

Knowledge and oral health care practices among Saudi pregnant women

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Abstract: Proper oral health care is usually neglected by pregnant women due to anxious expectations. This may affect the pregnant woman and of the the unborn child during or immediately after delivery. Some studies showed that there was ana association between poor oral health in pregnant mothers and low birth weight in their newborn, while other studies were able to associate poor oral health in mothers with the likelihood of pre-term birth. Just as proper prenatal care is important to reduce prenanancy complications, proper oral health care is also an important part of this process. Hence, a preminary step for the design of proper health education strategy is to know how much the target group knows about oral health problems, and their attitudes towards this important element of health care. The aim of this study is to assess knowledge, and oral health self-care practices of Saudi pregnant women. This descriptive study involves a cross-sectional survey was used. All participants in this study (n=363) were convenient Saudi third trimester pregnant or recently pregnant women over 18 years olf from Riyadh, Jeddah and Dammam. Women who gave informed consent were asked to complete a self-admisintered questionnaire and return it to the researcher or the researcher's assistants. Before commencement of this study, ethical approval was obtained from the Participated Centre's Research Ethics Board. An SPSS database (version 17.0) for analysis. A linear stepwise regression analysis was chosen. In this regression model the predictors were income, education, insurance, referral to oral health care, dental check-up attendance and number of pregnancies. The results showed that Saudi women of lower income and education had a lower score on general oral health care knowledge, and those with low dental check-up attendance had a lower score on general oral health care, Saudi women's knowledge was lacking in certain important areas of oral health care practices specific to pregnancy. Overall, Saudi women were not aware of the susceptibility to periodontal disease during pregnancy. An important issue found by the current study was that the majority of women were not aware of periodontitis may lead to preterm birth. Many women are themselves are nor aware about the possible adverse pregnancy effects caused by periodontitis. Pregnancy is an ideal period when women can be motivated to change their behaviors and life style. Midwives can play a vital role in improving perinatal outcomes and maternal/fetal dental health through screening and education about risk factors and prevention, to the women and families they care for across various settings.

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1. Introduction

Pregnancy, although not a disease condition, is a period when some mothers due to anxious expectations tend to neglect some aspects of their routine self-care. Proper oral healthcare is not left out of this general neglect. This may affect the pregnant woman and or the unborn child during or immediately after delivery. In a population-based study, there was an association between poor oral health in pregnant mothers and low birth weight in their newborn; while in others they were able to associate poor oral health in mothers with the likelihood of pre-term birth^(1,2).

Several factors that have been linked to preterm birth and low birth weight can usually be treated to

prevent any adverse outcomes. Some of these factors are smoking, drug use, domestic violence, strenuous exercise, low maternal weight, obesity, diabetes, high blood pressure, being pregnant with multiples, previous preterm birth, and some maternal infections. For example, research has linked bacterial vaginosis, urinary tract infections, and periodontitis to preterm birth and low birth weight.^(3,4)

Although the research linking periodontitis to preterm birth and low birth weight is recent, it is beginning to point to a problem of concern. To date, research has focused on establishing the relationship between periodontitis and adverse pregnancy outcomes and the impact that periodontal treatment interventions have on reducing the risks. Studies have

included retrospective and prospective analyses of pregnancy outcomes in women with and without periodontitis, while other studies have investigated the effectiveness of treating periodontitis and its effect on pregnancy outcomes. However, virtually no studies have investigated what knowledge pregnant women have about oral health and what barriers they experience to accessing proper oral health during pregnancy^(3, 4, 5).

