Assessing Oral Health and Care Behaviors in Pregnant Women: A Study from Riyadh

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ABSTRACT

During pregnancy, gingivitis and periodontal infections are among the most prevalent illnesses. Pregnancy-related gingival disease can be reduced with proper dental care. Thus, the current study set out to evaluate the effects of dental treatment during pregnancy and self-reported daily oral hygiene on the oral health of Saudi Arabian women living in Riyadh. To quantify self-referred Oral Health-Related Life Quality (OHRQL), a structured online questionnaire was created that asked about demographics, medical conditions, daily oral care, pregnancy status, and complications, dental visits at the time of pregnancy, and an Arabic version of the standard OHIP-14 (oral health impact profile). Preliminary research was carried out, and its validity was evaluated. Of the 818 women who responded to the study, the majority (92.1%) were married, and over half (61%) were over 35. The findings of the OHIP-14 showed that 701 women (85.7%) had excellent OHRQL and 117 women (14.3%) had poor OHRQL. The OHRQL's overall score revealed remarkably significant findings about education level (P = 0.012), brushing and flossing frequency, gum bleeding when brushing, and toothache (P = 0.001); OBG YN clinic type (P = 0.024), having diabetes during pregnancy (P = 0.022), and medication use (P = 0.007). To avoid dental and oral disorders in Saudi women during pregnancy, it is necessary to create, educate, and encourage women on proper oral health and dental care.

Keywords: Saudi women, OHIP-14, Pregnancy, Oral care, Dental visits, Riyadh

Introduction

The mouth cavity is one of the many bodily systems that are significantly impacted by the intricate hormonal and physical changes that occur during pregnancy. Pregnancy-related oral health issues might include periodontal disorders and gingival inflammation [1]. It has been demonstrated that between 36% and 100% of pregnant women have gingivitis [2]. Additionally, it has been observed that over 18% of preterm deliveries and low birth weight babies are linked to pregnant women with periodontal disease [3].

Plasma levels of progesterone and estrogen are elevated throughout pregnancy because the corpus luteum continuously secretes progesterone during the beginning of the pregnancy and the placenta afterward [4]. Literature that looked at how sex steroids affected the periodontium is supported by the following findings. Estrogen receptor (ER) and progesterone receptor (PgR) are localized in the human periodontium, according to reports, indicating that the periodontium is the hormones' target region [5]. Estrogen can affect the cytodifferentiation of the stratified squamous epithelium and the production and upkeep of fibrous collagen [6]. Hormone activity on these cells can impact collagen and repair as well as the effectiveness of the epithelial barrier against bacterial invasion. The expression of apoptotic factors, cytokine synthesis, antigen presentation and expression, and cell death are all immunologic mediators and responses that may be changed by these hormones. Particularly, progesterone has been used to increase the formation of prostaglandin E2, an inflammatory mediator, decrease the generation of interleukin six by human gingival fibroblasts, and increase the deposition of polymorphonuclear leukocytes in the gingival sulcus [7].

From a different perspective, pregnancy may affect the body in several ways. As energy requirements rise, so do nutritional requirements. This, by offering a suitable substrate for cariogenic organisms, can raise the risk of dental caries in pregnant women and additionally raise dietary carbohydrate intake to meet energy demands [8]. Additionally, vomiting can cause degradation of the motherly enamel layer or negatively disrupt dental hygiene. There is a decrease in calcium levels during pregnancy. Even though the turnover doubles during pregnancy, there is no change in the level of ionized calcium before pregnancy. Pregnancy-related dental hygiene practices can assist to reduce or avoid this issue [8].

