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## **Assessment of knowledge, attitude and behavior of pregnant women in Pakistan towards oral hygiene - A cross-sectional study**

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### **Abstract**

Studies have shown that there is higher incidence of gingival inflammation in pregnant women than non-pregnant women. At the time of pregnancy, the woman is relatively immune compromised, resulting in their higher susceptibility to dental pathology. Periodontal disease is also been associated with risk of adverse pregnancy outcome. Poor oral hygiene condition and less knowledge of oral health care of mother has been seen to be directly associated with the newborn oral health.

The aim of this survey is to assess pregnant women's oral hygiene status, self-care oral hygiene practice, oral belief and knowledge about oral problems in a low income setting in Pakistan.

A cross sectional survey was conducted. Questionnaires were administered in maternal ward waiting area. A questionnaire was designed to assess pregnant women oral health behavior, their beliefs and knowledge about pregnancy in relation to oral health care. 180 women have participated in this survey. After they completed the questionnaire they undergone oral examination.

The mean age of the participants was 28 years, out of which 50 % were in their third trimester. 77 % of women used tooth brush and 47% of women brushed their teeth twice a day. 49 % of women never went to dentist and only 13 % went to dentist during pregnancy. 88 % of women did not know what is dental plaque but 62 % believed that tooth brush is effective means in reducing mouth debris. Surprisingly 80 % of women did not believe that there exists a causal relationship between pregnancy and oral health. 42 % of women were using betel nut during pregnancy.

On the examination, the mean score of DMF was found to be 3 and 84 % of women were found to have bleeding in their lower incisor. We found an association between monthly income and dental visits, use of betel nut, bleeding and presence of stains, Whereas education was found to be associated with cleaning type use, dental visit and knowledge.

Economical status and educational background are one factor influencing the utilization of dental care during pregnancy. In addition, lack of practice standard and persistent myths on effects of dental care on pregnancy and concern about fetus safety can be one of factor causing pregnant women to avoid treatment and dental checkups. Nevertheless, pregnancy is the best time, when women can be motivated to have healthy changes. For this physicians and obstrecians, should to address women oral problem when they come on regular check up during pregnancy and refer to a dentist.

**Keywords:** Pregnancy; oral hygiene; dental care utilization, self-rated oral health, socio-demographic factors in Pakistan.

## **INTRODUCTION**

It has been seen that hormonal level changes during pregnancy, puberty and menstruation have been associated with development of periodontal disease. Normal hormonal cycle has found to change bacteria anaerobes, it results in ulceration of the gingivae and the subsequent entry of bacterial products, hydrolytic enzymes and peptidoglycan fragments into the systemic circulation which in turn leads to periodontitis. The systemic response is detected by increased levels of serum antibodies and biological mediators [1].

A systemic review of 27 studies (15 case control, 8 cohort and 4 controlled trials) has demonstrated that pregnant women's oral hygiene can have an effect on pregnancy outcomes. Heavy oral microbial load and maternal periodontitis can cause obstetrical complication that includes low birth weight, preterm birth and preeclampsia. Periodontitis and inflammatory reaction can lead to increase in systemic cytokines, prostaglandins, interleukin and bacteria products [2,3]. This can lead to cardiovascular disease, osteoporosis, adverse pregnancy outcome and other conditions. Women with low birth weight and preterm deliveries have been found to have worse periodontal disease, as compared to women that had normal deliveries [4,5]. Preeclampsia is also linked independently to periodontal disease, caused by oral pathogens that inflame placenta leading to preeclampsia and oxidative stress [5,6].

Preterm or premature birth is defined by the WHO as delivery of an infant before 37 completed weeks of gestation. It affects 12-13% of pregnancy in United States and 5-9 % in Europe and developed countries. It is still the number one cause of neonatal death. Infection has been known to be associated with preterm and low birth weight [2,4]. Low birth weight is defined as a weight of less than 2500 g [7].