Just as proper prenatal care is important to reduce pregnancy complications proper oral health care is also an important part of this process, given that periodontitis may play a role in adverse pregnancy outcomes. Understanding the modifiable risk factors of preterm birth is an important step to help in possibly reducing preterm births. Thus, as the research appears to point to oral health as a potential modifiable risk factor of preterm birth, it is important to encourage women to maintain proper oral health to reduce the incidence of periodontitis. There is clinical support for the theory that general maintenance of oral health can reduce the incidence of periodontitis and other dental problems from occurring. Daily brushing and flossing, not smoking, eating a healthy diet, and attending regular dental check-ups (twice a year) before and during pregnancy are the best ways to reduce the incidence of gingivitis and periodontitis. The increase in hormones during pregnancy makes the gums more sensitive and prone to infection. Increased brushing, with a soft bristled toothbrush, flossing, and maintaining regular dental check-ups are necessary to prevent oral infection and problems during pregnancy^(5, 6).

The Aim of This Study

It is hoped that the findings of this study will open new frontiers in the management of oral diseases during pregnancy in Saudi Arabia, as well as bridging the literature gaps in this field.

2. Methodology

This descriptive study involves a cross-sectional survey to assess knowledge, and oral health care practices among Saudi pregnant woman in Saudi Arabia.

Study Sample

All participants in this study (n=363) were convenient Saudi third trimester pregnant or recently post-partum women over 18 years old, attending antenatal, or post natal care in Riyadh (King Fahad Medical City, and King Saud Medical City), Jeddah (King Abdulaziz University Hospital), and Dammam (Maternity and Child Hospital). The data collection occurred during a one-month period (December 2011- January 2012) involving recruitment from antenatal and postnatal centers. All these centers were contacted and agreed to the researcher using the

antenatal and postnatal care as a means for recruitment of potential participants to the study. The women attending these antenatal classes were typically in the last trimester of their pregnancy, or recently delivered.

Eligible women were approached on the antenatal and postnatal centers and given a study information pamphlet. Women who gave informed consent were asked to complete the questionnaire and return it to researcher or research assistants.

Study Instrument

The instrument used in this study was a self-administered questionnaire, The questionnaire for the current study consisted of four sections: 1) demographics, 2) knowledge of general oral health and oral health during pregnancy, 3) dental check up attendance and barriers to dental care, and 4) pregnant women's experiences related to their oral health. All the questions were in multiple-choice formats.

In order to determine content validity prior to the commencement of the current study a practicing dentist and obstetrician in Riyadh reviewed the questionnaire. This review ensured that the questions were clear and that they reflected current and valid dental and prenatal health practices in Saudi Arabia. After a few formatting adjustments, a small test-run was completed by a group of prenatal and obstetrics nurses at King Fahad Medical city to ensure the clarity of the questions and determine the approximate time to complete the questionnaire. The average time determined to complete the questionnaire was eight minutes.

The independent variables in this study were income, education, insurance, referral to oral health care, dental check up attendance and number of pregnancies. The dependent variables 'general oral health care knowledge', 'pregnancy oral health care knowledge', and 'risk of adverse pregnancy outcomes knowledge' were created by adding up each participant's total number of correct questionnaire responses to each of the three types of knowledge.

Section One: Demographics

Questionnaire items 1 through 7 resulted in descriptive statistics for each participant. The answers to items 1-5 resulted in a description of participants' education, income, dental plan insurance coverage status and current place of residence. Answers to items 6-7 were used to describe the stage of pregnancy and number of deliveries for participants.

Section Two: Knowledge of Oral Health and General Health During Pregnancy

For questionnaire items 1 though 14 there was one correct answer. Answers were coded as 1 =

correct answer and 0 = incorrect/unknown/unanswered answer. In order to know exactly what each participant's responses were to each item, the SPSS database was created so that an answer would have to be inputted for each answer option of each item. For example, a participant answered option "a" for item number one. In the database, it was entered as follows: la = 1, lb = 0, lc = 0, ld = 0. This way, the data of participants' exact responses would not be lost by only coding it as a correct or incorrect answer. For each participant, the number of correct answers was added up for a total score and defined into the following variables. Questionnaire items 1 through 8 were used to calculate the variable 'general oral health care knowledge'. Questionnaire items 9 through 12 were used to calculate the variable 'pregnancy oral health care knowledge'. Questionnaire items 13 and 14 were used to calculate the variable 'risk of adverse pregnancy outcomes knowledge'. Answering questionnaire items correctly gave a high score and an incorrect answer or answering "Not sure" gave a low score.

