and routine dental checkups during pregnancy were assessed using the attitude scale. This scale consisted of 4 items that are scored using a three-point scale ranged agree (2) to disagree (0). Scale scores ranged from 0 to 8, with higher scores indicating more positive attitudes.

Development and Validation of the Scale of Knowledge and Attitudes

The initial item pool of 31 items (knowledge 18 items and attitudes 10 items) was generated by two researchers (T.P.) and (G.U.) through comprehensive reviews of published literatures and existing instrument (4,6,18). Following the generation of the initial item pool, face and content validity of items developed in this study were evaluated by an expert panel consisting of comprising two periodontists, one dental public health specialist, one biostatistician, and one gynecologist. They independently rated each item using the item-level content validity index (I-CVI) for its relevancy ('not relevant -1' to 'very relevant-4') and clarity ('not clear-1' to 'very clear-4'). An I-CVI ≥ 0.78

was defined as having good content validity (25). Twelve items with an I-CVI value of <0.78 (knowledge 6 items and attitudes 6 items) that had I-CVIs of 0.78 were excluded from the questionnaire and the final scales were obtained.

According to the recommendations of the expert panel, two knowledge items were revised to improve their clarity and understanding and reassessed by this panel.

According to the opinion of the expert group, two questions were included in this survey: willingness to initiate the periodontal treatment (yes vs. no), and having a dental care referral and advice from family doctor/gynecologist (yes vs. no). Pregnancy-related characteristics, including the trimester of pregnancy, the number of pregnancies, and having a history of premature birth (yes vs. no) were obtained through the pregnant women's medical records. Socio-demographic variables included age (years), monthly family income (<Turkish Lira (TL) 1,000 (low), TL 1,000-2,999 (lower-middle), TL 3,000- 4,999 (upper-middle), \geq TL 5,000 (high) (26), employment status (unemployed vs. employed), location (rural vs. urban), having national health insurance (yes vs no), and educational level (≤ 8 years vs. >8 years) (27).

Five self-reported measures of general and oral health behavior were included: tooth brushing frequency (\geq twice a day vs \leq once a day) (28), use of dental floss (yes vs. no) (28); dental attendance patterns (regular vs. problem-oriented) (28); dental check-up during pregnancy (yes vs. no) (4, 6) and smoking during pregnancy (yes vs. no) (29).

Self-reported periodontal disease was assessed using the three items on gingival bleeding, gum swelling /readness, and tooth mobility. Response options for each item were "yes" and "no (30,31). Self rated oral health was assessed using a single-item question with ordinal response options, which were grouped into good (excellent, very good, good) and bad (fair and poor) (32).

Statistical Analysis

Descriptive statistics were used to summarize the study. Data normality was tested using the Kolmogorov-Smirnov test. Due to the non-normal distributions, the Mann-Whitney U test was used to test significant differences between two groups while Spearman's rank correlation coefficient was used to evaluate the relationship between two variables

measured on an ordinal or continuous scale. Two multiple linear regression analyses with backward stepwise selection method were conducted for knowledge and attitudes to identify its related factors.

All variables found to be significant ($p < 0.10$) in univariate analysis were entered into the multivariate regression analysis. R^2 statistic was used to determine the proportion of variance explained by the predictors. The standardized β coefficients were calculated for all variables. Reliability of the scales was assessed using the Cronbach's alpha coefficient and the corrected item-total correlation. A Cronbach's alpha value of 0.5-0.69 is considered for a new scale as acceptable (33). For item-total correlation, we considered a value greater than 0.20 (34).

In addition, the test-retest reliability of the scales was assessed using the intra-class correlation coefficients (ICC) in a subsample of 46 pregnant women who were reinterviewed about 2 week after the first interview. According to Walter et al. (35), the required sample size for the test retest reliability was calculated was determined based on the following parameters: $\alpha = 0.05$, $\beta = 0.20$, acceptable ICC = 0.80, and hypothesized ICC = 0.90. Following these parameters, 46 women were required. We considered an ICC greater than 0.75 as excellent agreement (36).

Results

The sample consisted of 407 pregnant women, with mean age of 29.08 [standard deviation (SD) = 5.67]. Of these, 67.3% were housewives, 47.9% lived rural, 39.3% had formal school education, 83.8% had health insurance, 40% were in lower-middle income groups, 43% were in the third trimester period, 89.9% did not smoke. The mean number of pregnancies in the sample was 2.33 (SD = 1.10; range, 1-6). 75.9% had a problem-oriented dental visits pattern, 30.5% brushed their teeth \geq twice a day, 57.7% didn't use dental floss, and 29.7% visited the dentist for dental check-ups during their pregnancy. More than half of women perceived signs of gingival bleeding (56.3%) and gum swelling and redness (56.5%) but only 18.4% reported the presence of tooth mobility. Of these, 7.1% had a dental care referral and advice from family doctor/gynecologist, 83.5% were willing to initiate the periodontal treatment during pregnancy, and 88% rated their oral health as good (data not shown).