Periodontitis produces mediators, which may have a role in labour onset. It is also seen that pregnancy of a women with bacterial vaginosis, who have short cervix also could result in delivering preterm baby. Therefore maternal periodontitis along with other maternal risk factors could induce preterm birth [8]. It has been also seen that levels of *Lactobacillus casei* in maternal

saliva could help to predict infant birth weight and gestational age at delivery [9].

Periodontitis and genitourinary infection are caused by gram negative bacteria. These cause elevation of systemic Prostaglandin E2 and Tumour Necrosis Factor. Periodontal pathogens like *Porphyromonas gingivalis*, *Treponema denticola* and *Tannerella forsythia* are found higher in mothers of preterm born babies [10]. *P. gingivalis*, a consensus pathogen in periodontal disease, has been detected in amniotic fluid from women identified as having threatened premature labour [11]. A study has also found that periodontopathic bacteria like *Lactobacillus* in maternal saliva may cause preterm labour by reaching bloodstream leading to inflammatory cascade. They may be present after a simple dental procedure or during the normal mastication and it can reach placenta tissue by haematogenous spread.

Studies have shown that there is higher incidence of gingival inflammation in pregnant women than non-pregnant women [12]. During pregnancy, women are relatively immuno-compromised, resulting in their higher susceptibility to oral infections [13]. Age, poor education, and unemployment can increase the extent of disease [6].

This is caused by an increase in oestrogen, progesterone and estradiol levels, which affect periodontal micro-vasculature. This results in gingival inflammation, oedema and tooth sensitivity [5]. Bacteria in plaque like *Porphyromonas intermedia* feed on estradiol causing their colonies to flourish during pregnancy [14]. For this reason, bleeding gums are more common during pregnancy, and hyperemesis causes erosion of the enamel. During pregnancy, benign pedunculated lesions of gingiva can also arise.

Attempts are made to focus on pregnant women's dental health care in their pregnancy, as studies have shown that women attend health centres more often during this time [15]. It is an opportunity to improve mother's oral health and the well being of infants, children and

adolescent. To improve her supportive function, primary focus should be on the mother and the child, rather than the child alone; and to focus intervention before the child is born [16]. Studies has shown that educating women can prevent nursing bottle caries in infants and children, which can be caused by unlimited bottle feeding [17].

Another oral health condition prevalent in pregnancy is bad mouth breath. It can affect the individual by social isolation, frustration, personal discomfort and depression [18].

Oral diseases like periodontitis and gingivitis are both preventable and treatable. Removing plaque by brushing, flossing and professional prophylaxis intervention like scaling and root planning can easily control them. Incidence of preterm and low birth weight babies might be reduced when periodontal status of the pregnant woman is good prior to 28 weeks of gestation.

Common reasons given by patients for not utilizing care include lack of funding and insurance coverage, safety concern, and lack of their own realization, for need to seek regular dental care [19]. No research has been done about women's understanding of dental hygiene and whether pregnant women understand current oral hygiene strategies [20].

### **Material and Method**

A cross sectional survey using a self-assessment questionnaire was done, followed by a clinical dental exam. The study population included pregnant women attending hospital to consult gaenocologist. The aim was to target 200 pregnant women using a convenient sampling for the survey and all participants were invited for free dental check up where the dental exam took place.

The Bage Halar Maternity hospital in Karachi, Pakistan was selected for this study as it is located in low income area is run by the group of trustees of Halari community. Consultation and delivery fees are very nominal and free treatment is provided to patients who cannot afford their service. The hospital has 3 wards for pregnant/delivering women (60 beds), with about 9 deliveries/day (altogether over 2500 deliveries/year). In addition, the hospital has an outpatient clinic, which, on average accommodates about 278 pregnant women visit per week.

Questions were developed in English and were translated into Urdu by an expert translator. Patients who were unable to read/write were provided with the necessary help to fill the questionnaire.

