Periodontal health status and adverse pregnancy outcomes among pregnant women in Northern India

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Abstract

Objectives: To assess the oral health status and treatment needs of pregnant women and to correlate periodontal health with adverse pregnancy outcomes like pre-term birth and low birth weight.

Materials and Method: A prospective study was undertaken at General Hospital, Panchkula, Haryana. 223 pregnant women in their third trimester of pregnancy who visited the hospital for routine ante-natal check-up constituted the final sample size. Periodontal status was assessed using CPI Probe. The main outcome measures were gestational age and weight of the new born. Data was analyzed using SPSS package version 13.

Results: Bleeding was the main finding which was present in majority (47.5%) of the study subjects followed by calculus. Maximum no. of subjects (53.8%) with attachment loss belonged to 20-24 year age-group. There was a statistically significant association of probing depths and attachment loss with adverse pregnancy outcomes ($p<0.05$).

Conclusion: There is a significant association between maternal periodontics and pregnancy outcomes in the present study. It is recommended that suitable measures be undertaken by various health organizations to prevent periodontal problems among this particular group.

Keywords: Oral Health, Periodontal Health, Pregnant women, Pre-term birth, Low birth weight

Introduction

Oral Health is an integral part of general health. Physiological conditions such as pregnancy, puberty, menstrual cycle, menopause and non-physiological conditions such as hormonal contraception and hormonal therapy all influence women's oral health.(1) Before the turn of the 20th century a fairly precise description of the gingival change during pregnancy was available. This description suggests that gingival condition in pregnant women should be considered as separate problem from that of simple gingivitis. In addition to generalized gingival changes pregnancy may also increase the prevalence of gingivitis and may cause tumor like growth called "pregnancy tumor" or "Epulis gravidatum" which may occur inter-proximally and usually regress itself after delivery.(2)

The periodontal changes such as pocket formation, increased tooth mobility and loss of attachment may lead to deterioration of oral health and loss of teeth.(3) *"Lose a tooth for every pregnancy"* is a popular notion that suggests that pregnancy causes tooth loss, however there is no medical literature to support this statement.

Preterm birth (PTB) and low birth weight (LBW) are the leading prenatal problems worldwide and have evident public health implications because they are closely related to perinatal mortality and to nearly one half of all serious long-term neurological morbidity.(4) Various maternal factors have been associated with the delivery of preterm birth and low birth weight infants, that include age, height, weight, socioeconomic status, smoking, alcohol consumption, nutritional status and stress. In addition previous complications, maternal hypertension, infection and cervical incompetence may also be important.(5,6) Periodontal infection can increase the level of inflammatory mediators which shortens gestation age leading to low birth weight infants, preterm births, miscarriage and still birth. Hence maternal periodontal infection is emerging as an independent risk factor for preterm delivery and low birth weight.(7) In contrast, several other studies question such an association and attribute it to a mere chance; substantial proof is yet to arise.(8,9)

Haryana is a state with population density of 477 persons/ sq. Km with per capita income of Rupees 67,891. The literacy rate of Haryana state is 69.97%, infant mortality rate is 59% and birth rate is 24.3% and growth rate is 28.43%.(10) Studies regarding oral health status (specially periodontal status) and treatment needs of pregnant women and their pregnancy outcomes are almost non-existent in India, hence the current prospective study has been undertaken -

- To correlate periodontal health status with adverse pregnancy outcomes (preterm birth and low birth weight).

Materials and Method

Study Population: This study was conducted after obtaining ethical clearance from the Institutional Review Board and with prior permission from the Director, Medical Health, Haryana. Written informed consent was taken from each subject before the start of the study. Pregnant women who visited the General Hospital, Panchkula, in their third trimester during nine months of the study were enrolled in the study. Subjects

in the first and second trimester of the pregnancy were excluded from the study. 223 pregnant women in their third trimester constituted the final sample size.

Recording and Diagnosing Criteria: As per the scheduled visits, pregnant women were interviewed and a clinical examination was conducted. The information regarding alcohol consumption, tobacco smoking and post-partum obstetric history (pregnancy outcomes, birth weight and gender of child) were recorded on a structured format by an investigator. The oral cavities were examined using additional artificial light. Periodontal assessments were done using CPI-probes for measuring the pocket depths and attachment loss.

Pregnancy outcome data collection: Gestational age and birth weight of child were chosen as the two main pregnancy outcome characteristics. Estimation of gestational age was calculated on the basis of last menstrual period, ultrasound examinations and other physical parameters. In addition, adverse pregnancy outcome was categorised into outcome categories. Spontaneous birth at less than 37 weeks gestation was considered as PTB and LBW was defined as birth weight less than 2,500 g. Both these categories were evaluated for their association with pocket depths and clinical attachment loss of the mothers.

