

Knowledge, attitude and practice of oral and periodontal care among pregnant women – A cross sectional study¹Dr Kamakshi Gupta, ²Dr Neetika Datta, ³Dr Navneet Kaur, ⁴Dr Gurpreet Kaur¹⁻⁴National Dental College and Hospital, Derabassi Mohali (Punjab) India**Corresponding Author:** Dr Neetika Datta, National Dental College and Hospital, Derabassi, Mohali, Punjab, India**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Abstract**

Background: There is plenty of literature suggesting the correlation between oral and periodontal health status and pregnancy in females. Conditions like periodontal diseases can result in premature delivery, low weight birth babies, still birth and pre- eclampsia. Awareness regarding Oral and Periodontal health care among pregnant women will result in improved oral health practices among mothers and new born.

Aim & Objective: To assess the knowledge, attitude and practice of oral and periodontal care among pregnant women

Materials and Methods: A descriptive cross-sectional study design was conducted on 200 pregnant women. The study was a self-administered questionnaire based survey consisting of 26 questions related to demographic analysis in the first domain and a structured interview questionnaire was used; included part A: assessment of knowledge about oral and periodontal health, part B: included pregnant women attitude toward oral and periodontal health, part C: reported practices of oral and periodontal health. During the study every pregnant female was provided with supplements of folic acid and calcium. Data were analysed by multiple logistic regression analysis using SPSS software 20.

Results: In referral to personal characteristics of the participated pregnant women, about three fourth of them were aged ≤ 30 years. The education of 64 (32.4%) pregnant ladies was primary, 82 (41.6%) pregnant ladies had secondary education while 51 (25.6%) pregnant ladies had graduate/post graduate education. Participants agreed positively to the statement stating that the foetus is absorbing calcium from mothers body resulting in weak tooth structure and education of the ladies ($p < 0.05$). When asked about their daily brushing habit the results showed that there was statistical significant difference in practice score based on education level.

Conclusion: The study demonstrate poor level of oral health knowledge and attitude, the results have clearly revealed that women lack the knowledge of proper oral hygiene, periodontal disease and its effect on pregnancy outcomes. Thus, pregnant women need more information about oral health and prevention of gingival and periodontal disease.

Keywords: Oral health Knowledge, Pregnancy and Oral health, C - reactive protein, Pregnancy Gingivitis, Low Birth Weight (LBW) babies.

Introduction

The life cycle of females presents unique challenges to the oral health care professionals. Hormones associated with the reproductive cycle alter oral and periodontal tissue responses to local factors like plaque, thus resulting in diagnostic and

therapeutic dilemmas among clinicians. Therefore, it becomes important that oral health care professional diagnose, customise and vary periodontal therapy, according to the age and the stage of a female's life cycle.¹

The varying levels of circulating female sex hormones cause various biological and physiological changes in the body. Hence, changes in the oral and periodontal tissues are unavoidable during pregnancy. The etiological factor for periodontal disease is the plaque but pregnancy can also affect the progression of the disease.²

Various physiological conditions like puberty, pregnancy and menopause are such factors that bring reversible changes in oral and periodontal health of a female. Specifically, hormonal changes during pregnancy along-with neglected oral hygiene practices and immunological response increase the incidence of periodontal problems like gingivitis and pregnancy tumours which if not treated timely can result in periodontitis. The exaggerated inflammatory response of gingiva to local factors like plaque in pregnant females is known as pregnancy gingivitis. Periodontitis is a destructive inflammation of the tooth supporting structures affecting approximately around 30% of child bearing age women. In more advanced stages of periodontal disease, it is characterized by attachment loss followed by bone loss. The increased levels of C reactive protein along with other clinical findings in the oral cavity is an important indicator of exaggerated response of the oral tissues during pregnancy.^{3,4}