Two female dental students and one female dental assistant were hired to collect the data. They were trained before data collection so as to avoid inter-examiner bias. The data collection for the study was carried from 29th August 2011 to 3rd November 2011.

Participants were invited to receive an oral examination by a dentist and a female dental assistant was hired, so that patient feels comfortable in the room. Dental examinations were conducted at the same hospital facilities using overhead light, dental mirrors, and Community Periodontal Index probes. To estimate the dental caries, full mouth recording of 32 teeth were examined with the help CPI probe and it was measured in DMF scale. That included **decayed teeth**; all teeth, which were decayed from any surface, were marked as one. It could include severe caries or open cavities as well as minor cavities and was summed for every individual patient. **Filled** and **Missing teeth** were also noted to calculate DMF score. To assess the periodontal condition, Community periodontal index (WHO 1997) was used. In this index six index teeth are measured, if one of them is missing, then next tooth is taken for recording using CPI probe (William probe). It is a diagnostic instrument; specially designed to take periodontal measurements. It has 0.5mm diameter ball on tip, with black bands between 3.5 and 5.5 mm and a second marking between 8.5 mm to 11.5 mm. It was probed and rotated around the sulcus parallel to each tooth, to check bleeding, calculus and measurement were recorded for pocket dept . Coding was given by examining one tooth in each sextant. If they are healthy (code 0), gingival bleeding (code 1), dental calculus (code 2), periodontal pocket with depth 3.5-5.5 mm (code 3) and periodontal pocket with dept 6 mm or deeper (code 4). Preferred tooth examine in each sextant were upper and lower molar, first right and first left incisor of maxilla and mandible respectively. According to code, treatment need was indicated, as code 0 regarded as healthy periodontal, Code 1 need oral hygiene instruction (TN1), code 2 and code 3 needed professional scaling (Tn2). Whereas code 4 were regarded as complex treatment need. Stains were recorded, if they present on incisor or molar, as yes or no. That includes stains of tea and betel nut.

**Results**

The age of the sample ranges from 18 to 40 years with a mean age of 26 years. 30% of the women were in their first pregnancy at the time of this study.

From the total sample only 7 % of women were employed. Based on questioning, 26 % had a monthly household income less than 100 dollar (1 dollar= Pak Rupees 86), and 30 % of them had less than US \$150 per month. Only 40% of the participants had completed their university education, whereas 32 % had secondary education. 28% had neither completed primary education nor had no education at all. Table 1 Shows details of the demographics of the population.

**Table 1** : Socio-demographic profiles of pregnant mothers

Demographic Variable	Frequency	%	Demographic Variable	Frequency	%
<b>Age</b>			<b>Job or house wife status</b>		
18 - 24	70	38,9	House wife	168	93,3
25 - 31	83	46,1	Employment	12	6,7
32 - onwards	27	15	<b>Education Level</b>		
			No Education + less than high school	51	28,3
			High School education	57	31,7
			University and Masters Education	72	40
<b>Marital Status</b>					
Married	117	98,3			
Unmarried	1	0,6			
Separate	2	1,1			
<b>Monthly House Income In Rupees</b>					
3000-7999	41	22,8			
8000-11999	47	26,1			
12000-15999	36	20			
16000- onwards	31	17,2			

77 % of women used toothbrush, 5 % used miswak and 10% used both to clean their teeth. 10% of women used both miswak and toothbrush. 7 % of women reported using only finger to clean their teeth. The frequency of cleaning was once (48%), twice (47%) and three times or more per day (3%). There was a positive correlation between education and frequency of tooth brushing. Only 15 % of the participants reported mouth rinse and only 4 % used dental floss. 68 %

answered that they had occasionally experienced bad breath. These results are summarized in Tables 2, 3 and 4.