Gingival infections during pregnancy can be reduced with improved oral hygiene practices. Therefore, it is necessary to assess women's oral health status, availability of fluoridated water, oral-related disorders (such as gingivitis and tooth decay), and dental treatment accessibility. The tongue, palate, mucosa, gingiva, and teeth should all be examined orally. It is recommended that patients brush and floss regularly and refrain from consuming too many sugary foods and beverages. A doctor should be consulted regarding oral health conditions and treatment strategies. According to reports, dentists are reluctant to handle expectant patients [9]. Appropriate information, effective communication, and the development of ongoing cooperative partnerships can all help to solve this situation. Dentists can give clear referral advice and educate their colleagues about the safety of dental procedures during pregnancy [10].

Since clinical variables alone are insufficient to characterize dental patients' complaints, calculating the effects of oral diseases on life quality should be a part of assessing oral health requirements. Indicators of oral health-related life quality were included in cross-sectional and longitudinal research [11]. Self-reported functional pain, limitation, and fragility related to oral problems are measured by the OHIP-14 (14-item oral health impact profile) [12].

Pregnancy-related oral health care and knowledge have been the subject of several research studies [10, 13]. In Spain, Llena et al. [13] confirmed based on their findings that some criteria, such as nationality, degree of self-care, and awareness of oral health prevention, were in charge of pregnant women's general knowledge and safe care. According to Boggess et al. [14], routine dental care consumption was linked to participants' oral hygiene habits during pregnancy in the United States.

Pregnant Saudi women's dental care, eating patterns, and oral health practices have not been well studied [15-17]. Studies on the effects of dental care and oral health on Saudi women's quality of life during pregnancy are few. Thus, the current study set out to evaluate the effects of dental treatment during pregnancy and self-reported daily oral hygiene on the oral health of women in Riyadh, Saudi Arabia.

Materials and Methods

The study has been approved by the Institutional Review Board of King Saud University and the College of Dentistry's Research Centre. This was a questionnaire-based observational cross-sectional study conducted in the Riyadh area. An online structured questionnaire by Google Forms was utilized to obtain the participants' data. It included; a consent form, demographic data, medical and pregnancy status and complications, dental visits during pregnancy and related information, and daily oral care. An Arabic version of the standard OHIP-14 was used to measure self-reported oral health-related quality of life (OHRQL) profile [18]. A pilot study of 20 participants was performed and evaluated for validity. The questionnaire was distributed in the Arabic language through social media networks targeting women across Riyadh city from January 2018 to June 2018.

The participants answered the last section (OHIP-14) with a scale ranging from 1 to 5 depending on the presence or absence and the severity of the problems listed. 5 referred to never (never in the last six months), 4 for rarely (once or twice in the last six months), 3 stands for sometimes (every month or every week in the last six months), 2 as usually (twice or more per week in the last six months), and finally 1 referred to always (all the time in the last six months). For statistical purposes, the total score for each participant is calculated and then assigned into two groups: The poor oral health group scored from 14-41, and the good oral health group scored from 42-70.

Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 21 software (SPSS Inc., Chicago, IL, USA). The frequencies and percentages for all nominal variables were calculated. A Chi-square test was used to compare the total scores for different levels of education, age groups, oral health status, and other demographic data. All statistical analyses were set at a significance level of $P < 0.05$.

Results and Discussion

The research involved a total of 818 individuals. The sample's demographic characteristics indicated that more than 60% (61%) were above the age of 35 years, with the majority married (92.1%). More than half (54.8%) of the questioned women reported having a bachelor's degree, and 43.3% were employed in the government sector, as shown in **Table 1**.

Table 1. The demographic specifications of the participants.

Characteristic	Frequency	%
Age (Years)		
20-24	61	7.5
Pregnancy is a delicate condition that involves complex physiological and physical changes. 25-29	104	12.7
30-35	154	18.8
> 35	499	61.0
Social status		
Married	753	92.1
Widow/Divorced, has children	65	7.9
Education level		
Secondary school or less	35	4.3
High school	128	15.6
Diploma	94	11.5
Bachelor	448	54.8
Higher studies	113	13.8
Occupation		
Housewife	336	41.1
Student	44	5.4
Employee/government sector	354	43.3
Employee / private sector	84	10.3

According to the sample's pregnancy status, the majority (78.1%) had previously been pregnant, while the remaining (87.5%) were not pregnant at the time of the study. Over half (59.9%) of the sample went to a private OBGYN practice. 8% reported having diabetes mellitus, while 9% reported having hypertension. **Table 2** demonstrates that almost three-quarters (77.9%) reported no problems during prior pregnancies.