Section Three: Barriers and Access to Oral Health

Questionnaire items 1 and 3 were used to calculate the variables 'dental check up attendance before pregnancy' and 'dental check up attendance during pregnancy'. Items 1 and 3 had a choice of responses to indicate how often participants' attend dental checkups and answers were coded as follows: 4= Twice a year; 3= Once a year; 2= Less than once a year; 1= I do not attend.

Section Four: Oral Health Practices

Questionnaire items 1 and 3 were used to calculate practices of oral health during pregnancy and after delivery. The reminding items were used to get further information about oral health.

Procedure

The procedure took place at multiple areas in Riyadh, Jeddah, and Dammam. The registration staff agreed to distribute the questionnaire packages to women at the time of registration. The questionnaire packages consisted of a study information sheet, and the questionnaire. The registration staff handed out questionnaires to only the women attending the regular obstetrics and family doctor obstetrics clinics. At this point a questionnaire was provided to them; however, each woman decided if she wanted to participate.

It was anticipated that women would complete the questionnaire in the waiting room. To further enhance confidentiality while completing the questionnaire, there was a designated area in the waiting room with more privacy where participants could complete the questionnaire away from other people in the waiting room. However, it was the

choice of each participant where she chose to complete the questionnaire.

Participants were first asked to read an information sheet on the purpose and procedure of the study. Participants were given detailed written instructions about completing the questionnaire, including inclusion criteria, and were provided with contact information for the researcher should they have any questions or concerns.

A secure drop-off box was placed at the main registration desk where completed questionnaires were placed. The front of the box contained a storage slot where stamped return envelopes were available to women who did not have enough time to complete the questionnaire before leaving the clinics, but it was anticipated that the majority of women would be able to place their completed questionnaire in the box

Ethical Considerations

Before commencement of this study, ethical approval was obtained from the Participated Centre's Research Ethics Board.

Statistical Analysis

Data from all the completed questionnaires were entered into an SPSS database (version 17.0) for analysis. The results are presented in the following order: preliminary analyses, summaries of women's oral health care, oral health knowledge.

Preliminary Analyses

Prior to beginning the analysis, the entered data were examined for any data entry errors or outlying values and none were found. In order to test the reliability of the questionnaire a series of inter-item reliability tests were conducted with the items that made up each of the three types of knowledge (general oral health knowledge, pregnancy oral health knowledge, risk of adverse effects knowledge, and oral health practices) which resulted in Cronbach's a coefficients of 0.771, 0.869, 0.717, and 0.802 respectively. Ideally, Cronbach's a values of 0.7 or higher are considered acceptable⁽⁷⁾, thus, the items for the questionnaire appeared to have good reliability.

The demographic characteristics of the participants can be seen in Table 1. A total of 363 Saudi pregnant women returned questionnaires. The majority of participants (68.6%) was in the age range of 25-34 years, had achieved at least a university degree (44.6%) and reported an income in the 71,000-100,000 SR range (31.4%). The next highest reported income bracket was in the 'over 100,000 SR' category (23.1%). The majority of participants reported having a dental care insurance plan (80.2%). The majority of participants reported living in Riyadh and the surrounding areas (80 %), while only 7% reported living in Dammam area, and 13% reported living in Jeddah.

The majority of participants reported being in postnatal (71.9%), about half reported that this was their first pregnancy (53.7%), and about one third reported having at least one delivery (32.2%).