**Table 2** : Oral health Behavior of pregnant mothers

Oral Hygiene Behavior	Frequency	%	Oral Hygiene Behavior	Frequency	%
<b>How much time do you spend each day cleaning your teeth?</b>			<b>Other dental hygiene devices do you use?</b>		
Less than 1 minute	39	21,7	Dental floss	7	3,9
More than 1 minute	61	33,9	Mouth rinses	28	15,6
More than 2 minutes	43	23,9	Interdentally brushes	21	11,7
More than 3 minutes	11	6,1	other	2	1,1
More than 4 minutes	11	6,1	none	122	67,8
More than 5 minutes	15	8,3	<b>Do you visit the dentist?</b>		
<b>How often do you clean your teeth?</b>			Every six month	9	5
Once daily	87	48,3	Every year	7	3,9
Twice daily	85	47,2	When I have problem	75	41,7
Three or more times a day	5	2,8	I have never been to a dentist	89	49,4
Weekly, but not daily	3	1,7	<b>Did you get Tooth brushing instructions from a dentist?</b>		
<b>Type of oral cleaning device?</b>			no	132	73,3
Toothbrush	139	77,2	yes	48	26,7
Miswak	9	5			
Both toothbrush and miswak	19	10,6			
Finger	12	6,7			
None	1	0,6			



**Table 3:** Perceived oral health and belief of Pregnant mothers

Oral Hygiene Belief	Frequency	%	Oral Hygiene Belief	Frequency	%
<b>Is tooth-cleaning technique is effective?</b>			<b>Do your gums bleed when you clean your teeth?</b>		
Yes, 100% effective	93	51,7	Always	21	11,7
Maybe	79	43,9	Sometimes	90	50,0
No	8	4,4	Never	69	38,3
<b>Quality of your breath?</b>			<b>how would you rate the amount of bleeding?</b>		
Always have bad breath	5	2,8	Slight bleeding	86	47,8
Never have bad breath	52	28,9	Moderate bleeding	17	9,4
Sometimes have bad breath	123	68,3	Heavy bleeding	8	4,4
<b>Rate you overall oral hygiene status?</b>			Not applicable		
Excellent	40	22,2	<b>Why do you think that your gums bleed?</b>		
Good	58	32,2	Accumulation of bacteria	16	8,9
Fair (average)	66	36,7	Accumulation of food	35	19,4
Poor	16	8,9	Poor brushing technique	34	18,9
<b>Most important reason of toothbrushing?</b>			Poor flossing technique	1	0,6
To keep mouth fresh	53	29,4	<b>Why do you think that your gums bleed?</b>		
To prevent Dental caries	105	58,3	Brushing too hard	31	17,2
To have good smile	22	12,2	Its normal for gums to bleed	6	3,3
<b>Rate the stains on your teeth?</b>			I don't know	57	31,7
Severe	19	10,6	<b>Rate the level of tooth decay in your mouth?</b>		
Moderate	55	30,6	Severe	17	9,4
Slight	51	28,3	Moderate	40	22,2
No stains	55	30,6	slight	49	27,2
<b>Rate the level of gum disease</b>			No tooth decay	74	41,1
Severe	9	5	<b>Did you ever hear of dental plaque?</b>		
Moderate	45	25	no	159	88
Slight	70	38,9	yes	21	11
No gum disease	56	31,1	<b>Do you notice any redness in your gums?</b>		
<b>How would you rate your overall oral health?</b>			always	11	6
Excellent	38	21	sometimes	74	41
Good	53	29	never	95	52
Fair	74	41	<b>Which of the following is MOST effective in reducing mouth debris, tooth decay?</b>		
Poor	15	8			

Do you experience pain in your mouth?			Toothbrush	112	62,2
Always	8	4	miswak	23	12,8
Sometimes	75	41	Both toothbrush and miswak	43	23,9
Never	97	53	Neither is effective	2	1,1