Table 2. The distribution of the participants is based on their pregnancy status.

Characteristic	Frequency	%
Pregnancy status		
1st Pregnancy	103	12.6
Multiple pregnancies, but not one at the moment	639	78.1
New delivery, > 3 months	76	9.3
If you are pregnant, what stage of pregnancy are you in?		
Not pregnant	716	87.5
> 6 months	41	5.0
≤ 6 months or more	61	7.5
OBG YN clinic type		
Private OBGYN clinic	490	59.9
Public OBGYN clinic	297	36.3

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Do you have any chronic systemic diseases?		
Hypertension	74	9
Diabetes mellitus	73	8.9
Did you experience any complications during pregnancy?		
No	637	77.9
Yes	181	22.1

The sample's oral health habits and use of dental care services are displayed in **Table 3**. The majority of participants (61.1%) consider their overall dental health to be excellent or good. 55.9% of respondents said they had experienced dental issues in the previous six months. 32.1% reported experiencing a toothache at the time of the study, and 46.1% reported bleeding gums during brushing. Brushing and flossing were reported by more than half of the sample (53.8%) and every day by 16.5%, respectively.

Table 3. The sample distribution was by reported dental care services and oral health practice.

| Characteristic	Frequency	%
How would you rate your overall oral health?		
Excellent	119	14.5
Good	381	46.6
Moderate/Fine	251	30.7
Not good	67	8.2
Have you had any dental problems in the past 6 months?		
Yes	457	55.9
No	361	44.1
Do your gums bleed when you brush your teeth?		
Yes	377	46.1
No	441	53.9
Do you currently have a toothache/teeth ache?		
Yes	278	34.0
No	540	66.0
How often do you brush your teeth?		
Once a day	308	37.7
2-3 times a day	440	53.8
2-3 times a week	54	6.6
I don't brush my teeth	16	2.0
Do you use dental floss to clean between the teeth?		
Yes daily	135	16.5
Sometimes\ When needed	435	53.2
Never	248	30.3

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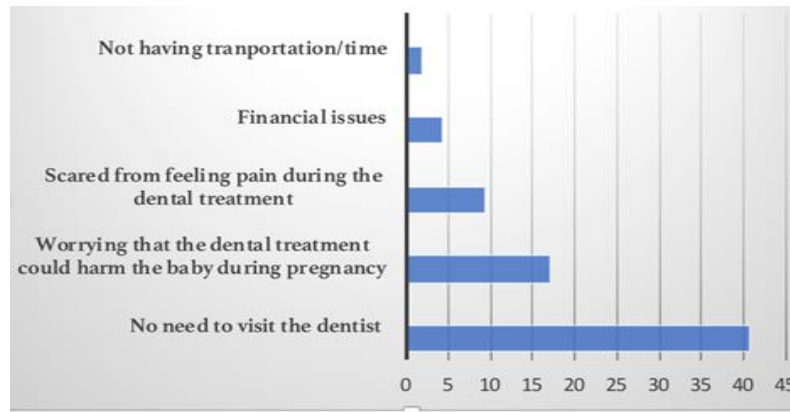
Figure 1. Stated reasons for avoiding dental medicine referral during pregnancy.

As shown in **Figure 1**, the stated dental care in pregnancy showed that 44.5% of the people did not visit the dentist. The main reason given by 40.6% of the participants was "No requirement to visit the dentist," and the second most common one was "worrying that treatment of dental could harm the baby." **Table 4** shows that the bulk of the sample (81.1%) was enrolled in private dental clinics. The majority of participants (79.4%) did not exposure any training about dental health care in pregnancy, and over one-third (36%) of them got their oral health knowledge from social media, with dentists coming in second (29%).

