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Research Article

Dental Caries and Gingivitis in Pregnant Women

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Abstract: The aims of this study were to find occurrence of dental caries and gingivitis among pregnant women and to compare it with those in non-pregnant women. 265 pregnant and 270 non-pregnant women were recruited from Department of Ob –Gy, S. M. S. Method: Medical College Jaipur. Dental caries and gingivitis was defined clinically according to the World Health Organization (WHO) diagnostic criteria. Over 61.5% of pregnant women had caries, and 52.6% had gingivitis. There were significant differences between pregnant and non-pregnant women with regard to dental caries (p=0.0001) and gingivitis (p=0.0008). The pregnant women were 1.97 times more likely to suffer from dental caries (95% confidence intervals (CI), 1.39 – 2.78), and 1.81 times more (95% CI, 1.28 – 2.57) from gingivitis compared to non-pregnant women. Age less than 25 years (Odd ratio 1.8; 95% CI, 1.09 – 3.03), illiteracy (OR, 2.33; 95% CI, 1.40 – 3.86), and rural dwelling (OR, 1.96; 95% CI, 1.18 – 3.26) were significant predictors for dental caries. Predictors for gingivitis were similar to dental caries that is age less than 25 years (Odd ratio 2.22; 95% CI, 1.31 – 3.75), illiteracy (OR, 1.79; 95% CI, 1.07 – 2.99) and rural dwelling (OR, 2.14; 95% CI, 1.27 – 3.59). Poor oral hygiene (OR, 1.57; 95% CI, 0.95 – 2.59), poor attitude (OR, 1.51; 95% CI, 0.91 – 2.49) and poor behavior (OR, 2.03; 95% CI, 1.23 – 3.35) were important risk factors for dental caries. Similarly, inadequate knowledge (OR, 1.67; 95% CI, 1.01 to 2.75), poor oral health attitude (OR, 1.92; 95% CI, 1.15 – 3.22) and poor behavior (OR, 2.01; 95% CI, 1.20 – 3.38) were found to be significant risk factors for gingivitis among pregnant women. In conclusion, dental health awareness programs should be encouraged to improve the dental health of pregnant women.
Keywords: Dental caries, Gingivitis, Pregnant women.

INTRODUCTION

Pregnancy affects nearly every aspect of a woman's life, including her oral health. Hormonal changes in the body during pregnancy make them more susceptible to oral infections and gum diseases. These dental problems not only affect expectant mothers but also the developing baby. Oral cavity is subjected to reversible as well as irreversible changes due to fluctuations in levels of estrogen and progesterone during pregnancy, leading to dilatation and tortuosity of gingival microvasculature, circulatory stasis and increase in oral vasculature permeability along with a decrease in host immunocompetence, thereby increasing susceptibility to oral infections [1, 2].

Dental caries is an infectious microbiologic disease of the teeth that results in localized dissolution and destruction of the calcified tissues [3]. It is the most prevalent dental disease in the world. The prevalence of dental caries has been reported from 44%-60% [4,5].The reported risk factors that affect its occurrence include; age, sex, socioeconomic status, race, geographical location, food habits and oral hygiene practices [4]. Pregnancy increases the risk of dental caries, some studies have suggested that changes in the oral environment during this period may predispose them to an increased incidence of this dental problem [6]. It is believed that increased consumption of carbohydrates, increased acid in the mouth from vomiting, and reduced salivary production and/or increased acidity of saliva combine to raise the risk of dental caries in pregnant women [7].

Published studies have shown that the prevalence rates of gingivitis during pregnancy range between 30 and 100% [8-14]. Reports from the Health Care Centers of Bangkok, Nakornsawan and Yala showed that the prevalence of gingivitis in pregnant women was 98.0%, 86.3% and 98.8%, respectively. The rates of those needing treatment for dental problems such as caries and gingivitis were 86.0%, 97.0%, and 94.8%, respectively [15].

Dental caries continues to be a serious health problem in India. Although several studies have been conducted about the status and prevalence of caries but so far no study has been carried out regarding the distribution of caries and gingivitis in pregnant women of Rajasthan where preventive services are often lacking. The objective of this study was to assess the occurrence of dental caries and gingivitis in the oral cavity of pregnant women and to compare them with those in non-pregnant women, to find predictors of dental caries and gingivitis among sampled women and

to find associations of these with oral hygiene status, dental care knowledge, attitude, and behavior among pregnant women.