Mean knowledge was 16.96 (SD = 2.36), mean attitude was 7.55 (SD = 1.13). The corrected item total correlations were all positive and more than 0.20, supporting the internal reliability of these scales. The Cronbach's alpha was 0.63 for knowledge and 0.79 for attitude. For test-retest reliability, ICC's for knowledge and attitude were 0.84 and 0.86, respectively (data not shown).

As seen in Table 1, the total score on the knowledge scale was positively correlated with income ($r = 0.106$, $p < 0.05$). Women with 8 years or less of schooling had lower knowledge ($p = 0.001$) and attitude scores ($p = 0.041$). The scores on the attitude ($p < 0.001$) and knowledge ($p = 0.04$) were found to be lower among pregnant women who reported "tooth mobility". Lower attitude scores were found among pregnant women who reported gingival bleeding ($p = 0.008$), gum swelling and redness ($p = 0.007$), not having dental check ups during pregnancy ($p = 0.001$), and no flossing ($p = 0.025$). Among pregnancy-related characteristics, increasing gestational stage ($r = 0.155$, $p < 0.05$) and having a history of premature birth ($p = 0.002$) were associated with more positive attitudes.

As seen Table 2, the final model explained 21.8 and 8.9% of the variation in attitude and knowledge, respectively. Having a higher education level, the use of dental floss, having a check-up during pregnancy, having a history of premature birth, having longer periods of gestation, having greater knowledge, the absence of gum bleeding and tooth mobility were found to be significant predictors of more positive attitudes. Higher education level and positive attitudes were the predictors of better knowledge.

Table 3 showed that most of the pregnant women knew about the increased risk of caries due to frequent consumption of sugar containing foods and beverages (94.3%), the main cause of periodontal disease (90%), the relationship between eating foods high in protein, calcium, phosphorus and vitamins A, C and D and good oral health during pregnancy (89%), the first signs of gum disease (86%), the cause of tooth loss (85%), the control methods in the prevention of periodontal disease (75%), and the negative effect of smoking (72%). More than half of them didn't know about the increased risk for low birth weight, preterm birth, and pre-eclampsia due to periodontitis (60.7%), and the best time to perform non-surgical periodontal therapy during pregnancy (59.2%). In addition, 74%

Table 1. Differences in scores of oral health knowledge and attitude according to socio demographic, behavioural and subjective characteristics of study participants (n=407)

Characteristics		Knowledge Mean ± SD	Attitudes Mean ± SD
Age (years) (r)		0.011	-0.040
Income (r)		0.106*	-0.031
Employment status ^a	Unemployed (n=274)	16.87±2.31	7.55±1.15
	Employed (n=133)	17.12±2.47	7.54±1.09
p-value		0.103	0.679
Location ^a	Rural (n=195)	16.81±2.43	7.47±1.23
	Urban (n=212)	17.09±2.30	7.62±1.02
p-value		0.171	0.220
National health insurance ^a	Yes (n=341)	16.95±2.39	7.55±1.12
	No (n=66)	17.01±2.22	7.51±1.15
p-value		0.884	0.726
Educational level ^a	≤8 years (n=160)	16.44±2.68	7.41±1.28
	>8 years (n=247)	17.30±2.08	7.64±1.02
p-value		0.001	0.041
Toothbrushing ^a	≤once a day (n=283)	16.90±2.26	7.55±1.10
	≥twice a day (n=124)	17.08±2.59	7.53±1.20
p-value		0.108	0.933
Dental flossing ^a	Yes (n=172)	17.08±2.33	7.65±1.01
	No (n=235)	16.86±2.39	7.41±1.26
p-value		0.326	0.025
Smoking ^a	Yes (41)	16.68±3.10	7.34±1.29
	No (366)	16.99±2.27	7.57±1.11
p-value		0.905	0.161
General dental attendance pattern ^a	Regular (n=98)	16.87±2.19	7.46±1.21
	Problem-oriented (n=309)	16.98±2.42	7.57±1.10
p-value		0.377	0.283
Dental check-up during pregnancy ^a	No (n=286)	16.75±2.68	7.16±1.56
	Yes (n=121)	17.04±2.22	7.71±0.84
p-value		0.775	0.001
Self-rated oral health ^a	Good (n=358)	17.03±2.33	7.55±1.12
	Bad (n=49)	16.40±2.55	7.51±1.19
p-value		0.089	0.990
Self-reported gingival bleeding ^a	Yes (n=229)	16.82± 2.51	7.37±1.36
	No (n=178)	17.13±2.16	7.78±0.67
p-value		0.402	0.008
Self reported gum swelling and readiness ^a	Yes (n=230)	16.92±2.47	7.40±1.29
	No (n=177)	17.00±2.22	7.73±0.84
p-value		0.806	0.007
Self-reported tooth mobility ^a	Yes (n=75)	16.09±3.13	6.74±1.79