Table 4. The sample distribution based on the reported dental care services

Characteristic	Frequency	%
Have you had a dental medicine referral during pregnancy?		
I don't visit the dentist	364	44.5
Only one visit	102	12.5
More than one visit	63	7.7
Only when I feel pain	289	35.3
What dental clinic type did you visit during pregnancy?		
Private dental clinic	663	81.1
Public dental clinic	155	18.9
Did you receive any oral health instructions during pregnancy?		
Yes	161	19.7
No	650	79.4

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701 women (85.7%) had high oral health status and happiness with life (OHRQL) based on their OHIP-14 score, whereas 117 women (14.3%) had low OHRQL. The frequency of dental visits, age, employment, and pregnancy status did not significantly correlate with OHRQL. However, the OHRQL total score revealed statistically significant outcomes regarding education level (P = 0.012), brushing and flossing frequency, gum bleeding when brushing, and toothache (P = 0.001); OBG YN clinic type (P = 0.024); medication use (P = 0.007); and having diabetes during pregnancy (P = 0.022) (P < 0.05 in every instance) **(Table 5)**. **Table 5** displays the association between OHRQL level and other factors, whereas **Figure 2** shows the link between OHRQL level and educational attainment.

Table 5. The correlation between the OHRQL level and various variables

Variable		OHRQL		
		Poor ORH **N = 117**	**Good ORH** **N = 701**	**P-value**
Age (Years)	20-24	11 (18.0%)	50 (82.0%)	
	25-29	11 (10.6%)	93 (89.4%)	0.079
	30-35	14 (9.1%)	140 (90.9%)	

|				
	> 35	81 (16.2%)	418 (83.8%)	
Education level	Secondary school or less	6 (17.1%)	29 (82.9%)	
	High school	25 (19.5%)	103 (80.5%)	
	Diploma	21 (22.3%)	73 (77.7%)	0.012
	Bachelor	56 (12.5%)	392 (87.5%)	
	Higher studies	9 (8.0%)	104 (92.0%)	
Do you use medication for diseases of chronic systemic?	Yes	40 (20.1%)	159 (79.9%)	0.007
	No	77 (12.4%)	542 (87.6%)	
Do you have diabetes mellitus?	Yes	17 (23.3%)	56 (76.7%)	0.022
	No	100 (13.4%)	645 (86.6%)	
Have you experienced any complications during pregnancy?	Yes	39 (21.5%)	142 (78.5%)	0.002
	No	78 (12.2%)	559 (87.8%)	
How would you rate your overall oral health?	Excellent	0	119 (100%)	
	Good	36 (9.4%)	345 (90.6%)	0.0001
	Moderate/Fine	45 (17.9%)	206 (82.1%)	
	Not good	36 (53.7%)	31 (46.3%)	
Have you had any dental issues in the past 6 months?	Yes	96 (21.0%)	361 (79.0%)	0.0001
	No	21 (5.8%)	340 (94.2%)	
Do your gums bleed when you brush your teeth?	Yes	84 (22.3%)	292 (77.7%)	0.0001
	No	33 (7.5%)	408 (92.5%)	
Do you currently have a toothache/teeth ache?	Yes	75 (27.0%)	203 (73.0%)	0.0001
	No	42 (7.8%)	498 (92.2%)	
How often do you brush your teeth?	Once a day	54 (17.5%)	254 (82.5%)	
	2-3 times a day	43 (9.8%)	397 (90.2%)	0.0001
	2-3 times a week	15 (27.8%)	39 (72.2%)	
	I don't brush my teeth	5 (31.3%)	11 (68.8%)	
Do you utilize dental floss to clean between the teeth?	Yes daily	10 (7.4%)	125 (92.6%)	
	Sometimes\ When needed	55 (12.6%)	380 (87.4%)	0.0001
	Never	52 (21.0%)	196 (79.0%)	
OBG YN clinic type?	Private OBGYN clinic	66 (13.5%)	424 (86.5%)	0.024
	governmental OBGYN	51 (17.2%)	246 (82.8%)	

