

ASSESSMENT OF COMMON ORAL AND DENTAL DISEASES AMONG PREGNANT WOMEN AT DHAKA CITY IN BANGLADESH

A Case Study By Mahmud SZ¹, Begum F³, Uddin MM²; Bangladesh

¹Dr. Shaikh Zakir Mahmud, BDS, MPH, Senior Medical Officer (Dental Surgeon), Ibrahim General Hospital-Mirpur, Dhaka, Bangladesh

²Dr. (Lt Col) Mohammad Mesbah Uddin, BDS, Consultant Dental Surgeon, Saba Dental Care, DOHS Baridhara, Dhaka, Bangladesh

³Dr. Ferdousi Begum, MBBS, DGO, MCPS, Consultant Gynecologist, Ibrahim General Hospital-Mirpur, Dhaka, Bangladesh)

Email:- suman79_bd@yahoo.com

ABSTRACT

BACKGROUND: Globally, the oral health care for pregnant women is inadequate relating to education and health promotion sectors along with disparities in socio-economy and ethnicity. Neglected oral care often has long-term effects on our overall health, including the health of the baby during pregnancy. Serious problems like gingivitis and periodontal disease may also occur during this period as a result of neglected oral hygiene.

OBJECTIVE: This descriptive type of cross sectional study was carried out to assess the pattern of common oral and dental diseases among pregnant women.

MATERIALS AND METHODS: A total 147 pregnant women attended at the selected hospital and healthcare centre of Dhaka city for routine checkup over a period of five months from September 2013 to January 2014 fulfilled the eligibility criteria were selected consecutively. Pre-tested semi structured interviewer administrated questionnaires were used to collect the information.

RESULTS: The study shows that most of the pregnant women (72%) age ranged from 20-24 years. Also, majority (88%) of them were housewives while only 11% were service holders with monthly family income of BDT≤10000 of more than half of the respondents (52%). Oral complaints found from the study were bleeding gums (78%), sensitive tooth (52%) and cavities (35%) respectively. In addition, 63% never access to their dentists throughout their whole life and only 6% visited their dentists at the time of pregnancy. Lastly, the frequency of oral diseases

revealed in this study was gingivitis (100%), dental caries (54%), dental erosion (52%), periodontitis (27%) and aphthous ulcer (16%) respectively.

CONCLUSION: It can be said from the study that educational and occupational statuses of pregnant women in Bangladesh were not satisfactory. An extensive number of pregnant women did not seek oral health care during pregnancy. There is a need for further study on oral health status of the pregnant women to formulate appropriate oral health guidelines for better oral and dental health outcome.

KEY WORDS

Dental diseases, Oral Diseases, Pregnant Women

INTRODUCTION

Pregnancy is a major event in any woman's life and is associated with physiological changes affecting especially the endocrine, cardiovascular and hematological systems, and often attitude, mood or behavior.¹ The mouth serves as a mirror to general health and also as a portal for disease to the rest of the body. Since the old wives' tale of "the loss of a tooth for every pregnancy", oral health during pregnancy has long been a focus of interest.²

Oral changes due to the complex physiologic alterations occurring in pregnancy are believed to be related to fluctuations in levels of estrogen and progesterone, leading to an increase in oral vasculature permeability and a decrease in host immune competence, thereby increasing susceptibility to oral infections.³ These changes include pregnancy gingivitis, benign oral gingival lesions, tooth mobility, tooth erosion, dental caries, and periodontitis.⁴⁻⁶

Gingivitis is the most common oral disease in pregnancy in such situations. It is inflammation of the superficial gum tissue. During pregnancy, gingivitis is aggravated due to increase in hormone (estrogen and progesterone) levels, alteration in oral flora and a decreased immune response, thus reducing the body's ability to repair and maintain healthy gingival tissue.⁷ Many studies have reported an increase in subgingival growth of *Provetella intermedia* during the 2nd trimester of pregnancy, which may be responsible for increased inflammation.