Table 1. Demographic Characteristics of Participants (n=363)

	No	%
<i>Age (in years)</i>		
Under 18	3	0.8
18-24	30	8.3
25-29	138	38
30-34	111	30.6
35-39	69	19
Over 40	12	3.3
<i>Education</i>		
No high school	21	5.8
High school	48	13.2
Some university	33	9.1
Diploma	54	14.9
BSc or higher	162	44.6
Other	45	12.4
<i>Income</i>		
Under SR 36,000	21	5.8
SR 36,000 –SR 50,000	66	18.2
SR 51,000S- R 70,000	66	18.2
SR 71,000-SR 100,000	114	31.4
Over SR 100,000	84	23.1
<i>Insurance</i>		
Do have insurance	291	80.2
Do not have insurance	72	19.8
<i>City</i>		
Riyadh	290	80
Dammam	25	7
Jeddah	48	13
<i>Trimester</i>		
Third	102	28.1
Delivered	261	71.9
<i>Number of deliveries</i>		
One	117	32.2
Two	36	9.9
Three	9	2.5
Four or more	3	0.8
None	195	53.7

Oral health care

The results showed that the majority of participants had good oral health care maintenance prior to becoming pregnant, with 47.9 % reporting they attended dental check-ups twice a year. Another 29.8% reported they attended dental check-ups at least once a year. Only 5% of participants reported they did not attend regular dental check-ups before pregnancy, and the main reason for not attending was

due to financial reasons, including lack of a dental insurance plan.

During pregnancy 34.7% of participants reported they attended at least twice a year and 26.4% reported they attended once a year. However, 17.4% of participants reported that they did not attend or were not planning to attend a dental check-up during pregnancy. Interestingly, 14% of these participants were women who reported regular dental check-ups before pregnancy. It is important to note that there was a reduction of about 13% in women attending dental check-ups "twice a year" from before pregnancy to during pregnancy.

The majority of participants reported that no one recommended they have regular dental check-ups during pregnancy (62.8%). Of those who did receive a recommendation to continue with regular dental check-ups during pregnancy, 12.4% reported being told by their dentist, 3.3% reported being told by their obstetrician, 5.8% reported being told by a family member or friend, and 11.6% reported reading about it in a pregnancy book, magazine or on the internet.

Knowledge of general and pregnancy related oral health care.

Examination of participants' responses to the questionnaire items on oral health care showed that the majority of the participants (see Table 2) chose the correct answers. There were several questions, which less than 50% of participants answered correctly. Questionnaire responses indicated that the majority of participants did not seem to know what plaque was, when the best time to floss is, that tooth brushing and flossing should increase during pregnancy, and that the best time to receive dental treatment during pregnancy is in the second trimester. Although 57% of participants agreed that pregnant women were more susceptible to gum disease, this could be considered a marginal majority.

Knowledge about risk of smoking and periodontitis on pregnancy

Almost all of the participants reported that they thought smoking during pregnancy had a negative effect on the fetus (92.6%). Surprisingly, there was a minority of participants who reported that they did not think smoking during pregnancy was harmful to the fetus (1.7%) and some reported that it was possibly harmful (3.3%). Only a minority of participants thought that periodontitis was linked to preterm birth (17.4%). The remaining participants reported that they thought it was not linked (21.5%), possibly could be linked (21.5%), or that they were unsure (37.2%). Participants who did not know about the link between periodontitis and preterm birth ranged in education and income.

Predictors of Oral Health Knowledge

A linear stepwise regression analysis was chosen to analyze the data, as this method is “parsimonious and ensures that you end up with the smallest possible set of predictor variables” (7). In this regression model the predictors were: income, education, insurance, referral to oral health care, dental check-up attendance and number of pregnancies. The dependent variables were ‘general oral health care knowledge’, ‘pregnancy oral health care knowledge’, and ‘risk of adverse pregnancy outcomes knowledge’.

