



## **Periodontal Disease in Pregnant Women and Impact on in Tabuk Region, Saudi Arabia**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Background:** Periodontal disease is amongst the top ten most common diseases to affect humans and the leading cause of tooth loss for adults, so it's important to be aware of the condition and how it can develop. Periodontitis is an inflammatory process initiated by bacterial plaque involving the supporting structures of the tooth which include the gingiva, the junctional epithelium, root cementum, periodontal ligament, and alveolar bone.

**Methods:** A cross-sectional study using a self-managed questionnaire conducted among 127 pregnant women in King Salman Armed Forces Hospital in Tabuk region, Saudi Arabia (2020).

**Results:** the study found that 69.3% of cases had symptoms of periodontitis. Also, the study found that there were no significant correlations between symptoms of periodontitis and all variables like; age group, marital status, educational level, employment, number of children, brushing daily, and visiting dental clinic during pregnancy ( $p > 0.05$ ). As regards symptoms of periodontitis associated with pregnancy, our study reported that 56.7% had Bleeding per gum, 44.9% had gum swelling and 40.9% had an offensive odor from the mouth.

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**Conclusion:** The study concluded that the majority of pregnant women cases had periodontitis and there was no significant association found with different variables like age, educational level, marital status. Also, there was good practice and attitude toward pregnancy-associated periodontitis.

*Keywords: Periodontal disease; periodontitis; health awareness; pregnant; oral health.*

## 1. INTRODUCTION

Periodontal disease is amongst the top ten most common diseases to affect humans and the leading cause of tooth loss for adults [1-7], so it's important to be aware of the condition and how it can develop. Also, periodontal disease is one of the most common chronic infectious diseases, which include gingivitis and periodontitis, in humans with a prevalence of 10 - 60% depending on the definition and the population being studied. Periodontal disease has been identified as vascular stressors that cause an increase in inflammatory mediators which leads to endothelial damage. The evidence suggests that localized periodontitis can have a significant effect on systemic health. periodontal disease is associated with many adverse pregnancy outcomes, such as preterm delivery, pre-eclampsia, abortion and stillbirth, low birth weight (LBW)infants, and preterm LBW infants [8].

During pregnancy, women undergo the greatest hormonal and physiological changes in their lives [9-16], some of which can affect their mouths. These changes may include an increase in cariogenic and periodontopathogenic bacteria from changes in diet, in dental hygiene and salivary composition, changes in gingival tissue from increased vascular permeability, and increased sex hormones: estrogen and progesterone.

Several studies have investigated the occurrence of periodontal disease during pregnancy, yielding a wide variation in prevalence (11% to 100%; Ifesanya et al. 2010; Piscoya et al. 2012). Pregnant women with periodontal disease have been reported to be at increased risk of adverse pregnancy outcomes [17], including preeclampsia (Kunnen et al. 2007; Siqueira et al. 2008), preterm delivery [18], and low birth weight LBW; [19]. However, many other studies failed to confirm these associations [20].

### 1.1 Objectives

The study aims to investigate changes in periodontium during pregnancy, to investigate of

effect periodontal disease on fetus, and for giving health awareness to pregnant about oral health.

## 2. PARTICIPANTS AND METHODS

The current study is cross-sectional analytical conducted in King Salman Armed Forces Hospital in Tabuk region, KSA. The study used a self-administrated questionnaire. The study targeted the Women in Saudi Arabia in Tabuk Region during the period of 1 January 2020 to 30 February 2020.

### 2.1 Sample Size

We calculated our sample size using standard online tools through the following formula ( $N=(Z\alpha)^2 \times ([p(1-p)]/d^2)$ )and randomly-selected 127 females.

Where:

n = estimated sample size.

Z $\alpha$  at 5% level of significance = 1.96

d = level of precision and is estimated to be 0.05

p = High awareness levels in two previous studies (30%).

Actual sample size = (Primary sample size  $\times$  design effect (estimated to be 1.5)

The expected response rate was estimated to be 80%.

### 2.2 Data Collection

The disseminated questionnaire consisted of open and close-ended questions on demographics, symptoms and clinical history of periodontitis and attitude towards visiting dental clinics.

### 2.3 Statistical Analysis

Data was compiled and analyzed using Statistical Package for the Social Sciences (IBM SPSS, version 23, Chicago, USA) and results were analyzed with frequencies and Chi-square test. P-value was considered significant if <0.05.

### 3. RESULTS

Table 1 shows the demographic data of all 127 participating women. Mean age was 35.2 and 99.2% were Muslim. The majority (96.9%) were married and had a university degree or more (70.9%). More than half (64.6%) had more than two children and 55.9% were unemployed.