However, other studies have reported a gradual increase in severity until the 36th week of gestation with gingival condition recovering spontaneously after delivery.⁸ Based on clinical observations, the prevalence of periodontal diseases during pregnancy varies from 35% in some studies to 100% in others.⁹ Pregnancy increases the risk of dental caries. A study reported that 61.5% of pregnant women had caries, and 52.6% had gingivitis.

The pregnant women were 1.97 times more likely to suffer from dental caries and 1.81 times more from gingivitis compared to non-pregnant women.¹⁰ 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.¹¹

The increase in progesterone levels during pregnancy causes a decrease in lower esophageal tone and gastric and intestinal motility. The combined effects of hormonal and mechanical changes in the gastrointestinal system and greater sensitivity of the gag reflex also increases the risk of gastric acid reflux.¹² Gag reflux that make women vulnerable to nausea and vomiting, this condition if persist may lead to enamel erosion. The acid erosion of teeth may occur if pregnancy sickness (morning sickness) or esophageal reflux is severe and involve repeated vomiting of the gastric contents.^{13,14} The pyogenic granuloma calling as epulis or pregnancy tumor is the benign inflammatory lesion composing proliferating capillaries mostly observed in 5% of gestating women during 2nd trimester of pregnancy.¹⁵ Aphthae monitoring, through no type of treatment, salivary changes with variation in pH and composition, an increased frequency of temporomandibular joint disorders seems to be more related to dental losses and malocclusions or poorly executed fillings during this period. The melasma or skin alteration in pregnant women improves after delivery.¹⁶

During pregnancy, certain systemic conditions need to be considered. Oral health care provider should be careful in dealing patients of hypertensive disorders because of increased risk of bleeding during procedures and needs to discuss with prenatal care providers prior to initiating any procedures in women with uncontrolled severe hypertension. Hypertensive disorder including chronic hypertension occurs at 12 to 22% of pregnancies and the tendency of chronic hypertension may be up to 5%.¹⁷

Hypertensive disorder causes adverse outcomes like premature birth, intrauterine growth restriction, fetal demise, placental abruption and cesarean delivery.¹⁸ Gestational or type III diabetes commonly diagnosed after 24 weeks of gestation occurs in 2 to 5% women of the United States.¹⁹ An increased risk of periodontal breakdown is observed in diabetic patients in whom the condition has not been properly controlled. The periodontal infection adversely affects the blood glucose level in diabetic patients.^{20,21}

The pregnancy associating gingivitis and gingival inflammation can be found in diabetic patients carrying the same amount of bacterial plaque than non-diabetic control patients and hence, the diabetes control is important during 1st trimester as the congenital anomalies increases with uncontrolled diabetes.^{22,23}

Oral and dental diseases are the most prevalent and preventable health conditions. Attainment of oral health issues and dental care within the current system of health care accessed by pregnant women throughout their life course provides greater opportunity for reducing known risk factors and providing early treatment, potentially resulting in reduced health care costs and improved oral and dental as well as general health outcomes.

MATERIALS & METHODS

This descriptive type of cross sectional study was conducted to assess the pattern of common oral and dental diseases among pregnant women attended at the out-patient department of Ibrahim General Hospital-Mirpur and National Healthcare Network (NHN) Mirpur Centre both are the Enterprises of Diabetic Association of Bangladesh. The study was carried out from September 2013 to January 2014 among 147 married women who were suffering from different oral and dental diseases.

To get the target sample quickly non randomized purposive sampling technique was followed by using a pre tested semi-structured questionnaires and a check list. Only pregnant women of reproductive age (15-49 years) were included in this study. On the other hand, those who refused to provide informed consent and who were below 15 or above 49 years were excluded from the study.

The severity of oral and dental diseases was assessed at the dental units of same hospital and centre. Instruments used for the clinical examination were periodontal probe, dental mirror, caries probe or explorer and excavator. Data were checked, cleaned and edited properly before analysis.