A stepwise multiple regression analysis was performed to determine which variables best predicted ‘general oral health care knowledge’. This resulted in a significant model (Adjusted R square = 0.070. $F_{2,118} = 5.488, p < 0.01$). This model showed that the predictor variables education (Beta = 0.201, $p < 0.05$) and dental checkups during pregnancy (Beta = 0.185, $p < 0.05$) were significantly related to general oral health care knowledge (see Table 3). This showed partial support for Hypothesis 1 (Saudi

women of lower income and education will have a lower score on general oral health care knowledge) and Hypothesis 3 (Saudi women with low dental check-up attendance will have a lower score on general oral health care knowledge), confirming that, as education and regular dental check-ups increased, so did general oral health care knowledge. The variables ‘referral’ and ‘number of pregnancies’ were not found to be significant predictors of general oral health knowledge. Thus, Hypothesis 2 (Saudi women whose physician or dentist has recommended dental care during pregnancy will have a higher score on general oral health care knowledge, pregnancy oral health care knowledge, and risk of adverse pregnancy outcomes knowledge) and Hypothesis 4 (Saudi women with lower number of previous pregnancies will have a lower score on general oral health care knowledge, pregnancy oral health care knowledge, and risk of adverse pregnancy outcomes knowledge) were not supported.

Table 2. Participants' responses on oral health care (general and pregnancy) and risk of adverse effects knowledge questions

	No	%
General Oral Health Questions (Correct answer)		
What is plaque? (Soft bacterial deposit build-up on gums)	135	(37.2)
What could plaque cause? (Gum disease)	285	(78.5)
What do bleeding gums indicate? (Inflamed gums)	327	(90.1)
How can gum disease be prevented? (By brushing and flossing)	354	(97.5)
How important do you think brushing is? (Very important)	363	(100)
When is the best time for brushing? (More than once a day)	321	(88.4)
How important do you think flossing is? (Very important)	342	(94.2)
When is the best time to floss? (Before brushing)	147	(40.5)
Pregnancy Oral Health Questions (Correct answer)		
Do you think pregnant women are more likely to get gum disease? (Yes)	207	(57)
What causes inflamed gum disease in pregnant women? (Hormonal changes)	249	(68.6)
Regarding tooth brushing and flossing during pregnancy, which of the following is true? (Tooth brushing and flossing should increase)	153	(42.1)
When do you think is the best time to receive dental treatment during pregnancy? (Second Trimester)	51	(14)
Risk of Adverse Effects Questions (Correct Answer)		
Do you think gum disease is linked to preterm labour? (Yes)	63	(17.4)
Do you think smoking during pregnancy has a negative effect on the baby? (Yes)	336	(92.6)

Table 3. Variables that best predict general oral health knowledge

<i>Predictor variables</i>	<i>Beta</i>	<i>p</i>	<i>Adjusted R square</i>	<i>Tolerance</i>
Education	0.201	p <0.05		0.981
Dental check- ups during pregnancy		p <0.05	0.07	0.981

A second stepwise multiple regression analysis was performed to determine which variables best predicted 'pregnancy oral health care knowledge' and this resulted in a significant model (Adjusted R square = 0.036. $F_{1,119} = 5.458$, $p < 0.05$). This analysis indicated that income (Beta = 0.209, $p < 0.05$) was the only predictor significantly related to

pregnancy oral health care knowledge (see Table 4). This showed partial support for Hypothesis 1, as the higher the income the more knowledge participants had about oral health care practices during pregnancy. In this analysis, Hypotheses 3 and 5 were not supported.

Table 4. Variables that best predict general oral health knowledge

<i>Predictor variables</i>	<i>Beta</i>	<i>p</i>	<i>Adjusted R square</i>	<i>Tolerance</i>
Income	0.209	p <0.05	0.036	1.0

A third stepwise multiple regression analysis was performed to determine which variables best predicted 'risk of adverse pregnancy outcomes knowledge' and this resulted in a significant model (Adjusted R square = 0.087. $F_{1,119} = 12.417$, $p < 0.005$). This model indicates that dental check-ups before pregnancy (Beta = 0.307, $p < 0.005$) was the only predictor related to risk of adverse pregnancy

outcomes knowledge (see Table 5). This result partially supports Hypothesis 3, as it shows that the more regular the dental check-up attendance before pregnancy, the more knowledge participants had about the risk of adverse pregnancy outcomes due to periodontitis and smoking. Hypotheses 2 and 4 were not supported in this analysis.