The association between periodontal disease and pre-term low birth weight (PLBW) babies has been related to other maternal infections with the same underlying mechanisms.⁵ Premature delivery implies labour that occurs at fewer than 37 complete weeks of gestation and is generally accompanied by Low Birth Weight <2500 grams.⁶ Pregnancy does not cause periodontal diseases but it aggravates the response of tissues to plaque and microbial flora which in turn exacerbates pre-existing diseases and some studies have even shown that periodontal pockets increase in parallel with the increase in the duration of pregnancy.⁷ Periodontitis causing microbes can serve as a chronic reservoir of lipopolysaccharide from the cell membrane which can target the placental membranes after being circulated by bloodstream. Lipopolysaccharides have been shown to stimulate IL-1 β and PGE2 production by the chorioamnionic and trophoblastic cells, which can result in preterm parturition⁸. Even if the mother completes the required duration before delivery, the lack of knowledge regarding oral and periodontal care can lead to a greater risk of infecting their children by passing cariogenic bacteria through improper feeding practices.⁴ Thus it becomes very important to educate pregnant women regarding prevention of dental diseases is critical as evidence exists that most infants and young children acquire cariogenic bacteria from their mothers.⁹

Literature shows a positive relationship between periodontal disease and many adverse pregnancy outcomes, including low birth weight, preterm birth, pre-eclampsia, and miscarriages. Poor maternal oral hygiene increases risk for early childhood caries many-folds. World Health organization, World Health Day theme of 1998, "safe motherhood pregnancy is precious-let's make it special" makes it clear about the importance of a safe and healthy pregnancy. Prevention of oral and periodontal problems and their complications during pregnancy can be achieved if pregnant females have appropriate knowledge attitude and practice.¹⁰ Overall health care of the pregnant female can be achieved by the synergistic approach of all health care professionals specially the gynaecologists. Gynaecologists should educate their patients regarding oral health assessment at earlier stages of pregnancy so that the reactionary aggravated changes can be minimised. The females of child bearing age should be encouraged to go for oral health assessment even before they are planning to extend the

family as pregnancy is the right time for many preventive measures to be taken by the expecting mothers. During pregnancy period, the mother is more concerned about general health and if communicated about the importance of oral and periodontal health, their counselling can result in promising outcome.³

This study provides a small understanding into the current situation of oral and periodontal healthcare knowledge among pregnant women and it will also help in raising awareness about the significance of good oral health care during pregnancy.

Materials and Methods

The cross-sectional questionnaire-based study was conducted over a period of 3 months, from August 2021 to October 2021, among pregnant women to assess and obtain information about the knowledge, attitude and practice of oral and periodontal care. Prior to the start of study, a protocol and purpose of the study was discussed and explained in detail with the participants and verbal informed consent was obtained before the initiation of the study. During the study every pregnant female was provided with supplements of folic acid and calcium. The samples of the study were selected based on the convenience sampling which was conducted among 200 pregnant women, reporting to the department obstetrics and gynaecology, Government Hospital, Jammu. The objective type of questionnaire proforma was distributed to the participants and it consisted of close ended questions.

Those who were uncooperative or not willing to give consent were excluded from the study. Participation in the survey was voluntary and anonymity was maintained about the personal records. Pregnant women who did not respond/give back the questionnaire proforma during time period of study were also excluded from the study.

Questionnaire design:

A study specific questionnaire consisted of 26 questions which were divided into 4 parts. The basic idea of framing the questionnaire was to assess about the knowledge and practice of oral and periodontal health care among pregnant women. The third part of questionnaire proforma which was related to attitude towards oral and periodontal health care specially the maintenance of oral hygiene during pregnancy was based on Hiroshima University- Dental Behaviour Inventory (HU-DBI) questionnaire, consisted of 10 questions in response format (agree/disagree/equivocal). A quantitative evaluation of oral health attitude and behaviour was provided by the total appropriate agree/disagree/equivocal response.