The data were sorted and analyzed by using the software SPSS version 16. Descriptive statistics were used for interpretation of the findings. Cross tabulations and associations were determined by using the Pearson Chi-square Test where applicable. The analyzed data were presented in the form of frequency distribution tables.

RESULTS

The frequency of patients' socio-demographic characteristics in relation to oral diseases is provided in Table 1. Maximum 72% were in the age group of 20 to 24 years and only 1.4% of pregnant women correspond to the age group of above 35 years. Among them, 57% of had completed SSC and only 4.8% were illiterate whereas 53% husbands of pregnant women had SSC level and only 5% husbands had no education respectively. Moreover, majority of (88%) them were housewives and only 1% of them were day-laborers while 63 % husbands of pregnant women belonged to service holders and only 8% husbands were day-laborers. More than half (52%) of the patients whose monthly family income were less than or equal to 10 thousand BDT and only 1% showing lowest were above 40 thousand BDT. In addition, 41% respondents had only one child and 7% had two or more children.

Table 1: distribution of the pregnant women according to socio-demographic characteristics, in relation to oral and dental diseases (n=147)

Characteristics	Frequency	Percentage
Age (years)		
15-19	28	19
20-24	106	72
30-34	11	8
above 35	2	1
Educational Status		
No Education	7	5
Primary	33	22
SSC	83	57
HSC	12	8
Graduate or Above	12	8
Occupation		
House Wife	129	88
Day-laborer	2	1
Service holder	16	11
Husband's Education		
No Education	7	5
Primary	27	19
SSC	77	53
HSC	13	9
Graduated or Above	23	16
Husband's Occupation		
Day-laborer	12	8
Business	43	29
Service-holder	92	63
Monthly Family Income (BDT)		
<10000	76	52
11000-20000	45	31
21000-30000	24	16
above 40000	2	1
Number of Children		
None	76	52
One	60	41
Two or more	11	7

Distribution of the patients according to pregnancy related variables, in relation to oral and dental diseases is provided in Table 2. Majority of the (69%) patients had dental problem in 2nd trimester stage, 27% reported at the stage of 3rd trimester and only 4% respondents were at the stage of 1st trimester. More than half (54%) of respondents were expectant for the 1st time and only 9% respondents were pregnant for the third time or more.

Moreover, 68% respondents liked to take sweetened food or drink as light meal, 18% respondents had preference for fruits or milk or egg as snacks and 14% respondents inclined to take fast food or snacks as extra meal in between meals. Prenatal care providers advised only 3% of respondents for dental check-up at pregnancy and majorities (67%) of the participants were recommended by no one.

Table 2: Distribution of the patients according to pregnancy related variables, in relation to oral and dental diseases (n=147)

Characteristics	Frequency	Percentage
Stage of Pregnancy		
1st trimester	6	4
2nd trimester	101	69
3rd trimester	40	27
Number of pregnancy		
1st pregnancy	79	54
2nd pregnancy	55	37
3rd pregnancy or more	13	9
Type of extra meal taken during pregnancy		
Sweetened food/drink	100	68
Fast food/Snacks	21	14
Fruits/Milk/Egg	26	18
Dental check up during pregnancy		
Self	99	67
Prenatal care provider	4	3
Parents or Husbands	29	20
Others	15	10

Distribution of the pregnant women according to record of visiting dentists, in relation to oral and dental diseases is provided in Table 3. Majority of the respondents (63%) had never visited their dentists, 18% of respondents accessed to their dentists before 2 years or more, 12%

respondents were found to visit their dentists 1 year ago and only 6% respondents appeared at pregnancy.