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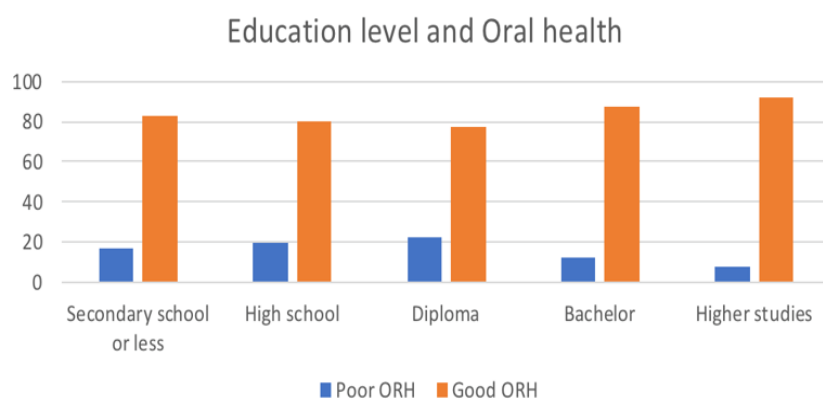
Figure 2. The correlation between the OHRQL level and level of education.

An observational cross-sectional research was performed in Riyadh, Saudi Arabia, to evaluate pregnant women's self-reported oral health habits, dental care services, and their effects on quality of life.

Brushing two or three times a day was reported by 53.8% of the group under study. This finding is comparable to those that Gaffar *et al.* [19] and Bamanikar and Kee [20] reported. In their research, 51.5% and 51% of pregnant women reported brushing once or twice daily. While Assery observed a lower incidence of 33.3% of the sample cleaning their teeth twice a day [21], Al-Turck discovered that around 46.4% of the pregnant women announced brushing twice a day [15]. Similarly, 16.5% of the current group reported flossing every day. Some studies revealed a lower percentage of people utilizing the floss daily, such as the Al-Turck research (7.2%) and Gaffer *et al.* (6.8%) [15, 19]. In comparison to non-pregnant women, pregnant women exhibit worse oral hygiene, increased gingival inflammation, increased pocket depth, and greater periodontal disease, making brushing and flossing frequency crucial [22]. Preventive care for expectant mothers is crucial since it can help children avoid dental cavities for a long time [15]. It is essential because pregnant women who don't take the time to wash their teeth will typically fail to clean their unborn child's mouth [23].

Pregnancy-related hormonal changes that impact dental health cannot be avoided. Consequently, as part of their prenatal care, pregnant women require routine dental examinations [19]. Only 7.7% of the individuals in our study reported routine dental visits during the pregnancy; other researchers found significantly higher percentages, ranging from 13.7-20.4% [15, 17, 19]. According to Honkala *et al.* [24], 40% of the women reported having dental discomfort in the preceding six months, and 50% of the women had seen a dentist during the pregnancy, mostly for tooth pain. Furthermore, of the women studied, over 40% (44.5%) did not see the dentist while pregnant. Unfortunately, the most prevalent explanation given was "no requirement for a dental visit during the pregnancy" (40.6%), followed by "worried about dental treatment harming the baby" (17%). Albasri *et al.* showed that 52.6% of pregnant women avoided dental appointments; the most prevalent reason was the treatment of dental being harmful (24.8%), followed by the dread of dental treatment (17%) [17]. In contrast, the Boggess *et al.* [14] study found that 74% of pregnant women did not have routine dental appointments. "I was not having a dental issue" was more than 40% (45%) of their rationale. Another claimed reason was a financial barrier, as "I do not have insurance of dental" and can't go to the dentist by 31% and 25%, respectively.