As shown in Table 2, almost two-thirds (69.3%) of participants reported brushing daily, and 44.9% of all reported gum bleeding when brushing teeth. Gum redness and swelling, as well as mouth offensive odor were reported by 12.6%, 11.0%, and 19.7%, respectively, while 21.3% of participants had all of these symptoms combined. Changes in gum-related symptoms usually occur during pregnancy in 44.1% of participants, yet 42.5% of all pay the dental clinic less than two visits a year.

It is illustrated in table 3 that over half of the participants (56.7%) experienced bleeding per gum during pregnancy, while 44.9% reported gum swelling and 40.9% experienced an offensive odor from the mouth during pregnancy. These symptoms appeared in the first stage of pregnancy for 35.4%, second stage for 29.1%, and the majority (71.3%) did not take medications for any symptoms associated with periodontitis. The most prominent symptoms were gum swelling (26.8%), offensive odor (26.0%), and pain and bleeding per gum (20.5%). Over half the participants (63.8%) reported good prognosis after delivery, with no apparent health problems for the born infants (77.2%), nor in their other children (79.3%).

Table 4 shows that 81.1% of women believe that periodontitis is normal during pregnancy, and 76.4% believe that they need to visit a dentist if they develop symptoms of periodontitis during pregnancy. The majority (78.0%) did not visit a dentist for oral hygiene during pregnancy period, and 87.4% do not visit a dentist regularly during pregnancy. About half (48.0%) of participant believe that it is very important to visit a dentist during pregnancy, while 5.5% believe that it is unimportant.

Table 5 shows the association between reported symptoms of periodontitis that are associated with pregnancy and other potential risk factors. No significant association was found with age groups ( $P = 0.118$ ), marital status ( $P=0.784$ ), educational level ( $P=0.209$ ), employment ( $P=0.199$ ), number of total births ( $P=0.453$ ), habit

of brushing teeth daily ( $P=0.486$ ), and visiting dental clinic during pregnancy period ( $P=0.099$ ).

### 4. DISCUSSION

Periodontal disease is a Gram-negative anaerobic infection of the mouth that affects up to 90% of the population [17] and has been demonstrated to be higher in pregnant women [24]. It refers to gingivitis (an inflammatory condition of the soft tissues surrounding a tooth or the gingiva) and periodontitis (involving the destruction of such supporting structures as the periodontal ligament, bone, cementum, or soft tissues) [22]. The etiology of periodontal disease (PD) is complex, and it is a multifactorial disease, which is largely influenced by genetic, environmental, and microbial factors [23].

Periodontitis is an inflammatory process initiated by bacterial [24]. This is across-sectional study that was conducted among 127 pregnant women in King Salman Armed Forces Hospital in Tabuk region, KSA. The study aimed to investigate changes in periodontium during pregnancy, affect periodontal disease on fetuses, and giving health awareness to pregnant about oral health.

Periodontal disease is a common oral infection with prevalence ranging from 10-60% [25]. Pregnant women have a higher incidence of periodontitis and gingivitis compared with their non-pregnant counterparts and the prevalence rates vary between 36% and 100% [26]. In accordance with this, our study found that 69.3% of cases had symptoms of periodontitis. Another study was conducted among 924 pregnant women reported that the prevalence of periodontitis was 43% [27], which was less than our findings. In Brazil, another study carried out among pregnant women sample, in which the prevalence of periodontitis was (47%) [8]. However, Other South American study reported a lower prevalence of PD of 29.85% in the pregnant Chilean population [18]. In Khartoum, Sudan, a cross-sectional study was conducted among 404 pregnant women reported; 24.0% of these 404 women had periodontitis [28]. In Jordan, another study reported a slightly higher prevalence (31%) of periodontal disease was documented in pregnant women [29]. In India, Govindasamy et al. recently reported that over half (54.8%) of postpartum women had periodontal diseases [30], which was nears to our results. In Mali, West Africa, another study was carried out among 74 pregnant women reported; 49% of cases diagnosed with periodontitis [31].