Table 3: Distribution of the pregnant women according to record of visiting dentists, in relation to oral and dental diseases (n=147)

Record of visiting dentists	Frequency	Percentage
Never	92	63
1 year ago	18	12
2 years or more prior/ at pregnancy	28	19
	9	6
Total	147	100

Distribution of the pregnant women in relation to pattern of oral and dental diseases is provided in Table 5. Here we found 100% respondents experienced of gingivitis, 54% of respondents had dental caries, 52% of respondents were found to have dental erosion, 27% respondents suffered from periodontitis and 16% respondents complained of aphthous ulcer.

Table 5: Distribution of the pregnant women in relation to pattern of oral and dental diseases (multiple responses).

Dental diseases	Frequency	Percentage
Dental Caries	80	54
Gingivitis	147	100
Periodontitis	39	27
Aphthous Ulcer	23	16
Dental erosion	77	52

DISCUSSION

In the United States a study was done to determine national and state-specific estimates of dental care use and found that 27.37% pregnant women were in between 25-29 age group, 26.29% were between the ages of 20-24 years, 8.49% were in between 18-19 age, 23.40% were in between 30-34 years and the rest 14.44% were above 35 years of age.²⁴

Present study revealed that larger proportion of respondents (72%) had fallen within the age group of 20-24 years. 19% of the respondents represented the age group of 15-19 years, 8% respondents were within the range of 30-34 years and only 1% of respondents correspond to the age group of above 35 years (Table 1). According to demographic characteristics among Carolina Oral Health Literacy study participants who were pregnant for the first time, 25% did not finish high school, 30% received a high school or general educational development diploma and 45% completed some college or higher education.²⁵

Almost similar result found in the present study where more than half of the respondents (57%) completed SSC level, 23% of the respondents had primary education, 8% of the respondents finished HSC level and participants with graduation and above and no education were 8% and 4.8% respectively (Table 1).

A study was conducted to document oral health practices of pregnant women in two tertiary institutions in North-eastern Nigeria and found that majorities (48.3%) were housewife, 29% were civil servant, 11.6% were student and the rest 10.2% had business.²⁶ Present study also showed that 88% of respondents were housewives, 11% were service holders and only 1% of the respondents were day-laborers (Table 1). Among 388 participants, 28% pregnant women lived in a low and low-mid socio-economic index, 17% lived in mid-high socio-economic index and the rest 27% were in high socio-economic index.²⁷

In this study, more than half of the respondents (52%) had monthly income of BDT \leq 10000, 31% participants were within the income group of BDT 11000 to 20000, the salary of 16% respondents was ranged from BDT 21000 to 30000 and only 1% respondents got the salary of BDT above 40000 (Table 1). A study is done to assess the knowledge, attitude and practices of pregnant women and mothers about feeding habits and infant oral health and found that 57.6% were primigravidae, 31.1% had one child and the rest 1.7% had more than two children.²⁸ Present study showed that 52% respondents had no issues, 41% respondents had only one child and 7% pregnant women had two or more children (Table 1).

A study was conducted to examine the relationships between risk factors amenable to intervention and the likelihood of dental care use during pregnancy and found that most of the respondents (70%) reported that they had dental problem at the stage of 1st trimester, 23% reported at the stage of 2nd or 3rd trimester, 2% had dental problem but no care and the rest 5% are unknown.²⁹ This study also presents that 69% respondents had dental problem in 2nd trimester stage, 27% reported at the stage of 3rd trimester and only 4% respondents were at the stage of 1st trimester (Table 2).

The relationship between nutrition and dental health is often overlooked during pregnancy as most dieticians and pediatricians lack in training to make preventive or therapeutic oral health

recommendations and due to lack of dietary counseling skills of dentists to assess and provide appropriate nutrition interventions.³⁰ The main dietary aspect of dental health education is based on two key messages- reduce sugar consumption and drink of fluoridated water. It is extremely difficult to test the importance of just single dietary item on dental caries because its effect likely to go undetected amongst other sugar containing foods and drinks which may be consumed.³¹

Regarding food habit of respondents, present study showed that 94% took their main meals three times in a day and 6% of respondents took their meals twice daily. In addition to this, 35% respondents took snacks in between main meals three times or more daily followed by 33% twice daily, 28% once daily and 4% respondents did not take any extra meal. 68% respondents have chosen sweetened food or drink as snacks in between main meals, 18% consumed fruits or milk or egg as light meal and 14% respondents ate fast food or snacks in between main meals (Table 2).