MATERIAL AND METHODS

The study was carried out in the department of Obstetrics & Gynaecology, S.M.S. Medical College & M.G. Dental College & Hospital, Jaipur. 265 pregnant women in second trimester attending antenatal OPD and 270 women of reproductive age group who were not pregnant from Gynae. OPD were recruited. Written informed consent was obtained from all subjects who agreed to take part in the study. Prior to a clinical examination, demographic information regarding age, education, occupation, socioeconomic status and residence were obtained from the participants.

Dental caries and gingivitis were defined according to the WHO criteria; 'newly developed cavity' (dental caries) and 'gingival bleeding on probing' (gingivitis). The level of oral hygiene status, dental care knowledge, attitude, and behavior was noted. Data were statistically analysed. A logistical model was applied to calculate the odds ratio (OR) and 95% confidence interval (CI) of risk factors for dental caries and gingivitis. A *p*-value of <0.05 was considered statistically significant. Data were analyzed using the Statistical Package for Social Science (SPSS), software version.

RESULTS

The demographic characteristics of both pregnant and non-pregnant women are presented in Table 1. In the age group below 25 years, 62.6 % were pregnant and 45.2% were non – pregnant. The difference was statistically significant (p value < .0001). The difference between pregnant and non – pregnant women with regard to residence, education and occupation were statistically not significant.

Table 1: Demographic characteristics of women

Characteristics	Pregnant women (N = 265)		Non-pregnant women (N =270)		*p*-value
	Number	(%)	Number	(%)	
Age group (years)					
< 25	166	(62.6)	122	(45.2)	<.0001 Sig
≥ 25	99	(37. 4)	148	(54.8)	
Residence					0.6 ns
Urban	106	(40.0)	114	(42.2)	
Rural	159	(60.0)	156	(57.8)	
Education					
Illiterate	143	(53.9)	160	(59.3)	0.2 ns
Literate	122	(46.1)	110	(40.7)	
Occupation					
Working	100	(37.7)	99	(36.7)	0.8 ns
House wife	165	(62.3)	171	(63.3)	

Sig – significant, ns – not significant

Pregnant women were more likely to have dental caries and gingivitis compared to non-pregnant women. 61.5% pregnant women had dental caries as compared to 44.8% non pregnant women who had dental caries. The difference was statistically significant (p value - .0001). Gingivitis was seen in 66.8% pregnant and 52.6% non pregnant women. Again the result was statistically significant (p value - .0008) (Table 2)

Table 2: Dental diseases by pregnancy status

Dental diseases	Pregnant women (N = 265)		Non-pregnant women (N = 270)		*p*-value
	Number	(%)	Number	(%)	
Caries					Chi sq 14.97
Yes	163	(61.5)	121	(44.8)	df 1
No	102	(38.5)	149	(55.2)	p- value : 0.0001
Gingivitis					Chi sq 11.20
Yes	177	(66.8)	142	(52.6)	df 1
No	88	(33.2)	128	(47.4)	p- value : 0.0008

Table 3 shows occurance of dental caries and gingivitis with different demographic characteristics of pregnant women. Dental caries was more in women who were below 25 years of age (68.1%), resident of

rural area (61.3%), illiterate (61.9%) and housewife (65.1%). Similar results were noted for gingivitis. Gingivitis was also seen more in women who were below 25 years of age (68.9%), resident of rural area (66.1%), illiterate (58.8%) and housewife (69.5%).

Table: 3: Distribution of dental caries and gingivitis according to demographic characteristics

Characteristics	Dental Caries		Gingivitis	
	Yes (N = 163)	No (N = 102)	Yes (N = 177)	No (N = 88)
Age group (years)				
> 25	52 (31.9)	47 (46.1)	55 (31.1)	44 (50.0)
≤ 25	111 (68.1)	55 (53.9)	122 (68.9)	44 (50.0)
Residence				
Urban	55 (38.7)	51 (50.0)	60 (33.9)	46 (52.3)
Rural	108 (61.3)	51 (50.0s)	117 (66.1)	42 (47.7)
Education				
Illiterate	101 (61.9)	42 (38.1)	104 (58.8)	39 (44.3)
Literate	62 (38.1)	60 (41.2)	73 (41.2)	49 (55.7)
Occupation				
Working	57 (34.9)	43 (42.2)	54 (30.5)	46 (52.3)
House wife	106 (65.1)	59 (57.8)	123 (69.5)	42 (47.7)