Examiner calibration and Examination: A single trained examiner (PST) who was calibrated in the department conducted all the examinations. Intra examiner calibration was undertaken by examining 40 subjects followed by their re-examination a week later which resulted in 84% of diagnostic acceptability with a kappa value of 0.82. A well trained assistant was also taken for recording the data. Dental examination was conducted using additional artificial light. A table to place the instruments was placed within easy reach of examiner. The recording assistant was allowed to sit close to the examiner.

Statistical Analysis: The data were analyzed using SPSS package version 13.0. One-way analysis of variance (ANOVA) and Z-test was used to determine differences at the 5 percent significance level ($p<0.05$) whereas proportions were compared by the use of Chi-square test. $P < 0.05$ was selected to denote statistical significance.

Results

The present study was conducted to assess the oral health status and pregnancy outcomes of 223 pregnant women in their third trimester who visited General Hospital, Panchkula, Haryana for their regular follow up till delivery.

Among 223 subjects, majority 53.8% (120) were in the age group of 20-24 years followed by 33.2% (74) in the age group 25-29 years. 82.1% (183) of the subjects were unemployed and resided at homes only. Among a total of 223 subjects only 44.8% (100) of the subjects were having their first pregnancy and 39.9% (89) were having their second pregnancy (Table 1). All the study subjects were not involved in any of the deleterious habits like alcohol consumption, tobacco smoking and chewing.

Periodontal Status: Fig. 1, illustrates the periodontal health status of the study population. Shallow pockets were present in 4.5% of the subjects. Bleeding was the main finding which was present in majority (47.5%) of the study subjects followed by calculus present in 24.2% of the study subjects. Maximum no. of subjects (53.8%) with attachment loss belonged to 20-24 year age-group and 63.6% of the subjects with attachment loss of 4-5mm also belonged to 20-24 year age-group (Table 2). Loss of attachment was non-significant in relation to the age of study subjects ($p>0.05$).

Pregnancy outcomes and periodontal health: Table 3 demonstrates periodontal data for the subjects that gave birth to low birth weight babies and those who did not and those experiencing pre-term and normal-term deliveries in terms of CPI Index. There were statistically significant differences in the periodontal variables with the normal birth and low birth weight group ($p<0.05$). Normal-term group demonstrated a statistically significant difference in periodontal parameters when compared with the pre-term group ($p<0.05$). However there was higher percentage of subjects with bleeding and with pocket depth of 4-5mm in the normal-term group as compared to the pre-term group.

Table 4 demonstrates the attachment loss of the study population that gave birth to low birth weight babies and those who did not and those having pre-term and normal-term deliveries of their children. Loss of attachment was more significant in case of low-birth weight group as compared to normal-weight group ($p<0.05$). Normal-term group also experienced significant losses in the attachment level when compared with the pre-term group ($p<0.05$). There was comparatively higher percentage of subjects with attachment loss of 4-5mm who experienced a low birth weight.

Table 1: Distribution of subjects according to the status of gravidity

Gravidity	N	%
1st child	100	44.8
2nd child	89	39.9
3rd child	26	11.7
4th child	08	3.6
Total	223	100.0

N= No. of study subjects

Table 2: Age wise distribution of subjects according to loss of attachment

Age Groups	Loss Of Attachment								Total	
	0-3 mm Loss		4-5 mm Loss		6-8 mm Loss		9-11 mm Loss			
	%age	N	%age	N	%age	N	%age	N		
<20yrs	5.6	10	0.0	00	0.0	00	0.0	00	4.5	10
20-24 years	51.7	93	63.6	21	57.1	04	66.7	02	53.8	120
25-29yrs	35.0	63	21.2	07	42.9	03	33.3	01	33.2	74
30-34yrs	7.2	13	21.1	04	0.0	00	0.0	00	7.6	17
>=35yrs	0.6	01	3.0	01	0.0	00	0.0	00	0.9	02
Total	100.0	180	100.0	33	100.0	07	100.0	03	100.0	223

N= No. of subjects

Table 3: CPI Index of subjects that experienced a low birth weight and those who did not and for those having pre-tern and those who do not

Birth Weight and Gestational age	Healthy		Bleeding		Calculus		4-5mm Pocket		6mm or More Pocket	
	%age	N	%age	N	%age	N	%age	N	%age	N
Normal Weight	26.7	31	44.8	52	23.2	27	4.3	5	0.8	1
Low Birth Weight	16.8	18	50.4	54	25.2	27	4.6	5	2.8	3
p-value	0.036		0.025		0.043		0.012		0.023	
Normal Term	23	47	49.7	102	23	47	3.9	8	0.4	1
Pre-Term	11.2	2	22.3	04	38.9	7	11.2	2	16.7	03
p-value	0.031		0.015		0.023		0.036		0.045	