	No (n=332)	17.15±2.11	7.73±0.82
p-value		0.043*	<0.001
Self-reported willingness to initiate the periodontal treatment ^a	Yes (n=340)	16.91±2.45	7.52±1.15
	No (n=67)	17.20±1.83	7.65±1.02
p-value		0.920	0.412
Receipt of oral health referral and advice from family doctor/gynecologist ^a	Yes (n=29)	16.75±2.21	7.65±0.89
	No (n=378)	16.97±2.38	7.54±1.14
p-value		0.414	0.961
Number of pregnancies (r)		0.020	-0.031
Gestational stage (r)		0.078	0.155*
History of premature birth ^a	Yes (70)	17.02±2.37	7.80±0.80
	No (337)	16.67±2.33	7.49±1.18
p-value		0.161	0.002

*Correlation is significant at the 0.05 level (2-tailed); ^aStatistical evaluation by Mann-Whitney U test, SD: Standard deviation, r: Spearman's rank correlation coefficient

Table 2. Socio-demographic, behavioral and subjective predictors of the knowledge and attitudes

Model	The predictors	B	Std. error	β	t	Sig.
Attitudes	(R ² =0.235; adjusted R ² =0.218)					
	Having a higher education level	0.105	0.051	0.095	2.064	0.040
	Using dental flossing	0.206	0.103	0.090	2.005	0.046
	Having a check-up during pregnancy	-0.392	0.116	-0.158	-3.382	0.001
	Self reported absence of gum bleeding	0.355	0.104	0.156	3.401	0.001
	Self-reported absence of tooth mobility	0.679	0.135	0.233	5.016	0.000
	Having a history of premature birth	-0.354	0.136	-0.118	-2.616	0.009
	Having longer periods of gestation	0.190	0.063	0.137	3.022	0.003
	Having greater knowledge	0.078	0.022	0.164	3.590	0.000
Knowledge	(R ² =0.10; adjusted R ² =0.089)					
	Having a higher education level	0.319	0.110	0.138	2.887	0.004
	Having more positive attitudes	0.402	0.107	0.192	3.766	0.000

B: Unstandardized coefficients, β: Standardized coefficients, Std. Error: Standard error

of them had false knowledge about the relationship between hormonal change during pregnancy and periodontal health.

Most women had a positive attitude towards eating a balanced diet for their own health and that of their unborn child (92.6%), giving more attention their oral care for preventing periodontal diseases (92.4%), visiting the dentist for a check-up before pregnancy (91.1%), the effects of periodontal treatment on her pregnancy and the health of her baby (86%) (Table 4).

Discussion

In Turkey, oral health as one of consultancy issues was included in the recent Prenatal Care Management Guide of Ministry of Health, 2014 (37). Family medicine and obstetric practitioners have a responsibility for giving advise and information on oral and dental health (37). However, earlier studies (18,19) reported that the inter-professional collaboration among healthcare providers and dental professionals is required to improve the oral health care and dental care-seeking behaviour of Turkish

Table 3. The distribution of item responses of the knowledge scale

	Yes n (%)	Don't know n (%)	No n (%)
1. During pregnancy, frequent consumption of sugar containing foods and beverages increase caries risk	384 (94.3)	18 (4.4)	5 (1.2)
2. Hormonal change during pregnancy can affect periodontal tissue	46 (11.3)	60 (14.7)	301 (74)
3. Untreated periodontal diseases may lead to loss of teeth	344 (84.5)	53 (13)	10 (2.5)
4. The gingival health is controlled by effective oral hygiene measures (e.g, brushing twice daily and daily flossing)	307 (75.4)	78 (19.2)	22 (5.4)
5. The main cause of periodontal disease is bacterial plaque	365 (89.7)	35 (8.6)	7 (1.7)
6. Periodontitis is associated with a higher risk of low birth weight, preterm birth, and pre-eclampsia	129 (31.7)	247 (60.7)	31 (7.6)
7. Non-surgical periodontal therapy (scaling and root planing) during the second trimester is safe	158 (38.8)	241 (59.2)	8 (2)
8. Bleeding gums are one of the first signs of gum disease	349 (85.7)	53 (13)	5 (1.2)
9. Smoking during pregnancy increases the risk of health problems for baby and mother	292 (71.7)	105 (25.6)	10 (2.5)
10. Eating foods high in protein, calcium, phosphorus and vitamins A, C and D is necessary for good oral health during pregnancy	362 (88.9)	31 (7.6)	14 (3.4)