In 2004-2005 in Ohio surveyed women regarding their perceptions of dental care and dental care practices. More than half (54%) of the respondents reported that dental care was important during pregnancy, yet only 44% actually received care during pregnancy. Fewer than half (40%) stated they were advised by their obstetric provider to seek dental care during pregnancy, and 10% reported a dentist refused to provide them care because they were pregnant.³² The present study showed that only 3% women were advised for dental check-up during pregnancy by prenatal care providers, 20% by their parents or husbands and 67% did not get any information or advice from dentists or gynecologists (Table 2).

In 2011 a study was carried out to describe the self-reported oral hygiene habits and self-care in the oral health in a sample of Iranian women aged 21-35 years during pregnancy and found that 41% women had dental visit more than 2 years ago, 12% had visit less than 2 but more than 1 year ago, 29% visited dentist 6-12 months ago and 18% visited less than 6 months ago.³³ Almost similar result was observed in the present that majority of the respondents (63%) had never visited their dentists, 18% of respondents accessed to their dentists before 2 years or more, 12% respondents were found to visit their dentists 1 year ago and only 6% respondents appeared at pregnancy (Table 3).

A Danish study in 2003 looked at the self assessment of gingival conditions and found that about 30% have one or more gingival symptoms during pregnancy, bleeding gums at brushing, spontaneous bleeding from gums, gum pain or change in color of gums or swollen gums.³⁴ In contrast, present study showed that respondents complained of bleeding gums, sensitive tooth, cavities, toothache and gingival swelling were 78%, 52%, 35%, 11% and 10% respectively. Larger section of participants had problems of gum bleeding and tooth sensitivity (Table 4).

Periodontal disease is a common oral infection with prevalence ranging from 10-60%, and refers to gingivitis and periodontitis. Based on clinical observations, the prevalence of periodontal disease during pregnancy varies from 35% in some studies to 100% in others.³⁵ Pregnant women were more likely to have dental caries and gingivitis compared to non-pregnant women.

Three-quarter of pregnant women (74.5%) had dental caries, while in the non-pregnant group the percentage of caries was around 50.0%. Moreover, it was found that 86.2% of pregnant women had gingivitis in comparison to 72.8% among non-pregnant women.³⁶ Results in another study also revealed the increased rates of caries in which the prevalence of dental caries was found to be 74% and higher percentage of dental erosion (24.0%) were located in the third trimester of pregnant women.³⁷

Furthermore, only 1% pregnant woman had an aphthous ulcer in another study.³⁸ On the contrary, present study exposed that 100% respondents had gingivitis, 54% had dental caries, 52% were found to have dental erosion, 27% suffered from periodontitis and 16% had problems of aphthous ulcer (Table 5). Finally, no statistical significant associations were found between socio-demographic variables and proportion of oral and dental diseases.

CONCLUSION

It has been observed that majority of the respondents are young pregnant mothers of lower income group with lower educational and occupational status. It can be said from the study that educational and occupational statuses of pregnant women in Bangladesh were not satisfactory. Larger portion of the respondents gave priority of sweetened food or drinks as their extra meal which may predispose them to get more oral diseases.

It is also mentionable that an extensive number of pregnant women did not seek oral health care during pregnancy. In addition to this, very few respondents were advised for visiting dentists by their prenatal care providers during pregnancy period. It is also revealed from the study that all the participants suffered from gingivitis and half of them had dental caries and erosion while a small number of respondents got periodontitis and aphthous ulcer.