Table 5. Variables that best predict risk of adverse pregnancy outcomes

<i>Predictor variables</i>	<i>Beta</i>	<i>p</i>	<i>Adjusted R square</i>	<i>Tolerance</i>
Dental check- ups before pregnancy	0.307	p <0.05	0.087	1.0

Oral Health Care Practices

Table 6 represents the responses of Saudi women on oral health care practices. The majority of Saudi women 66.5 % brushed their teeth more than once a day, with 41.8% noticed a blood after brushing. 30.8% of them used either floss or toothpicks to clean between their teeth, with 52.0% who did not notice any blood after flossing. 43.5% of Saudi women did not have gaps between their teeth, while 17.3% have gaps that started to get wider.

All participant 100% responded that they do not have movable teeth or infection around their teeth. Almost half of the sample did not have plaque or tartar, but have sensitive gum. The majority of the participants 84.6% did not think they have gum disease with no family history.

4. Discussion

General Oral Health Knowledge and Oral Health Maintenance

For the most part, the majority of the Saudi women had adequate knowledge of general oral health care practices. Overall, when it came to basic oral health care practices, such as knowing that brushing and flossing are important, and that bleeding gums can indicate periodontal disease,

Saudi women appear to be properly informed. This finding has been supported by previous research, indicating that women are at least meeting minimum conditions for good oral health. This finding closely ties in with Saudi women's regular dental check-up attendance because it was found that dental check-up attendance was in part associated with better oral health knowledge⁽⁸⁻¹⁰⁾.

However, there were a few questions on basic oral health that Saudi women missed. For example, the majority of women did not know what plaque was and that the best time to floss is before brushing. This indicates that women were not aware of certain oral health practices that may help reduce periodontal disease, a finding that is also supported by previous studies. This shows that in three different populations, women's oral health knowledge, although adequate in most areas, can use some improvement. This is important information that dentists should know as it may have implications on the information they give women. Furthermore, these women will soon be mothers, who will influence their children's oral health. Although this study was not focused on children's oral health, this issue is one that future research can further explore⁽¹⁰⁻¹²⁾.

Table 6. Participants' responses on oral health care practices

<i>Response</i>	<i>No</i>	<i>%</i>
<i>How often do you brush your teeth?</i>		
Never	0	0
Less than once a day	36	9.9
Once a day	86	23.6
More than once a day	241	66.5
<i>Do you notice any blood when you spit out after brushing your teeth?</i>		
Not Applicable (I do not use a tooth brush)	0	0
Yes	65	17.9
No	152	41.8
Sometimes	146	40.3
<i>How often do you use either floss or toothpicks to clean between your teeth?</i>		
Never	0	0
Not every week	8	2.2
Once a week	89	24.5
More than once a week	112	30.8
Everyday	81	22.5
<i>Do you notice any blood on your floss or toothpick after cleaning between your teeth?</i>		
Not Applicable (I do not use a tooth brush)	0	0
Yes	68	18.7
No	189	52.0
Sometimes	106	29.3
<i>Have you noticed any gaps between your teeth getting wider or your teeth moving apart?</i>		
Not Applicable (I do not have gaps between my teeth)	158	43.5
Yes	63	17.3
No	142	39.2
<i>Do your teeth feel loose or do they move when you touch them?</i>		
Yes	0	0
No	363	100
<i>Do you have plaque or tartar build up on your teeth?</i>		
Yes	159	43.8
No	204	56.2
<i>Are any areas of your gums sensitive?</i>		
Yes	198	54.5
No	165	45.5
<i>Are any areas of your gums swollen?</i>		
Yes	112	30.8
No	251	69.2
<i>Do you have any pus or infection around any teeth?</i>		
Yes	0	0
No	363	100
<i>Does gum disease run in your family?</i>		
Yes	85	23.4
No	278	76.6
<i>Do you think you have gum disease?</i>		
Yes	56	15.4
No	307	84.6