Table 4. The distribution of item responses of the attitude scale

	Agree n (%)	No opinion n (%)	Disagree n (%)
1. Pregnant women must eat a balanced diet for their own health and that of their unborn child	377 (92.6)	27 (6.6)	3 (0.7)
2. Pregnant women must pay attention their oral care for preventing periodontal diseases	376 (92.4)	27 (6.6)	4 (1.0)
3. Women must go to the dentist for dental check-ups before pregnancy	375 (91.1)	28 (6.9)	4 (1.0)
4. Periodontal treatment has a positive effect in my pregnancy and the health of my baby	350 (86)	35 (8.6)	22 (5.4)

pregnant women as well as to increase the awareness towards these topics of medical providers. In addition, Turkish pregnant women had limited knowledge about periodontal disease and its possible effects on pregnancy. To develop the collaborative efforts, the factors affecting the knowledge and attitudes towards periodontal health should be determined culturally sensitive. In this study, we aimed to assess the knowledge and attitudes towards periodontal health among Turkish pregnant women and determine its socio-demographic, behavioral and subjective predictors.

We found that the majority of pregnant women had the proper knowledge about periodontal diseases (i.e. developing due to the bacteria, gingival bleeding, and tooth loss when untreated), caries risk and nutrition which are consistent with previous studies (10,38). This may be explained by the fact that more

attention has been paid to these topics in television programs and advertisements in recent years. The knowledge level of Turkish pregnant women on the link hormonal change and periodontal tissue and the association between periodontal disease and adverse pregnancy outcomes were better when compared with previous studies (5,7,38). However, there is a need for improving Turkish pregnant women's knowledge on the periodontal health, symptoms and necessary treatments during pregnancy. Compared to the previous studies (10,39). This study showed that Turkish pregnant women were more aware of the main topics of oral health and the importance of a balanced diet for their own health and unborn child. The knowledge level and positive attitudes of Turkish pregnant women were similar to those pregnant in developed countries (11,12,29). We found that most of Turkish pregnant women had positive

attitudes about the paying attention their oral care for preventing periodontal diseases, the necessity of for dental check-ups before pregnancy, the positive effect of periodontal treatment on their pregnancy and baby's health.

In line with previous study of Asa'ad et al. (5), most Turkish pregnant women stated that the gingival health is controlled by effective oral hygiene measures (e.g, brushing twice daily and daily flossing). Contradictory to these findings the Jordanian and Malaysian studies reported that most pregnant women did not believe that frequency of teeth brushing should be increased during pregnancy (38,40). Although most of Turkish pregnant had positive attitudes towards the importance of proper oral hygiene behaviours in maintaining gingival health, only less than half brushed their teeth more than twice a day and used dental floss daily. In contrast to our findings, most pregnant women in some countries reported tooth brushing twice daily (10,17,30). Decreasing in oral hygiene behaviours may be attributable to the complaints experienced during pregnancy such as nausea, sensitivity to smell and vomiting (19). In line with our findings, recent studies showed that use of dental floss were less preferred by pregnant women than tooth brushing due to a lack of awareness (15,16,25,39).

The limited number of studies (17,23) reported that poorer rating of oral health was significantly associated with having dental caries and dental pain which were the main reason for visiting dentist among pregnant. Minority of pregnant were not aware of having some periodontal problems. The most striking result of this study, that although more than half of Turkish pregnant had self-reported symptoms such as gingival bleeding, swelling, redness, most of them perceived their oral health as good. This may be associated with the beliefs that bleedings gums in pregnancy is normal (30) and gingival changes is due only to hormonal changes (5) that go away on their own after the baby's birth (7,9).

Only 30% of Turkish pregnant women reported visiting a dentist during pregnancy. This finding similar to previous studies (9,12). We found that only 39% had limited knowledge on the safety of non-surgical periodontal therapy during the second trimester, whereas most pregnant (83%) had willingness to start periodontal treatment if their doctor recommends.

This limited knowledge on this topic may be related to the fact that pregnant were not generally advised for a dental check up by healthcare professionals (7,17). As reported in a study of Honkala and Al-Ansari (17) the majority of Turkish pregnant reported that they were not referred by family doctor/gynecologist to a dentist and didn't take advice from them for oral health. In line with previous studies (7,9,12,18,19), we suggest that the effective oral health training programs are needed for gynecologist or obstetrician to increase their knowledge and attitudes towards the importance of oral health in pregnancy as well as to encourage dental visits of pregnant women.