So, this study provided some directions to future research in this area regarding the impact of oral health knowledge, attitude, behavior and food habit on the pattern of oral diseases with a larger sample size and expanded volume of queries in questionnaire to evaluate the actual proportion of oral diseases and to find out the important predisposing factors in Bangladesh for better oral health outcomes.

REFERENCES

- 1) ACOG Practice Bulletin. Chronic hypertension in pregnancy. *Obstet Gynecol* 2001; 98(1):177-185.
- 2) ACOG Practice Bulletin. Clinical management guidelines for obstetrician-gynecologists. Gestational diabetes. *Obstet Gynecol* 2001;98(3):525-538.
- 3) ACOG Practice Bulletin. Diagnosis and management of preeclampsia and eclampsia. *Obstet Gynecol* 2002;99(1):159-167.
- 4) AL-Sultani HFF. Prevalence and Severity of Dental Caries, Periodontal Diseases and Dental Erosion among (20-40) Years Old Pregnant Women in Hilla city, Babylon governorate-Iraq. *Medical Journal of Babylon* 2013;10(2):413-420.
- 5) Amar S, Chung KM. Influence of hormonal variation on the periodontium in women. *Periodontal* 2000; 6:79-87.
- 6) Annan BDRT, Nuamah K. Oral Pathologies Seen in Pregnant and Non-Pregnant Women. *Ghana Med J* 2005;39(1):24-27.
- 7) Barak S, Oettinger-Barak O, Oettinger M, Machtei EE, Peled M, Ohel G. Common oral manifestations during pregnancy: a review. *Obstet Gynecol Surv* 2003;58:624-628.
- 8) Boggess KA. Maternal oral health in pregnancy. Society for Maternal-Fetal Medicine. *Obstet Gynecol* 2008;111:976-986.
- 9) Chłapowska J, Opydo-Szymaczek J. Dietary and hygienic aspects of fluoride exposure in pregnant women. *Ann Acad Med Stetin* 2004;(31):44-65.
- 10) Christensen LB, Jeppe-Jensen D, Petersen PE. Self-reported gingival conditions and self-care in the oral health of Danish women during pregnancy. *J Clin Periodontol* 2003;30(11): 949-953.
- 11) Cuco G, Fernandez-Ballart J, Sala J, et al. Dietary patterns and associated lifestyles in preconception, pregnancy and postpartum. *Eur J Clin Nutr* 2006;60(3):364-371.
- 12) Eke PI, Timothe P, Presson SM, Malvitz DM. Dental Care Use Among Pregnant Women in the United States Reported in 1999 and 2002. *Prev Chronic Dis* 2005;2(1):A10.
- 13) Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding women: A background paper. Wellington: Ministry of Health 2006. [Online]. Available from: <http://www.health.govt.nz/publication/food-and-nutrition-guidelines-healthy-pregnant-and-breastfeeding-women-background-paper> [accessed]