Oral Health Knowledge Specific to Pregnancy and Oral Health Maintenance

Saudi women's knowledge was lacking in certain important areas of oral health care practices specific to pregnancy. For example, most women did not know that pregnancy a reason of why Saudi women were not aware of these pregnancy-specific oral health practices. By not attending dental check-ups, they may be missing out on receiving pertinent

information from their dentists. Previous studies have also found that women tend to decrease or stop attending dental check-ups during their pregnancy. Thus, it is important for dentists and health care practitioners to recognize that even women with dental insurance and regular dental check-up attendance before pregnancy may still need to be encouraged to continue during pregnancy^(13,14).

Overall, Saudi women were not aware of the susceptibility to periodontal disease during pregnancy, of the link between periodontitis and preterm birth, and many women decreased their dental check-up attendance during pregnancy, possibly putting these women at risk for poor oral health and possible adverse pregnancy outcomes. This information is new to this field, as research in Saudi populations has been lacking thus far. Health care practitioners and dentists should be aware that these are issues occurring in women's oral health, as they point to a need for increased oral health education for their patients. The hypothesized association between periodontal disease and preterm birth is still being investigated and therefore it may be too soon to begin sharing information on this link with pregnant women. However, health promoters may want to consider when it might be appropriate to share information about this potential risk with women.

The fact that, for some Saudi women, attending regular dental check-ups prior to becoming pregnant was associated with better attendance during pregnancy, means that a possible solution to increase dental check-up attendance during pregnancy would be to not only encourage pregnant women, but also women who may become pregnant, to may make women more susceptible to gum disease and that increased brushing could help to possibly prevent this from occurring. An important issue found by the current study was that the majority of women were not aware that periodontitis may lead to preterm birth. Previous studies have also found that women are generally unaware of oral health practices during pregnancy and the effects that poor oral health may have on pregnancy outcomes. Some Saudi women also decreased or stopped their dental check-up attendance during pregnancy and this may be attending regular dental check-ups. This emphasizes the importance of health promotion in this area, as by encouraging proper preconception oral health care for all women, possible adverse outcomes during their pregnancy may also be prevented^(9, 14).

Although Saudi women of high education and income were the majority in this study, there was a sub-sample of women who had low education and income and no dental insurance plan. Lack of oral health knowledge and poor dental check-up attendance was most visible in these women, indicating that these factors play a role in their oral health knowledge and maintenance. This finding is supported by the hypotheses and previous research that has linked low SES with poor oral health knowledge and maintenance⁽¹³⁻¹⁷⁾.

The effect that poor oral health knowledge and maintenance has on these women is increases their

risk of developing oral health problems, such as periodontitis, and possibly adverse pregnancy outcomes. Furthermore, the size of the correlation between SES and barriers to oral health care in this study of relatively well-off women and the fact that even women with dental insurance reported financial barriers to such care, suggests that financial issues may be a factor in oral care for many women, not just those of low SES. It is therefore important to consider each of these factors separately in new studies. Since this sample was so homogenous, it is also important to ensure a wider range of SES in future work to further explore the connections between income, education, dental insurance and other financial considerations.

The women in this study generally reported that one of the best ways to help them maintain good oral health and learn about the effects of periodontitis, would be to help them to be able to afford dental check-ups, thus allowing them to maintain regular oral health care. In other words, they understood that oral health is an important issue, but many of them just did not have the financial ability to take care of their oral health. For these women being informed about the importance of maintaining oral health care during pregnancy is not enough, they also need a way to access oral health care services.