Of the women in the current study, 38.9% stated that they had average or poor oral health, whereas 61.1% reported having exceptional or good dental health. These results align with the research of Boggess *et al.* (59% and 41%, respectively) [14]. According to Llena *et al.* [13], over 70% (73.4%) of participants said they had not had any pain or oral infections in the 10 months prior. Nonetheless, 42.2% of their sample had seen a dentist in the previous 12 months, and 49.6% of them reported having bleeding gums.

For many years, dentists have known that pregnant women are more likely than non-pregnant women to experience gingival inflammation [25]. In the current survey, 34% of participants reported having oral discomfort right now, 56.1% complained of bleeding when brushing, and 55.9% stated having dental issues in the previous six months. These findings concur with earlier research.

The majority of participants in this research (79.4%) did not obtain professional training for oral health care during pregnancy. Over one-third (36%) of the sample, followed by dentists (29%), sourced their dental health information from social media. Likewise, Gaffar *et al.* [19] reported 36% and 30.6%, respectively.

The pregnant group had the highest score on the oral hygiene index (i.e., high plaque buildup), according to Shah *et al.* additionally, they had more edematous gingiva, which makes it harder to maintain good dental hygiene. Furthermore, pregnant women's self-reported OHRQL was lower than that of other categories. They discovered that periodontal health, caries, and the number of prior pregnancies were significant predictors of OHRQL. Numerous more investigations discovered the same correlation [26].

Among the factors that were statistically significant in our study were level of education (P = 0.012), brushing and flossing frequency, having bleeding gums during brushing, and having a toothache (P = 0.001). According to Boggess *et al.* [14], these findings support the idea that dental hygiene habits are influenced by educational attainment. Women with higher levels of education were more probably than others to strongly believe that using dental floss will help reduce tooth and gingiva issues. Women with lesser levels of education were less aware of the health benefits of fluoridated water, fluoride toothpaste, and fluoride's safe dental caries prevention [27]. Pregnant women who practice worse self-care tend to have less general awareness about dental health, and vice versa [10]. Furthermore, the OHRQL score indicated a statistically significant relationship with the kind of prenatal care clinic (P = 0.024). The rationale for this result is that these women will be more likely to have insurance coating for their dental and medical requirements.

In the current research, 24.3% of women stated taking medication for chronic systemic disorders, while 8.9% of women reported having diabetes. Chronic conditions like diabetes have been connected to poor oral health [23].

Pregnant women with diabetes had higher levels of periodontal inflammation and damage than pregnant women without diabetes [28]. According to Demmer *et al.* poor dental health has been associated with chronic conditions such as diabetes, pulmonary infections, cardiovascular disease, and stroke, which can have an impact on health throughout one's life [29]. Furthermore, a recent research by Anil *et al.* [30] showed that drugs may damage the periodontium, particularly when oral hygiene is reduced.

This study's primary drawback was its reliance on self-reports, which may have inflated oral health behaviors due to the desire to provide the right response. This bias may be avoided in future research by clinically evaluating oral hygiene utilizing plaque indices and evaluating genuine, routine dentist visits from medical records. Another drawback was that the respondents' socioeconomic standing and access to dental insurance coverage were not assessed.

Conclusion

To avoid dental and oral disorders and to urge Saudi women to receive regular dental treatment to prevent additional diseases, it is necessary to enhance their oral health education and oral health care practices during pregnancy. Pregnant women use dental care less frequently than normal women, which might worsen dental issues. Routine dental care is crucial for the oral health of both moms and children. Therefore, standard prenatal care procedures must include referrals for and promotion of dental care from both public and private medical providers. Additionally, there are recommendations on how medical and dental professionals may use social media to spread awareness about oral health and urge regular dental treatment for women in pregnant and general women in particular. Also, to clarify misconceptions regarding dental care and pregnancy.

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