Previous studies have reported lower rates of dental care use when pregnant women have dental problems, even in countries that provide free access to public dental services (8,18,19,29). This may be related negative beliefs about the safety of dental treatment during pregnancy and the attitudes of medical as well as dental health providers (9,12,16,26). Both pregnant women and medical providers should be educated about the importance of receiving dental care for the maintenance of optimal oral health by a multidisciplinary team (7,9,12,18,19).

The knowledge level of pregnant women about the harmful effects of smoking during pregnancy and the prevalence of non-smoking were found to be higher, which are consistent with findings in other published studies (5,38).

Confirming the study hypothesis, the results of bivariate analyses showed that knowledge was positively correlated with income and education level. Similar findings were reported by previous studies that higher levels of income (11,24) and education (11,13) were associated with better knowledge. Turkish pregnant women with higher knowledge level had lower perception of tooth mobility. The results of multivariate analyses showed that higher education level and positive attitudes were the predictors of better knowledge. This may be explained by the fact that having higher levels of education and income may increase women's access to correct and relevant oral health informations (5). These findings support previous studies that suggests that the socio-demographic factors should be taken into account when planning oral health promotion strategies and programmes for pregnant women (11,24).

Attitudes of Turkish pregnant women were found to be correlated with the level of education which is in line with previous studies (13,23). We found that self perceptions of tooth mobility and gingival bleeding were important predictors of lower attitudes. In addition, Turkish pregnant women with lower attitudes reported no flossing and not visiting the dentist for dental check ups during pregnancy. This is not surprising considering the fact that positive oral health behaviors and practice are influenced by pregnant women's attitudes (11).

Increasing gestational stage and having a history of premature birth were associated with more positive attitudes. Negative prior experiences during pregnancy may lead to increase the awareness on periodontal health and the attitudes towards gaining oral care.

To the best of our knowledge, this was the first study evaluating the socio-demographic, behavioral, and subjective predictors of oral health knowledge and attitudes among Turkish pregnant women. However, this study has some limitations. This study performed was based on a sample of pregnant women attending a maternal health center in the western Black Sea region of Turkey which limits the generalizability of these results. Future large population and clinical based studies are needed to confirm the results obtained from this study. Memory-recall errors and social desirability bias may threaten the validity of self report data used in this study. Oral health assessments were not performed in this study because there was not a separate room for oral examination and diagnosis. Further studies are required to examine the agreement between the normative and subjective perceptions of periodontal health and the validity and reliability of subjective measures among Turkish pregnant women. Despite these limitations, this study may provide valuable information to the oral health and antenatal providers in the designing the effective oral health education programs and specifying culturally specific messages for pregnant women receiving antenatal care.

Conclusion

A majority of the pregnant women has adequate knowledge about general oral health, positive attitudes, and the effect of periodontal health on pregnancy; though, their knowledge regarding

periodontal health on birth outcome is limited. Having a higher education level was found to be a predictor for both Turkish pregnant women's knowledge and attitudes. A significant positive association was found between the knowledge and attitudes. Pregnancy related characteristics, subjective evaluation of periodontal health, and behavioural factors were associated with attitudes. These findings may provide an insight into the identification of pregnant with low level of dental awareness and attitudes and the development of effective health education strategies through the collaboration between medical and dental care providers. Both obstetrician and dentists should work together to improve the awareness and attitudes of pregnant and to optimize preventive dental and general health strategies. It is obvious that efforts to educate pregnant of the benefits of continued dental care before and during pregnancy is needed. Nevertheless, this requires educating dentists and obstetricians of the guidelines and recommendations for dental care for pregnant.

Ethics

Ethics Committee Approval: All procedures performed in this study were approved by the Clinical Researches Ethics Committee of Bolu Abant İzzet Baysal University (decision no: 2018/221, date: 13.12.2018).

Informed Consent: Participation was voluntary, and informed written consent was also obtained from each pregnant woman before the start of the study.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: T.P., K.P., G.U., Ü.M.U., Concept: T.P., K.P., G.U., Ü.M.U., Design: T.P., K.P., G.U., Ü.M.U., Data Collection or Processing: T.P., K.P., G.U., Ü.M.U., Analysis or Interpretation: T.P., K.P., G.U., Ü.M.U., Literature Search: T.P., K.P., G.U., Ü.M.U., Writing: T.P., K.P., G.U., Ü.M.U.

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