Even though many of the women reported they had good oral health care maintenance, more than half reported one or more barriers to accessing oral health care. In fact, regardless of education and income women reported several common factors that prevented them from accessing oral health care. For example, lack of information on oral health, lack of time, and fear about dental treatments was all reported as barriers by women. So why is this occurring when most of the women had good oral health maintenance? As highlighted by women's responses, even women who did attend dental check-ups regularly before becoming pregnant may still need to be encouraged to continue to have dental check-ups during pregnancy. Furthermore, some women who had regular dental check-ups before pregnancy stated that they did not plan to attend during pregnancy.

The issue of not going to the dentist while pregnant has been raised by previous research, indicating that lack of oral health care during pregnancy is an ongoing issue for women. Perhaps the reason why women do not attend dental check-ups during pregnancy is related to the fact that women also reported they perceived a lack of information from their health care practitioners about oral health and this affected their oral health care maintenance. Related to this issue was the fact that only a minority of women were informed that they

should continue with regular dental check-ups during pregnancy. In fact, women themselves suggested that it would raise their awareness of oral health issues during pregnancy if health care practitioners informed them of these issues^(13, 19).

Previous research has shown that if their health care practitioner tells women about the importance of oral health care during pregnancy, it can have a positive impact on their dental check-up attendance. This finding was supported by the current study, as the women who reported being referred to continue regular oral health care when they became pregnant, did in fact have more regular dental check-up attendance during pregnancy. This goes along with the finding that increased education and information may also improve prenatal care and pregnancy outcomes. The findings of the current study imply that key figures in women's health care are not informing their patients about oral health care and not encouraging them to continue dental check-ups during pregnancy. This is particularly worrisome, as it indicates that women are not being informed about a potentially serious health issue that may have adverse pregnancy outcomes. If women are not properly informed on oral health care and the important impact it may have on their pregnancy outcomes they may not make it a priority to attend dental check-ups during pregnancy^(13, 20).

This is perhaps complication further by the fact that there are many misconceptions surrounding the safety of oral health treatments during pregnancy, even though most oral health care treatments are safe. Although it was not one of the specific research questions in the current study, fear of potentially harming the fetus may be a factor of why women are not attending dental check-ups regularly during pregnancy. However, the results of this study appear to show that this was not one of the main concerns for women, as only a few women reported that this was the reason for not attending dental check-ups during pregnancy. Furthermore, there is limited research investigating what role fear of harming the fetus plays on women's oral health care behaviour. Thus, future studies should consider investigating this issue further^(10, 19, 20).

Furthermore, as several studies have shown, including the current one, many women are themselves not aware about the possible adverse pregnancy effects caused by periodontitis. Therefore, they may not be taking the initiative to seek out oral health care during their pregnancies. If women were aware that poor oral health, especially during pregnancy, may have adverse effects on their pregnancy, it is possible that they might make every effort to ensure their oral health was taken care of. This is an important finding, as it shows that dentists

and other health care practitioners need to provide information to women so any misconceptions on the safety of dental check-ups during pregnancy can be addressed and to educate women on the serious pregnancy outcomes that may arise from poor oral health. In doing so, perhaps more women may be inclined to attend dental check-ups during pregnancy^(19, 20).

The issues raised by the current study on women's oral health knowledge and barriers to accessing oral health care have pointed to the fact that many women do not

have the financial ability to access oral health care, that women have indicated they need more information on oral health, and that health care practitioners need to provide information and encouragement to women on maintaining proper oral health. These findings have important implications for health care practitioners and dentists.

Conclusion & Recommendation:

Health promotion initiatives should focus on finding the most appropriate ways to provide access to oral health care to women as well as relevant information to health care practitioners, dentists, and women. Future research should focus on further investigating what oral health information women need and how to effectively provide this information to women. In addition, investigating the beliefs of health care practitioners in Saudi Arabia about oral health and pregnancy could also provide useful information.

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