**Table 1. Sociodemographic data of the participants, KSA, 2020 (N=127)**

Parameter	Frequency	Percent
Age		
• 21 – 30 years	39	30.7%
• 31 – 40 years	65	51.2%
• 41 < years	23	18.1%
Mean±S.D.	35.2±6.7	
Religion		
• Muslim	126	99.2%
• Christian	1	0.8%
Marital status		
• Married	123	96.9%
• Divorced	2	1.6%
• Widowed	2	1.6%
Educational level		
• Primary education or illiterate	6	4.8%
• Elementary education	2	1.6%
• Secondary education	29	22.8%
• University degree or more	90	70.9%
Number of children		
• One	17	13.4%
• Two	28	22.0%
• More	82	64.6%
Employment		
• Employed	52	40.9%
• Unemployed	71	55.9%
• Retired	4	3.1%

**Table 2. Practice of participants & symptoms of periodontitis, KSA, 2020 (N=127)**

Parameter	Frequency	Percent
Brushing daily		
• Yes	88	69.3%
• No	39	30.7%
Gum bleeding while brushing		
• Yes	57	44.9%
• No	28	22.0%
• Sometimes	42	33.1%
Changes in the gum		
• Redness	16	12.6%
• Swelling	14	11.0%
• Offensive odor	25	19.7%
• All of the above	27	21.3%
• No changes	45	35.4%
Changes usually occur		
• During pregnancy	56	44.1%
• Normally	39	30.7%
• No changes	32	25.2%
Visiting a dental clinic		
• Yes	103	81.1%
• No	24	18.9%
Frequency of dental clinic visits		
• Once a year	36	28.3%
• Twice a year	20	15.7%
• More than two times a year	29	22.8%
• Less than two times a year	54	42.5%
Symptoms of periodontitis		
• Yes	88	69.3%
• No	39	30.7%

**Table 3. Symptoms in the gum associated with pregnancy, KSA, 2020 (N=127)**

Parameter	Frequency	Percent
Bleeding per gum during pregnancy		
• Yes	72	56.7%
• No	55	43.3%
Gum swelling during pregnancy		
• Yes	57	44.9%
• No	70	55.1%
Offensive odor from the mouth during pregnancy		
• Yes	52	40.9%
• No	24	18.9%
Taking medications for these symptoms		
• Yes	36	28.3%
• No	91	71.7%
Symptoms appear in ...		
• The first stage of pregnancy	45	35.4%
• The second stage of pregnancy	37	29.1%
• The third stage of pregnancy	45	35.4%
Most prominent symptoms during pregnancy		
• Pain and bleeding	26	20.5%
• Swelling	34	26.8%
• Pain, bleeding & swelling	24	18.9%
• Offensive odor	33	26.0%
• All of the above	10	7.9%
Child-related difficulties		
• Yes	29	22.8%
• No	98	77.2%
If yes, the difficulty was ... (N=29)		
• Early delivery	7	5.5%
• Low birth weight	4	3.1%
• Others	18	14.1%
Same difficulty in other children (N=29)		
• Yes	6	20.7%
• No	23	79.3%
Prognosis of gum symptoms post-partum		
• Good prognosis	81	63.8%
• Bad prognosis	6	4.7%
• No changes	40	31.5%

**Table 4. Participants' attitude towards periodontitis with pregnancy, KSA, 2020 (N=127)**

Parameter	Frequency	Percent
Do you believe that periodontitis is normal in pregnancy?		
• Yes	103	81.1%
• No	24	18.9%
Do you need to visit a dentist for periodontitis during pregnancy?		
• Yes	97	76.4%
• No	30	23.6%
During pregnancy, did you visit a dentist for oral hygiene?		
• Yes	28	22.0%
• No	99	78.0%
During pregnancy, do you visit the dentist regularly?		
• Yes	16	12.6%
• No	111	87.4%
Importance of visiting a dentist during pregnancy		
• Very important	61	48.0%
• Important	59	46.5%
• Unimportant	7	5.5%

**Table 5. Correlation between participants' demographics, brushing habits, dental visits, and symptoms of periodontitis, KSA, 2020 (N=127)**

Parameter		Symptoms of periodontitis		P-value
		Yes	No	
Age groups	21 – 30 years	26.1%	31.4%	0.118
	31 – 40 years	58.0%	52.9%	
	41 < years	15.9%	15.7%	
Marital status	Married	97.7%	96.1%	0.784
	Divorced	1.1%	2.0%	
	Widowed	2.0%	1.1%	
Educational level	Primary education or illiterate	5.7%	3.9%	0.209
	Elementary education	1.1%	2.0%	
	Secondary education	22.7%	26.5%	
	University degree or more	70.5%	67.6%	
Employment	Employed	43.2%	37.3%	0.199
	Unemployed	52.3%	59.8%	
	Retired	4.5%	2.9%	
Number of children	One	12.5%	10.8%	0.453
	Two	23.9%	22.5%	
	More	63.6%	66.7%	
Brushing daily	Yes	70.5%	71.6%	0.486
	No	29.5%	28.4%	
Visiting dental clinic during pregnancy	Yes	27.3%	22.5%	0.099
	No	72.7%	77.5%	