- 14) Gordon MC. Maternal physiology in pregnancy. In: Gabbe SG, Niebyl JR, Simpson J, editors. *Obstetrics: normal and problem pregnancies*, 4th ed. New York: Churchill Livingstone; 2002.p. 63-91.
- 15) Hara AT, Lussi A, Zero DT. Biological Factors. In: Lussi A, editor. *Dental Erosion From Diagnosis to Therapy*, 20th vol. Basel: Karger Publishers; 2006.p.88-99.
- 16) Hom JM, Lee JY, Divaris K, Vann Jr WF. Oral health literacy and knowledge among patients who are pregnant for the first time. *J Am Dent Assoc* 2012;143(9):972-980.
- 17) Lalla E, Lamster IB, Drury S, Caifeng F, Schmidt AM. Hyperglycaemia, glycoxidation and receptors for advanced glycation endproducts: Potential mechanisms underlying diabetic complications including diabetes associated periodontitis. *Periodontol* 2000; 23:50-62.
- 18) Lyndon-Rochelle MT, Krakowiak P, Hujoel P, Peters RM. Dental care use and self-reported dental problems in relation to pregnancy. *Am J Public Health* 2004;94:765-771.
- 19) M, Audu BM, Adesina OA, Marupa JY. Oral health practices among pregnant women in North Eastern Nigeria. *Niger J Clin Pract* 2012;15:302-305.
- 20) Matthews DC. The Relationship between Diabetes and Periodontal Diseases. *J Can Dent Assoc* 2002;68(3):161-164.
- 21) Mishkin DJ, Johnson KE, Javed T. Dental diseases. In: Gleicher N, editor. *Principles and Practice of Medical Therapy in Pregnancy*, 3rd ed. Stamford: McGraw-Hill Medical Publishing; 1998.p.1093-1095.
- 22) Mital P, Amit, Raisingani D, Mital P, Hooja N, Priyanka. Dental Caries and Gingivitis in Pregnant Women *Sch J App Med Sci* 2013;1(6):718-723.
- 23) Nagaraj A, Pareek S. Infant oral health knowledge and awareness: Disparity among pregnant women and mothers visiting a government health care organization. *Int J Clin Pediatr Dent* 2012;5(3):167-172.
- 24) Nassrawin N, Barakat M. Prevalence of gingival disease in a population of pregnant women. *JRMS* 2002;9(2):12-15.
- 25) Pirie M, Cooke I, Linden G, Irwin C. Dental manifestations of pregnancy. *Obstet Gynecol* 2007;9:21-26.
- 26) Rakchanok N, Amporn D, Yoshida Y, Harun-Or-Rashid M, Sakamoto J. Dental caries and gingivitis among pregnant and non-pregnant women in Chiang Mai, Thailand. *Nagoya J Med Sci* 2010;72(1-2):43-50.

- 27) Rugg-Gunn AJ. Dental Caries: The Role of Dietary Sugars. In: Hackett AF, editor. Nutrition and Dental Health, 1st ed. New York: Oxford University Press; 1993.p.470.
- 28) Sacco G, Carmagnole D, Abati S, Luglio PF, Ottolenghi L, Villa A, et al. Periodontal disease and preterm birth relationship: a review of the literature. *Minerva Stomatol* 2008; 57(5):233-250.
- 29) Scully C, Cawson RA. Women's Health. In: Parkinson M, editor. Medical problems in dentistry, 5th ed. New Delhi: Elsevier Ltd; 2005.p.489-497.
- 30) Shamsi M, Hidarnia A, Niknami S. Self-Reported Oral Hygiene Habits and Self-Care in the Oral Health in Sample of Iranian Women During Pregnancy. *Middle-East J Sci Res* 2013;13(1):91-100.
- 31) Shanthi V, Vanka A, Bhambal A, Saxena V, Saxena S, Kumar SS. Association of pregnant women periodontal status to preterm and low-birth weight babies: A systematic and evidence-based review. *Dent Res J* 2012;9:368-380.
- 32) Silk H, Douglass AB, Douglass JM, Silk L. Oral health during pregnancy. *Am Fam Physician* 2008;77:1139-44.
- 33) Strafford KE, Shellhaas C, Hade EM. Provider and patient perceptions about dental care during pregnancy. *J Matern Fetal Neonatal Med* 2008;21(1):63-71.
- 34) Thomas NJ, Middleton PF, Crowther CA. Oral and dental health care practices in pregnant women in Australia: a postnatal survey. *BMC Pregnancy Childbirth* 2008;8:13.
- 35) Vogt M, Sallum AW, Cecatti JG, Morais SS. Factors associated with the prevalence of periodontal disease in low-risk pregnant women. *Reprod Health* 2012;9:3.
- 36) Yalda B, Offenbacher S, Collins JG. Diabetes as a modifier of periodontal diseases expressions. *Periodontal* 2000; 6:37-49.
- 37) Zachariassen RD. The effect of elevated ovarian hormones on periodontal health: oral contraceptives and pregnancy. *Women Health* 1993;20:21-30.