- The first domain included the questions based on personal data related to Name, Age, Educational Level, Occupation, Number of Pregnancy
- The second domain included 8 questions which evaluate the knowledge about oral and periodontal health and importance of oral hygiene maintenance.
- The third domain included 10 questions related to attitude about the changes in oral and periodontal health during pregnancy and its outcome on the health of child.
- The fourth domain included 8 questions related to the practice of oral hygiene maintenance, interdental cleaning aids, need and time period to visit dentist.

The questionnaire was designed in two languages i.e. English and Hindi which was validated and modified accordingly before the commencement of final questionnaires. The questionnaire took 10-15 minutes to complete. All questionnaires were assessed for completion, and incomplete questionnaires were discarded. The questionnaire proforma was distributed

physically by the investigator to all the participants. After filling the questionnaires by the participants, investigator waited there and collected the questionnaire proforma on the same day. The data were collected and compiled and were checked for completeness. The filled responses were then transferred to micro soft excel sheet for appropriate statistical analysis.

Statistical Analysis

All data was analysed by using the Statistical Package for Social Sciences (SPSS) software, for windows, version 20. Collected data was analysed by frequency, percentage and Chi-square test for general association to test all the data. Statistical significance was considered when $p < 0.05$ in all tests

Results

Out of 200 pregnant women, a total of 197 participants completed the Questionnaire Proforma and positively participated in the study. The response rate of participants was 98.5%. Only 3 participants did not complete the questionnaire proforma and they were excluded from the study.

Socio demographic features of study participants:

The population included 150 (75.3%) pregnant women below 30 years while 47 (23.6%) were above 30 years of age. The education of 64 (32.4%) pregnant women was primary, 82 (41.6%) pregnant women had secondary education while 51 (25.6%) pregnant women had graduate/post graduate education. Among all, 168 (84.4%) were housewife while 29 (14.7%) were employed. It was first pregnancy for 111 (55.7%), 2-3 pregnancy for 75 (38%) women and more than third pregnancy for 11 (5.5%) women.

Table 1: Socio demographic features of study participants (n-200)

Variables		Pregnant women(frequency)	Percentage(%age)
Age	Below 30	150	75.3%
	Above 30	47	23.6%
Education	Primary	64	32.4%
	Secondary	82	41.6%
	Graduate/post graduate	51	25.6%
Occupation	Housewife	168	85.2%
	Employee	29	14.7%
Number of pregnancy	First pregnancy	111	55.7%
	2-3 pregnancies	75	38%
	>3 pregnancies	11	5.5%

Association between the knowledge about oral and periodontal health among pregnant women and education level

Table 2 shows the association between the knowledge about oral health and periodontal health among pregnant women based on education level. The results showed statistically significant difference based on the knowledge and education level among pregnant women who considered bleeding from gums as disease ($p < 0.05$).

When asked about the factors which are responsible for causing dental caries and gum diseases, majority of pregnant women (59.30%) considered poor oral hygiene as the major factor of causing oral and periodontal diseases. Also majority of them (64.9%) agreed positively that tooth brushing should be done for cleaning of tooth surface. There was a statistically significant difference regarding the bottle feed causing nursing bottle caries and cleaning of oral cavity of baby before the first tooth eruption ($p < 0.05$). The rest of the knowledge such as dietary factor and visiting the dentist during pregnancy did not show any statistically significant difference with education level ($p > 0.05$).

Table 2: Association between the knowledge about oral and periodontal health among pregnant women and education level