Predictors of dental caries and gingivitis based on logistic regression analyses are shown in Table 4. We found that pregnant women were approximately 2 times more likely to suffer from dental caries (Odd ratio 1.97; 95% CI, 1.39 – 2.78, p=0.0001) and 1.81 times more likely to suffer from gingivitis (odd ration 1.81; 95% CI, 1.28 – 2.57; p value - .0008) than non pregnant women. Occurrence of dental caries was significantly higher in pregnant women who were below 25 years of age (Odd ratio 1.82; 95% CI 1.09 – 3.03; p value - .02), illiterate (Odd ratio 2.33; 95% CI 1.40 – 3.86; p value - .001) and resident of rural area (Odd ratio 1.96; 95% CI 1.18 – 3.26; p value - .008). There was no significant difference in occurrence of dental caries in house wife and working women (Odd ratio 1.36; 95% CI 0.82 – 2.25; p value - 0.2). Gingivitis was 2.2 times more in pregnant women below 25 years of age (Odd ratio 2.22; 95% CI 1.31 – 3.75; p value - 0.004), illiterate women (Odd ratio 1.79; 95% CI 1.07 – 2.99; p value - 0.02), belonging to rural area (Odd ratio 2.14; 95% CI 1.27 – 3.59; p value - 0.004) and house wife (Odd ratio 2.49; 95% CI 1.47 – 4.22; p value - 0.015)

Table 4: Predictors of dental caries and gingivitis among sampled women

Predictor	Dental caries			Gingivitis		
	OR[a]	(95% CI)[b]	*p*-value	OR	(95% CI)	*p*-value
Pregnancy status						
Non-pregnant women	1	Reference	0.0001	1	Reference	0.0008
Pregnant women	1.97	(1.39 – 2.78)		1.81	(1.28 – 2.57)	
Age group (years)						
> 25	1	Reference	0.02	1	Reference	0.004
≤ 25	1.8	(1.09 – 3.03)		2.22	(1.31 – 3.75)	
Residence						
Urban	1	Reference	0.008	1	Reference	0.004
Rural	1.96	(1.18 – 3.26)		2.14	(1.27 – 3.59)	
Education						
literate	1	Reference	0.001	1	Reference	0.02
Illiterate	2.33	(1.40 – 3.86)		1.79	(1.07 – 2.99)	
Occupation						
working	1	Reference	0.2	1	Reference	0.015
House wife	1.36	(0.82 – 2.25)		2.49	(1.47 – 4.22)	

OR[a]: Odds ratio; 95% CI [b]: 95% confidence interval.

Table 5 shows the relationship of dental caries with oral hygiene status, dental health care knowledge, attitude, and behavior among pregnant women. There was no significant difference in caries between the poor and good oral hygiene groups, pregnant women with poor oral hygiene were 1.5 times (Odd ratio 1.57; 95% CI, 0.95 – 2.59; p value - .07)) more likely to have caries compared with those in the good oral hygiene

group. We found that there was no significant difference in caries between pregnant women with either good or poor attitude (p value - 0 .1) or between women with adequate knowledge or inadequate knowledge (p value – 0.6). However pregnant women who had poor behavior were 2 times (Odd ratio 2.03; 95% CI, 1.23 – 3.35; p value - .005) more at risk of having caries than those with good behavior.

Table 5: Associations of dental caries with oral hygiene status, dental care knowledge, attitude, and behavior among pregnant women

Factors	Dental Caries (n = 163)		No Dental Caries (n =102)		OR[a]	(95% CI)[b]	*p*-value
	Number	(%)	Number	(%)			
Oral hygiene status							
Good	59	(38.4)	48	(47.1)	1	Reference	0.07
Poor	104	(61.6)	54	(52.9)	1.57	(0.95 – 2.59)	
Knowledge							
Good	49	(30.1)	33	(32.4)	1	Reference	0.6
Poor	114	(69.9)	69	(67.6)	1.11	(0.65 – 1.9)	
Attitude							
Good	62	(38.0)	49	(48.0)	1	Reference	0.1
Poor	101	(62.0)	53	(52.0)	1.51	(0.91 – 2.49)	
Behavior							
Good	69	(42.3)	61	(59.8)	1	Reference	0.005
Poor	94	(57.7)	41	(40.2)	2.03	(1.23 – 3.35)	

OR[a]: Odds ratio; 95% CI [b]: 95% confidence interval

Table 6 shows the relationship of gingivitis with oral hygiene status, dental health care knowledge, attitude, and behavior among pregnant women. Those with poor oral hygiene status were 1.5 times (95% CI, 0.92 – 2.66) more likely to have gingivitis compared with those with good oral hygiene status although the difference was not significant (p value - .09). Difference in occurrence of gingivitis between women with inadequate knowledge and adequate knowledge was significant (p value - .005). Similarly occurrence of gingivitis was significantly more with poor attitude (p value – 0.01) and poor behavior (p value – 0.008)