**Table 4:** Pregnancy status and hygiene behaviors of pregnant mothers

<b>Pregnancy Status and Oral Hygiene Behavior</b>	<b>Frequenc y</b>	<b>%</b>	<b>Pregnancy Status and Oral Hygiene Behavior</b>	<b>Frequency</b>	<b>%</b>
<b>What is your Pregnancy Month?</b>			<b>Have you seen dentist during this pregnancy?</b>		
1-3 month	39	21,7	no	155	86,3
4-6 month	55	30,6	yes	26	13,7
7-9 month	86	47,8	<b>If "Yes" please state the reason why?</b>		
<b>Is this your First child?</b>			For a routine check-up	8	4,4
1	54	30	Because you had toothache or gum problem	12	6,7
2	67	37,2	For planned treatment	1	0,6
3	28	15,6	For cleaning	5	2,8
4	20	11,1	not applicable	154	85,6
5	5	2,8	<b>Are you planning to see dentist soon?</b>		
6	1	0,6	no	117	65
7	3	1,7	yes	62	34,4
8	1	0,6	<b>State the reason I do not think I need to</b>		
9	1	0,6	I have no time	44	24,4
<b>Have you had problems with your gums during your pregnancy?</b>			Its expensive	36	20
No	128	71,1	I am afraid of going to dentists	38	21,1
Yes	52	28,9	not applicable	61	33,9
<b>Have you got any instructions for dental care during pregnancy?</b>					

No	155	86,1	<b>Do you consume pan following before pregnancy?</b>		
Yes	26	13,9	no	158	87
<b>Do you consume betelnut following before pregnancy?</b>			yes	22	12
No	92	87	<b>Do you consume betelnut following during pregnancy?</b>		
Yes	88	12	no	104	57
<b>Do you consume pan following during pregnancy?</b>			yes	76	42
No	158	87			
Yes	22	12			
<b>How many natural teeth have you lost?</b>					
0	118	65			
1	33	18			
2	16	8			
3	7	3			
4	3	1			
6	2	1			
8	1	0			

Almost half of all participants included in this study (49%) had never been to the dentist whereas 42% claimed to have visited the dentist only when they experienced tooth related health problems. During the pregnancy, only 13% visited a dentist, the main reason being toothache (7%), whereas 4% visited for a routine checkup and 3% for cleaning. The main reasons given for not visiting the dentist included ‘Time constraint’ in 24%, ‘Cost’ in 20% and ‘Anxiety to dental treatment’ in 21% of participants. Women with higher household income (more than Rs 16000) were more likely to go to the dentist during pregnancy as compared to lower household income. Details of income associations are seen in Table 5.

**Table 5:** Monthly household income associated with variable.

	Lower income < 1600	Higher Income >1600	P- Value
<b>Age</b>			
Mean (SD)	4,924	3,743	0,760 (a)
<b>Educational status</b>			
No Education %	33,9	9,7	
High school %	32,3	19,4	
university and masters %	33,9	71,0	
Mean Rank test	71,72	103,13	0,00 (b)

Type Of Oral Cleaning Device			
<b>Tooth Brush %</b>	73,4	90,3	
<b>Miswak %</b>	5,6	3,2	
<b>Tooth Brush and Miswak %</b>	12,9	3,2	0,043 (c)
<b>Finger %</b>	8,1	0	
<b>None %</b>			
Other Dental Cleaning Device Used			
<b>Dental Floss %</b>	1,6	3,9	
<b>Mouth Rinse %</b>	10,5	12,3	
<b>Interdental Brushes %</b>	12,9	11,6	
<b>Other %</b>	0,8	0,6	0,022 (c)
<b>None %</b>	74,2	71,6	
Did You Visit Dentist During pregnancy?			
<b>No %</b>			
<b>Yes%</b>	90,3	74,2	
	9,7	25,8	0,017 (c)
Use of Betel Nut during Pregnancy			
<b>No %</b>	51,6	77,4	
<b>Yes %</b>	48,4	22,6	0,009 (c)
Use of Pan During Pregnancy			
<b>No %</b>	87,9	87,1	0,903 (c)
<b>Yes %</b>	12,9	12,9	
Bleeding lower incisor			
<b>No %</b>	12,9	29,0	
<b>Yes %</b>	87,1	71,0	0,029 (c)
Stains On Teeth			
<b>No %</b>	43,5	67,7	
<b>Yes %</b>	56,5	32,3	0,016 (c)
DMF Score			
<b>Mean (SD)</b>	3,409	3,424	0,981 (a)