*P-value is calculated by Chi-Square Test*

According to the relation between participants demographics, brushing habits, dental visits and symptoms of periodontitis, our study found that there were no significant correlations between symptoms of periodontitis and all variables like; age group (p=0.118), marital status (p=0.784), educational level (p=0.209), employment (p=0.199), number of children (p=0.453), brushing daily (p=0.486) and visiting dental clinic during pregnancy (p= 0.099). In contrast to our results, another study found an association between periodontitis with higher gestational age, increased maternal age, poor oral hygiene (p<0.05) and there was no significant association between periodontitis and BMI [27]. Similar to our findings, another study reported; age, education, and brushing were not associated with periodontitis, but lower gestational age was associated with periodontal disease P= 0.011) [28]. In Bangladesh, another study reported; older age, a lower level of education, and unemployment were factors associated with periodontal disease in pregnant women [32]. A previous study showed that age (over 30 years) and high parity were associated with periodontal disease during pregnancy [33]. Also, In Uganda higher maternal age and parity were reported to be associated with periodontal disease during pregnancy [34]. In Northern Tanzania, another study found that women aged 36 to 46 years had 2.1-times higher odds of periodontal disease compared with the youngest

group (18 to 25 years) (p=0.001) and there was no association with the level of education, BMI and marital status (p>0.05) [35].

Regarding the practice of participants, we found that the majority of 69.3% brushing daily. 44.9% had gum bleeding while brushing, 81.1% of cases had visited a dental clinic and 42.5% visited the clinic less than two times a year. In Sudan, another study reported; 62.6% of cases brushing twice daily, 19.3% more than twice per day, and 18.1% brushing only once daily [28]. Another study was carried out among 415 pregnant women reported; 66% of cases brushing once daily and 34% more than twice daily. Only 36.6% have previous dental visits [36].

In Brazil, another study reported; in relation to the frequency of brushing, it can be seen that 55% brushed three times a day, while 35% brushed twice and 10% reported brushing more than three times a day. In terms of flossing, 49% reported doing so up to three times a day, while 48% reported once a day [37]. Moreover, another study reported; 99% indicated they brushed their teeth at least once a day or more. Almost 80% of the women indicated they used toothpaste and a toothbrush to clean their teeth and 81% said they had never had a dental or oral exam performed by a dental professional [31]. Another study reported that nearly all participants reported teeth

cleaning, most only once per day while the majority of participants (88%) had never visited a dentist [38].

As regards symptoms of periodontitis associated with pregnancy, our study reported that 56.7% had Bleeding per gum, 44.9% had gum swelling and 40.9% had an offensive odor from the mouth. Another study found that the majority of cases 88% had Gingival bleeding while in 12% no bleeding was observed in any region [37]. Another study carried out among 334 pregnant women, symptoms reported from cases with peritonitis were 73.2% had gingival bleeding followed by 48,6% for breaths through the mouth and 37.6% had offensive odor [39]. Moimaz et al. found that 67.06% of the pregnant women presented bleeding per gum [40]. However, in another study by Moimaz et al. only 15% of the women presented bleeding [41]. In Zambia, another study reported; the prevalence of self-reported periodontal problems included bleeding gums (23.2%), painful gums (15.9%), swollen gums (11.0%), reddish gums (10.5%), and tooth mobility (3.4%) [42].

As regards Participants attitude towards periodontitis with pregnancy, ours study reported; the majority of cases 81.1%believe that periodontitis is normal in pregnancy, 76.4% said that they need to visit a dentist for periodontitis during pregnancy, only 22%visit a dentist for oral hygiene, 12.6%visit the dentist regularly and 48% think that visiting a dentist during pregnancy is very important. In Sudan, across a sectional study carried out among 384 pregnant women found that 21% had a positive attitude, only 20% of the sample planned to visit a dentist and 26.2% said that pregnancy affected their attitude towards oral health [43].

## 5. CONCLUSION

The study concluded that the majority of pregnant women cases had periodontitis and there was on significant association found with different variables like age, educational level, marital status. Also, there was good practice and attitude toward pregnancy-associated periodontitis.

## DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and

producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

## CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline participant consent and ethical approval has been collected and preserved by the authors. The questionnaire contains a brief introduction to explain the aim of the study to the participant mothers. Participants were informed that participation is completely voluntary. No names were recorded on the questionnaires. All questionnaires were kept safe.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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