Table 6: Associations of gingivitis with oral hygiene status, dental care knowledge, attitude, and behavior among pregnant women

Factors	Gingivitis (n=177)		No Gingivitis (n=88)		OR[a]	(95% CI)[b]	*p*-value
	Number	(%)	Number	(%)			
Oral hygiene status							
Good	56	(31.6)	37	(42.0)	1	Reference	0.09
Poor	121	(68.4)	51	(58.0)	1.57	(0.92 – 2.66)	
Knowledge							
Good	63	(35.6)	47	(53.4)	1	Reference	0.005
Poor	114	(64.4)	41	(46.6)	1.67	(1.01 to 2.75)	
Attitude							
Good	68	(38.8)	48	(54.5)	1	Reference	0.01
Poor	109	(61.2)	40	(45.5)	1.92	(1.15 – 3.22)	
Behavior							
Good	72	(40.7)	51	(58.0)	1	Reference	0.008
Poor	105	(59.3)	37	(42.0)	2.01	(1.20 – 3.38)	

OR[a]: Odds ratio; 95% CI [b]: 95% confidence interval.

DISCUSSION

Physiologic changes during pregnancy may result in noticeable changes in the oral cavity [15–17]. These changes predispose women to pregnancy gingivitis, benign oral gingival lesions, tooth mobility, tooth erosion, dental caries, and periodontitis. The present study revealed that the rates of dental caries (61.5%) and gingivitis (66.8%) were significantly higher in pregnant than in non-pregnant women {dental caries 44.8% and gingivitis 52.6%}. These findings were consistent with the study done by George A *et al.* [18] and others [19, 20]. Kornman and Loeshe reported that

one-fourth of the women of reproductive age had dental caries, a disease in which dietary carbohydrate is fermented by oral bacteria into acid that de-mineralizes enamel [10]. Pregnant women are at a higher risk of tooth decay for several reasons. The possible causes of caries during pregnancy are: changes in saliva and mouth flora, vomiting, neglected oral hygiene and nutritional changes and inadequate attention to oral health [21].

Similarly women are more likely to develop gingivitis during pregnancy. Gingivitis affects up to 70% of pregnant women. Increases in the rate of both estrogen metabolism by the gingiva and in the synthesis of prostaglandins were found to contribute to the gingival changes observed during pregnancy [22]. Alterations in progesterone and estrogen levels have been shown to affect the immune system and both the rate and pattern of collagen production in the gingiva. Both of these conditions reduce the body's ability to repair and maintain gingival tissues [23, 24].

We also investigated the relationship of caries to risk factors. The results of the present study revealed a higher occurrence of dental caries among these who were housewives (65.1%) than working women (34.9%). A higher occurrence of dental caries was noted among those who were illiterate (61.9%) than those who had educated (38.1%). The high prevalence of dental caries in the low socio-economic status is because of their poor oral hygiene practice, lack of awareness, improper food intake and family status. This finding is similar to the study conducted by Sogi G and Baskar D.J [25]. There is fairly strong evidence for an inverse relationship between socioeconomic status and the prevalence of caries [26-28]. Similar findings were seen for gingivitis, which was more common in housewives (69.5%) and illiterate (58.8%) which is in agreement with the findings of other studies [19, 29-31]. Access to dental care is directly related to income level; the poorest women are least likely to receive dental care.

Poor oral hygiene was related to the increased dental caries and gingivitis score in our study. The literature on the relationship of oral hygiene and caries is controversial because some investigators have concluded that oral hygiene is a risk factor for caries [32] while others find no such association [25]. The inconsistency in these results might be due to different methods that were used to assess oral hygiene in such studies.

CONCLUSION

In conclusion, dental caries and gingivitis were more prevalent among pregnant than non-pregnant women. Those with a poor oral hygiene status, inadequate knowledge of dental health care, and poor dental hygiene practice were two to three times more at risk of developing those dental diseases. Pregnancy is a "teachable" moment when women are motivated to adopt healthy behavior. For women of lower socioeconomic status, pregnancy provides a unique opportunity to obtain dental care. Therefore, women should be offered training in good oral hygiene habits, and community awareness programs should be conducted time to time to increase their awareness regarding dental health.

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