Knowledge/ Education		Primary	Secondary	Graduate/ Post Graduate	N%	P- Value
Do you know the reason of dental caries or gum diseases?	Poor oral hygiene	38	49	30	59.3%	0.837
	Eating much sweets	20	23	13	38.7%	
	Hormonal change in pregnancy	0	2	0	1%	
	Environmental factor (Smoking)	2	4	3	4.5%	
	Systemic diseases such as diabetes Mellitus	0	0	0		
	Don't know	4	4	5		
Is bleeding from the gums considered as a disease?	Yes	26	42	23	46%	0.006
	No	19	28	25	36.5%	
	Don't know	18	13	3	17.2%	
Any idea about the food which protect against dental and gums diseases:	Yes	19	30	15	32.4%	0.242
	No	26	39	26	46.1%	
	Don't know	20	12	10	21.3%	
Types of food that considered good for teeth/gums:	Vitamin D rich foods (egg, fish)	18	25	17	30.4%	0.100
	Vitamin C rich foods (citrus fruits)	18	19	19	28.12%	
	Vitamin A rich food (carrots, mango)	8	3	2	6.5%	
	Don't know	19	36	13	34.5%	
Importance of tooth brushing	For cleaning of tooth surface	36	57	35	64.9%	0.261

	To Prevent dental caries	9	12	9	15.2%	
	Pleasant odor in oral cavity	6	5	2	6.7%	
	Prevent gum diseases	10	3	3	8.1%	
	Don't know	2	6	2		
Do you feel the need to visit the dentist in pregnancy?	Yes	16	21	12	24.8%	0.621
	May be	23	39	26	44.6%	
	When needed	15	14	8	18.7%	
	don't know	11	7	5	11.6%	
Do you know bottle feeding during night induces nursing bottle caries?	Yes	24	45	35	52.7%	0.003
	No	41	36	16	47.2	
Can you clean oral cavity of baby before first tooth eruption?	Yes	35	56	32	62.1%	0.027
	No	30	20	16	33.5%	
	Don't know	0	5	3	4.06%	

Association between the oral and periodontal health care likert attitude scale among the pregnant women and education level:

Table 3 shows the association between the oral and periodontal health care on likert attitude scale among the pregnant women and education level. The results showed that there was a statistical significant difference in attitude on likert scale among pregnant women as they agreed that tooth brushing is important for the teeth before going to bed. They also agreed positively to the statement stating that the foetus is absorbing calcium from mothers' body resulting in weak tooth structure. The rest of the likert attitude scale such as regular dental check-up, high sugar intake, bleeding gums and bad breath were statistically non-significant based on education level ($p > 0.05$).

Table 3: Association between the oral and periodontal health care likert attitude scale among the pregnant women and education level (n-200)

Attitude/ Education		Primary	Secondary	Graduate/ Post Graduate	N%	P- Value
Regular dental check-up is important during pregnancy even if there wasn't any dental problem.	Agree	50	49	30	65.4%	0.205
	Disagree	11	23	13	23.8%	
	Equivocal	4	10	7	10.6%	
Tooth brushing is important for the teeth before going to bed	Agree	61	70	39	86.2%	0.004
	Disagree	2	6	12	10.1%	
	Equivocal	2	5	0	3.5%	
Think that dental problems are related to other health problems.	Agree	11	20	8	19.7%	0.131
	Disagree	50	50	41	71.5%	
	Equivocal	4	11	2	8.6%	

Think that bleeding gums and bad breath in the oral cavity will go away on their own.	Agree	17	34	17	69%	0.220
	Disagree	44	40	29	57.3%	
	Equivocal	3	8	5	8.1%	
Think that sugar intake causes the disease of teeth	Agree	51	67	38	79.1%	0.530
	Disagree	9	10	11	15.2%	
	Equivocal	5	4	2	5.5%	
Think that the foetus is absorbing calcium from mothers body resulting in weak tooth structure	Agree	58	58	33	75.6%	0.015
	Disagree	2	12	11	12.6%	
	Equivocal	5	12	6	11.6%	
Connection between oral health of the mother and the child health during and after delivery	Agree	40	43	19	51.7%	0.050
	Disagree	13	12	11	18.2%	
	Equivocal	11	27	21	29.9%	
It is necessary to get treated for carious tooth	Agree	57	77	47	91.8%	0.527
	Disagree	5	3	2	5%	
	Equivocal	3	1	2	3.04%	
Taking balanced diet has no role in the dental and oral health.	Agree	34	41	31	53.8%	0.200
	Disagree	24	23	14	30.9%	
	Equivocal	7	18	5	15.2%	
It is possible to lose teeth because of pregnancy	Agree	44	44	29	59.3%	0.351
	Disagree	12	26	12	25.3%	
	Equivocal	9	11	10	15.2%	