(a) T-test

(b) Mann Whitney test

(c) Chi-square test

## **DISCUSSION**

This study evaluates the oral hygiene status, behavior and belief amongst pregnant women. Results show that socio-economic status and education are directly related to pregnant women's oral hygiene practices and belief.

Brushing habits were good overall, as 77% women uses tooth brush and 95 % women brush their teeth once or twice per day. It was also seen because of Islamic culture that Miswak is still used in sample size, as 5 % women only used Miswak for cleaning their teeth, whereas 10 % women used it occasionally.

The study also identifies barriers to dental visits during pregnancy. Half of the sample never visited a dentist. As we know that dental treatment is an important part of the prevention and treatment of oral diseases, access and use of dental services are not universal or evenly distributed among the population [21].Affordability also plays an important role in patients not attending dental clinics. It is like the common paradox of health care provision, that those women, who need it most, are less likely to avail it [22]. This was also observed in this study.

This study shows that 42% women were using areca nut during their pregnancy, and some of the women started this habit during pregnancy to overcome nausea in the early months of pregnancy. From cytogenetic studies, it is confirmed that it causes genomic damage to areca nut users [23] and is the single strongest risk factor for oral sub mucous fibrosis [24].

75% women did not agree that pregnancy can increase gingival bleeding. This suggests lack of knowledge and the need for understanding the benefit of using dental service during pregnancy [22]. 86% women never got dental care instruction during pregnancy.

Studies have shown that medical doctors, do not regard oral health care as a part of antenatal care and do not refer pregnant women to dental care [25]. This may be a cause for increasing oral health issues during pregnancy.

The study has shows that economical status and educational background also influence the utilization of dental care during pregnancy. In addition, lack of practice standard and persistent myths on effects of dental care on pregnancy and concern about fetus safety can be one of factor causing pregnant women to avoid treatment and dental checkups. Nevertheless, pregnancy is the

best time, when women can be motivated to have healthy changes. For this physicians and obstrecians, should to address women oral problem when they come on regular check up during pregnancy and refer to a dentist. This will reduce the risk of preterm birth, early childhood caries, bleeding gums and early diagnosis on other oral disease. This is also an important opportunity for dentists to affect a woman's oral health behaviors and use of dental care during and after pregnancy [26]. In order to achieve this close interdisciplinary collaboration between gynecologists, pediatricians, midwives, and dentists inter professional leaning courses is required [27].

In addition, future studies should assess:

- (1) Perception of doctor and dentist in Pakistan, about oral hygiene and pregnancy outcome connection.
- (2) The detail qualitative interview of pregnant women, assessing their perception in utilizing the dental care in Pakistan
- (3) Dental and medical educational interventions and their effects on utilization of dental services during pregnancy.
- (4) Effect of pregnant women, oral hygiene intervention on the children deciduous teeth in Pakistan.

### **Conclusion**

Economical status and educational background are one factor influencing the utilization of dental care during pregnancy. In addition, lack of practice standard and persistent myths on effects of dental care on pregnancy and concern about fetus safety can be one of factor causing pregnant women to avoid treatment and dental checkups. Nevertheless, pregnancy is the best time, when women can be motivated to have healthy changes. For this physicians and obstrecians, should to address women oral problem when they come on regular check up during pregnancy and refer to a dentist.

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### *Authors Column*



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