Table 4: Attachment loss of subjects experienced a low birth weight and those who did not and for those having pre-tern and those who do not

Birth Weight and Gestational age	0-3mm Loss		4-5mm Loss		6-8mm Loss		9-11mm Loss	
	%age	N	%age	N	%age	N	%age	N
Normal Weight	55.0	99	39.4	13	42.9	3	33.3	1
Low Birth Weight	45.0	81	60.6	20	57.1	04	66.7	2
p-value	0.029		0.033		0.046		0.017	
Normal Term	83.41	171	13.17	27	2.4	05	0.97	2
Pre-Term	50.0	9	33.34	6	11.12	02	5.56	1
p-value	0.042		0.027		0.038		0.021	

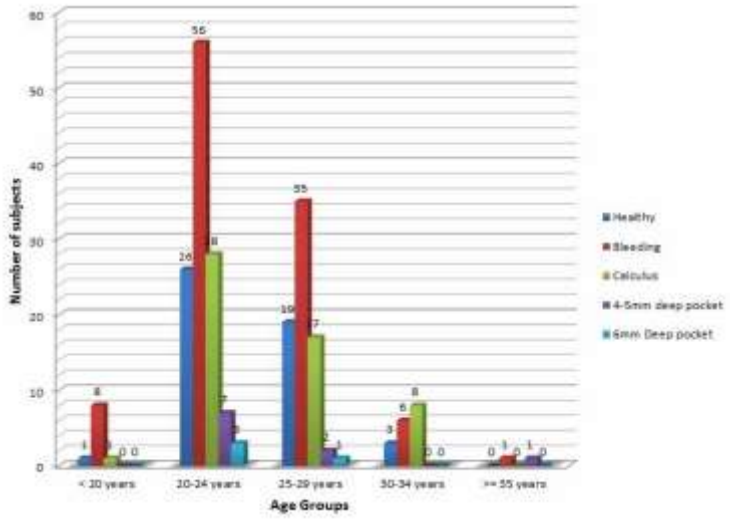

Fig. 1

Discussion

The present study was carried out to assess the oral health status and pregnancy outcomes of pregnant women in their third trimester who visited maternity ward of General Hospital Sector 6, Panchkula. A total of 223 subjects constituted the final sample size and were examined.

87% of the subjects belong to 20 to 29 years of age. As early 20's is the marriageable age of females this result correlates to the legal marriage age of the girls in India.[11] In the study 82.1% of women were found to be unemployed which is similar to some other study findings.[12] This can be attributed to the fact that in country like India, women still are thought to be caretaker and men are considered to be bread earner of the family. Low socio-demographic characteristics can have a detrimental effect on the periodontal health of the individuals.[13]

15% of the pregnant women were in 3rd and 4th gravida. This reflects on the failure of the family welfare programs and the other reason could be infant and child mortality.[14] Health care programmes should concentrate more on educating young people, providing financial support, creating awareness and counselling households with married adolescent women.

Only 8.1% of study subjects delivered preterm. The possible reason behind this may be because of the fact that 44.8% of subjects were in there 1st gravidity, hence were free of previous pregnancy related risk factors, and all the subjects who participated in the study were free of alcohol, smoking tobacco and chewing tobacco which are major risk factors for pregnancy failure in the Western world. Similar findings were reported in another study.[15]

The percentage of subjects having calculus and shallow pockets in the present study is less as compared to findings to some other study.[16] Advanced attachment loss was low in the all the age-groups in the present study population which is congruence with some other study findings.[17]

The incidence of LBW in the present study is much higher as compared to the results of a study conducted on Spanish population.[18] This could be due to various social, economic and biological variables which are the main contributing factors towards LBW in India.[19] But the periodontal status of pregnant women in the above Spanish study did not show any association with adverse pregnancy outcomes; which is not in agreement with the present study. 91.9% of pregnant women had normal term delivery in the present study, which is found to be similar to that reported by Gursoy et al[20] and Moore et al.[9] There was a significant associations of periodontal infection with PTB and LBW in the present study. This finding is similar to another study conducted in Madagascar in which there was a strong association between periodontitis and PTB and LBW ($P<0.001$).[21] Bleeding on probing was significantly greater in women with LBW in the present study and another study conducted on Caucasian pregnant women.[22]

Conclusion

The present study highlights the oral health status and relation of various periodontal variables with adverse pregnancy outcomes. The present study showed that there is a significant association between maternal periodontal foci of infection in third trimester and adverse pregnancy outcomes like pre-term birth and low birth weight. Measures can be taken from Government, Professional Organizations and Dental Institution to screen and identify pregnant women with early and late periodontal problems and suitable interceptive measures can be taken up.

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