Association between oral health and periodontal health related practices among pregnant women and education level

Table 4 shows the association between oral health and periodontal health related practices among pregnant women and education level. When asked about their daily brushing habit the results showed that there was statistical significant difference in practice score based on education level ($p < 0.005$). When asked about the number of visits to dentist, approx. 1/3rd (41.6%) participants revealed that they visit the dentist once a year with complaint of grossly decayed tooth and required tooth extraction. During the pregnancy period, more than half (59%) of pregnant women visited the dentist. Regarding the use of oral hygiene aid 51.7% pregnant women didn't use any other oral hygiene aid except tooth brushing. The frequency of changing the toothbrush is on monthly basis among pregnant women which was scored 34.5%. The practice score such as use of other oral hygiene aid, frequency of changing toothbrush and no of visits to dentist were found to be statistically non-significant with the education ($p > 0.05$).

Table 4: Association between oral health and periodontal health related practices among pregnant women and education level (n-200)

Practice/ Education		Primary	Secondary	Graduate/ Post Graduate	N%	P-Value
Do you daily brush your teeth?	Yes	60	71	50	91.8%	0.045
	No	5	10	1	8.1%	
How often do you visit the dentist?	Once a year	27	36	19	41.6%	0.774
	Twice a year	1	1	0	1%	
	On need basis only	4	4	7	7.6%	
	Never visited	33	40	25	49.7%	
Why did you visit dentist?	Painful teeth	7	6	7	10.1%	0.559
	Tooth extraction	12	19	7	19.2%	
	Routine visit	11	17	12	42.1%	
	Dental caries	3	1	3	4.6%	
	Bleeding gums	0	1	0	0.5%	
Have you visited the dentist during the current pregnancy?	Yes	41	51	25	59%	0.235
	No	23	31	26	40.6%	
Do you use any other aid rather than tooth brush?	No	31	43	28	51.7%	0.603
	Tooth pick	25	21	13	29.9%	
	Floss	3	5	5	6.5%	
	Mouth wash	6	12	5	11.6%	
Frequency of changing the toothbrush	Less than a month	20	24	13	28.9%	0.961
	Monthly	20	30	18	34.5%	
	After 3 months	14	15	13	21.3%	
	After 6 months	9	14	7	15.2%	
Which method do you use for cleaning your teeth?	Manjan	10	18	13	20.8%	0.346
	Datun	21	32	18	36%	
	Paste and brush	31	33	20	10.4%	
	Tooth powder	2	0	0	1%	
	others	0	0	0		
Do you rinse your mouth after every meal?	Yes	43	52	35	65.9%	0.373
	No	20	26	14	30.4%	
	Sometimes	0	5	2	3.5%	

Discussion

Pregnancy is a unique time period during a women's lifetime. The changes associated with pregnancy may occur at anatomical and at physiological level. These changes may adversely affect the oral cavity because of hormonal changes (estrogen and progesterone level) associated with the reproductive process which may further alter periodontal and oral tissue response aggravating due to the presence of local factors (such as plaque and calculus). Number of physiological conditions in women can bring reversible changes in oral health. Pregnant women are more susceptible to periodontal and gingival diseases. Periodontal disease may not experience symptoms until it reaches an advanced stage and therefore increase the risk of premature birth, preterm low birth weight babies, pre eclampsia, pyogenic granuloma, tooth erosion and ulceration of gingival soft tissues etc. during pregnancy.¹¹ During the first and third trimester of pregnancy, the severity of gingivitis is increased because of overproduction of gonadotropin hormones and increase in the estrogen and progesterone level respectively which may cause destruction of gingival mast cells and release of histamines and proteolytic enzymes further exaggerate the gingival tissue response due to presence of local irritating factors such as dental plaque. The most striking clinical feature of gingivitis is pronounced ease of bleeding, colour may vary from bright red to bluish red because of marked vascularity. Marginal and interdental gingiva may appear soft and edematous and sometimes it may appear as a raspberry like appearance.

During pregnancy, mothers' oral hygiene plays an important role because it may directly affect infants' oral health. The knowledge and attitude towards oral and periodontal health among pregnant women may be one of the strong predictor of her oral health but also for future infants' oral health. Number of evidences in literature indicates that good oral health of mother is a key element in establishing good infant oral health.¹² According to American Dental Association (ADA) elective dental care should be avoided during the first and third trimester of pregnancy if possible.¹³

In our sample, most of the participants (32.4%) had just a primary level of education and majority of the women (85.2%) were unemployed/housewives. **Shabbir et al 2015** and **Gupta et al 2015** observed that more than half of pregnant women had primary education and were unemployed/ housewives.^{14,6} Our findings are in accordance with other studies conducted by **Machuca et al in 1999** and **Yalcin et al in 2002** where low socio-economic variables were reported to have profound effect on the prevention of periodontal disease.^{15,16} Majority of the women (55.7%) had first time pregnancy in their lifetime.

In the present study, there is significant association between knowledge about oral and periodontal health among pregnant women and education level. Approximately 59.3% pregnant women considered that poor oral hygiene is the major factor responsible for oral and periodontal diseases. Majority of pregnant women (46.1%) also considered that bleeding from gums is a clinical indicator of pathological condition. More than half (65.4%) of women agreed that they visit the dentist for regular dental check-up during the pregnancy time period and approximately 1/4th of the surveyed women (23.8%) did not visit the dentist for regular dental check-up. The reason of visiting the dentist was with the chief complaint of painful teeth, tooth extraction, bleeding gums and dental caries. The result from this survey are consistent with the studies conducted in United States of America where more than 50% of pregnant women did not receive any dental care during their pregnancy^{13,17}. This issue has a serious concern about oral and periodontal health among pregnant women and may also need extra periodontal care¹⁸. The lack of visit to dental office could be attributed to

various factors such as poor knowledge, poor education, limited access to dental care as well as various sociocultural factors in perceptions among pregnant women in India.

The knowledge regarding the nutritional and well balanced diet knowledge among pregnant women is an important determinant for the optimum health of oral cavity. Evidence in the literature have shown that inadequate dietary intake during pregnancy results in increased risk of consequences such as pre-term birth, infant mortality and morbidity and metabolic disorders of child growth and development¹⁹. Our study revealed that 32.4% pregnant women were aware of importance of food. Also majority 79.1% agreed that sugar intake may cause dental caries/gum diseases. Our findings are consistent with the studies conducted by **Ibrahim et al 2017** and **Amit et al 2014** who reported that most women have an adequate knowledge regarding the consumption of too much of sweets which may cause tooth decay^{20,21}. Participants (34.5%) had a low knowledge regarding micronutrients and vitamins: 30.4%, 28.1%, 6.5% for vitamin D, vitamin C, and vitamin A respectively. **Fouda et al 2012**, in a study found that 61.3% pregnant females had a good knowledge about basic nutrients and well balanced diet²². In our study, the low level of knowledge may be due to lack of information and educational qualification which is key determinant to nutritional status in women.

Regarding the importance of teeth cleaning, majority (91.8%) of pregnant women daily brush their teeth and about 64.9% mentioned that tooth brushing is done for cleaning of tooth surface while 15.2%, 6.7%, 8.1% mentioned that tooth brushing is done to prevent dental caries, pleasant odor and prevent gum diseases respectively. Similar results were also reported in India by **Leelavathi et al in 2018**. 34.5% and 21.3% participants change their toothbrush on monthly basis and after 3 months respectively²³. Results of the current study show that 51.7% pregnant women do not use interdental cleaning aids. Similar findings reported in the study conducted by Leelavathi et al. in 2018 that 82.2% women do not use any interdental cleaning aid for oral hygiene maintenance. Similarly, **Bamanikar et al 2013** reported that almost more than half women do not use dental floss²⁴. Similar results were also found in study.

The current results disclosed that there was significant association between practice of teeth cleaning daily and women's education level. Evidence in the literature associated with the studies conducted by **Afshar et al in 2017** and **Amin and Shetty in 2014** noticed that there is a significant relationship between oral health practice and education level^{25,26}. Low education level and unawareness lead to improper oral hygiene practice.

This study is not without limitations. The major limitation is its reliance and self -reported data which is often subjected to bias inherit to questions being asked such as recall bias. Nonetheless, the results would serve as a veritable tool for designing and specifying appropriate oral health education message for pregnant women receiving antenatal care.

Mothers are the first role models in the life of every child. They play a vital role in all the first teachings and transfer of habits to their children. Oral microflora and habits also some under the same category. So it becomes imperative for the dental health care providers to provide adequate knowledge and awareness in pregnant women regarding oral and periodontal health so that upcoming generation can be benefitted with the previously acquired knowledge. A synergistic approach from dentist and gynaecologist can better help in motivating the pregnant women for improving oral and periodontal health.

Conclusion

The study demonstrated poor level of oral health knowledge and attitude; the results have clearly revealed that women lack the knowledge of proper oral hygiene, periodontal disease and its effect on pregnancy outcomes. Thus, pregnant women need more information about oral health and prevention of gingival and periodontal disease. An oral and dental health history, examination, screening should be made a part of routine check -up during pregnancy. For the awareness regarding oral and periodontal health, pre natal programmes should be conducted by the dental practitioners.

References

1. Singh S, Dagrus K, Kariya PB, Singh S, Darmina J, Hase P. Oral Periodontal Health Knowledge and Awareness among Pregnant Females in Bangalore, India. *Int J Dent Med Res* 2015;1:7-10.
2. N K Fathimath et al, Assessment of Knowledge, Attitude, Practice, Awareness Level of Periodontal Health and Adverse Outcomes among Pregnant Women – A Questionnaire Study, *International Journal of Innovative Science and Research Technology*, 2018 ;3: 820-26
3. Ishaq Z, R Faiz,, A Ahmaed ,S Tanveer Knowledge, Attitude and Practices of Pregnant Females Regarding Oral Health, *P J M H S*, 2018;12: 1556-59
4. Shimaa AK, Safaa RO, Ahmed MA, Taghreed AMI. Knowledge, attitude and practice of oral health care among pregnant women in Assiut, Egypt,. *Int. J. Community Med. Public Health.*,2018;5: 890-900.
5. López NJ, Da Silva I, Ipinza J, Gutiérrez J. Periodontal therapy reduces the rate of preterm low birth weight in women with pregnancy-associated gingivitis. *J Periodontol* 2005;7: 2144-53.
6. Gupta S, Jain A, Mohan S, Bhaskar N, Walia PK. Comparative Evaluation of Oral Health Knowledge, Practices and Attitude of Pregnant and Non-Pregnant Women, and Their Awareness Regarding Adverse Pregnancy Outcomes. *J Clin Diagn Res.* 2015;9:26-32.
7. Moss KL, Beck JD, Offenbacher S. Clinical risk factors associated with incidence and progression of periodontal conditions in pregnant women. *J Clin Periodontol.* 2005;32:492-8.
8. Offenbacher S, Katz V, Fertik G, Collins J, Boyd D, Maynor G, McKaig R, Beck J. Periodontal infection as a possible risk factor for preterm low birth weight. *J Periodontol.* 1996 ;67: 1103-13.
9. Nagi R, Sahu S, Nagaraju R. Oral health, nutritional knowledge, and practices among pregnant women and their awareness relating to adverse pregnancy outcomes. *J Indian Acad Oral Med Radiol* 2016;28: 396-402.
10. Agrawal N, Gupta N, Tewari R, Garg A, Yadav P. knowledge, attitude and practice of oral health care in pregnant women in north India cross sectional survey, *University J Dent Scie.* 2017;3:22-5.
11. Pattanshetti K, Kothari HP, Tiwari J, Malagi S, Pattanashetty S, Hinge K. Assessment of Knowledge and Attitude of Expectant Mothers Regarding Effect of Their Oral Health and Its Influence on the Infant Oral Health. *Int J Clin Pediatr Dent.* 2020 ;13:471-475.
12. Alwaeli HA, Al-Jundi SH: Periodontal disease awareness among pregnant women and its relationship with socio-demographic variables. *Int J Dent Hygiene* 3, 2005; 74–82
13. Gaffield ML, Gilbert BJ, Malvitz DM, Romaguera R. Oral health during pregnancy: an analysis of information collected by the pregnancy risk assessment monitoring system. *J Am Dent Assoc.* 2001 ;132: 1009-16.

14. Shabbir S, Masooma Zahid, Qazi A, Younus SM. Oral hygiene among pregnant women; practices and knowledge. *Professional Med J.* 2015;22: 106-111.
15. Machuca G, Khoshfeiz O, Lacalle JR, Machuca C, Bullón P. The influence of general health and socio-cultural variables on the periodontal condition of pregnant women. *J Periodontol.* 1999 ;70: 779-85.
16. Yalcin, Funda & Eskinazi, Esti & Soydinc, Mahtaban & Basegmez, Cansu & Issever, Halim & Isik, Gulden & Berber, Lacin & Has, Recep & Sabuncu, Hilmi & Onan, Utku. The Effect of Sociocultural Status on Periodontal Conditions in Pregnancy. *Journal of periodontology.* 2002; 73 :178-82.
17. Lydon-Rochelle MT, Krakowiak P, Hujoel PP, Peters RM. Dental care use and self-reported dental problems in relation to pregnancy. *Am J Public Health.* 2004 ;94: 765-71.
18. Mills LW, Moses DT. Oral health during pregnancy. *MCN Am J Matern Child Nurs.* 2002 ;27:275-80;
19. Rocco PL, Orbitello B, Perini L, Pera V, Ciano RP, Balestrieri M. Effects of pregnancy on eating attitudes and disorders: a prospective study. *J Psychosom Res.* 2005;59:175-9
20. Ibrahim HM, Mudawi AM, Ghandour IA. Oral health status, knowledge, attitudes and practice among pregnant women attending Omdurman maternity hospital, Sudan. *East Mediterr Health J.* 2017;22: 802-9.
21. Amit, Mital P, Hooja N, Mital P, Salvi A, Fatima A. Oral and dental health knowledge, attitude and practice among pregnant women. *Sch Acad J Biosci.* 2014;2:627-32.
22. Fouada, L.M., Ahmed, M.H., & Shehab, N.S. (2012). Nutritional Awareness of Women during Pregnancy. *Journal of American science.* 2012,8:494-502
23. Leelavathi L, Merlin T H, Ramani V, Suja R A, Chandran CR. Knowledge, attitude, and practices related to the oral health among the pregnant women attending a government hospital, Chennai. *Int J Community Dent* 2018;6:16-20
24. Bamanikar S, Kee LK. Knowledge, attitude and practice of oral and dental healthcare in pregnant women. *Oman Med J.* 2013 ;28: 288-91.
25. Alwaeli HA, Al-Jundi SH. Periodontal disease awareness among pregnant women and its relationship with socio-demographic variables. *Int J Dent Hyg.* 2005 ;3:74-82.
26. Amin, R. and Shetty, P., Oral health status during pregnancy in Mangalore. *Journal of Health and Allied Sciences NU,* 2014; 4: 114-117.