Proceeding S.Z.P.G.M.I. vol: 21(2): pp. 87-94, 2007.

Periodontal Status of Women During Pregnancy

Ambrina Qureshi, Amna Qureshi, Shamta Sufia, Ayesha Farooq and Ayyaz Ali Khan
Department of Oral Health Sciences, Shaikh Zayed Federal Postgraduate Medical Institute, Lahore.

ABSTRACT

Objectives: Periodontal condition of women is considered to be debilitated during pregnancy. This is suggested to increase the chances of complications during pregnancy. This study aimed at obtaining information regarding periodontal status during pregnancy, which may be necessary for planning periodontal disease preventive programs for pregnant women in our population. **Material and Methods:** A cross-sectional study was conducted on a sample of 322 registered women at department of Gynecology and Obstetric. Periodontal condition was assessed by CPITN Index and recorded in a semi-structured performa. The data was coded and entered in SPSS version 11.0 and percentage frequencies with their mean and standard deviations were calculated. Exact Chi-sqaure test was used to analyze any significant changes observed in the CPITN scores amongst the study population, where level of significance was $p < 0.05$ with confidence interval 95%. **Results:** Only 17% of these women were observed to have healthy periodontal status and 83% of women had some signs involving a mean of 3 out of six sextants with different levels of signs of periodontal disease, with only less than half sextant with periodontal pockets. However, a moderate level of periodontal debilitation was observed in this population with a mean of 3 sextants having healthy periodontal status. The present study observed a constant level of periodontal status assessed by CPITN Index ($p>0.05$) in women during pregnancy. **Conclusion:** Although CPITN scores remained constant through out pregnancy and no significant change observed in this moderate level of diseased condition. However, shallow and deep periodontal pockets, although not very severe, are observed to be more prevalent. Therefore, special preventive and prophylaxis oral health care programs remain the need for these women during pregnancy.

Keyword: Periodontal status, CPITN, pregnancy.

INTRODUCTION

With respect to the level of oral health deterioration, periodontal disease, in general is the most common oral disease[1]. Periodontal disease is a general term for a series of pathological alterations of the periodontium and firmly it refers to both gingivitis and periodontitis. Gingivitis is an inflammatory condition of the soft tissues surrounding the teeth (the gingiva) and is a direct immune response to the dental microbial plaque building up on teeth. Periodontitis follows gingivitis and is also influenced by the individual's immune and inflammatory response. It is initiated by microbial plaque, but it occurs in only a subset of the population. Periodontitis involves the destruction of the supporting structures of the teeth including the periodontal ligament, bone and soft tissues [2].

Periodontal disease was once generally believed to be an inevitable consequence of aging. However, it has been learned over time that not all people, nor all populations, are at equal risk of developing periodontal diseases [3]. In Pakistan, the high prevalence of periodontal disease correlates with conventional factors such as oral hygiene status, age and socio-economic factors [1, 4]. Clinical studies have shown that oral tissue can be affected by pregnancy. Pregnancy-related changes are most frequent and severe on gingival tissue and it is generally believed that periodontal health generally worsens during pregnancy [5, 6].

Periodontal disease during pregnancy is characterized by periods of exacerbation and

remission. Clinical signs of gingivitis are thus exaggerated and the gingival growth is more edematous and inflamed in such individuals. During pregnancy, the body experiences hormonal changes, which can affect many of the tissues in the body, include the gingival [5, 7, 8]. All such study suggests that both periodontal diseases (both gingivitis and periodontitis) are relatively common concomitant clinical conditions among pregnant women, although prevalence estimates during pregnancy vary considerably (gingivitis 30- 100% and periodontitis 5- 20%), it is usually said to begin in the second or third month of pregnancy, which increases in severity through the eighth month and begins to decrease in the ninth month [9]. During the second trimester of pregnancy, gingivitis may occur more frequently because of a rise in the estrogen level that increases the blood flow to the tissue, which exaggerates the reaction of gingival tissue to the irritants in plaque[7]. The maternal immune system is also thought to be suppressed during pregnancy, which also may be responsible for the exaggerated inflammatory response of gingival and periodontal tissues.

Community periodontal index for treatment needs (CPITN) reflects the oral hygiene care, needs and the periodontal status of the population. The three indicators of periodontal status are used for this assessment: gingival bleeding, calculus and periodontal pockets. No national data is available for the periodontal health status of the women during pregnancy in our population. However, in the light of the studies available, it is believed that periodontal disease severity increases with hormonal changes and therefore during pregnancy. A large body of clinical and laboratory evidence suggests that periodontal infection is one cause of pre-term delivery of low birth weight babies [10, 11] and other adverse pregnancy outcomes [12]. Thus there was a need to assess the periodontal status of these women, which may be debilitated in our population.

The present study was conducted to observe the periodontal status of pregnant women assessed by CPITN. The aim of this survey was to obtain information which is necessary to assess periodontal health needs of pregnant women in our population so that special periodontal preventive and prophylaxis programs may be planned for them.

MATERIALS AND METHODS

A cross-sectional study was conducted at the Gynecology & Obstetric Department of Shaikh Zayed Medical Complex Lahore, which is a tertiary care hospital situated in the urban area of Lahore. Out of the total 1966 cases, over the period of one year i.e., from September 2005 to August 2006, 325 subjects were selected at the time of delivery based on the study criteria.

Permission to carry out this study was taken from the Ethical Review Committee, Shaikh Zayed Medical Complex, Lahore. An informed verbal consent was obtained by each woman for periodontal examination, after explaining them the reason to conduct the study. Further, they were given home remedies for the prevention of poor periodontal condition and mothers who required prophylaxis treatment for their periodontal condition were invited at the Department of Oral Health Sciences for scaling and periodontal treatment.

Sample selection

Prior to periodontal examination, demographic characteristics of the subjects such as age, educational, socio-economic status, data about previous and current pregnancies, habits and drug history were obtained from the women's antenatal record and was transferred on to a semi-structured performa for analysis.

The study included only those registered pregnant women who aged ranging from 18-35 years, with ten or more years of formal education and those belonging to a socio-economic status of at least above poverty line (Rs. 750/ month/person). Women with a history of less than five numbers of pregnancies were included. Moreover, only those who had at least two teeth present in at least each four of the six sextants, with no active local infection (other than periodontal infection) for the past 6 months and who had not undergone any periodontal therapy (such as scaling and root planning) during pregnancy were considered for being study sample.

The present investigation excluded all those subjects who were smokers and alcoholics, women

having anemia, hypertension, diabetes mellitus/ gestational diabetes, hemorrhage, pre-eclampsia, urinary-tract infection, chronic liver disease and chronic renal failure. Moreover, those who were drug abused, had psychiatric illness requiring treatment, with auto-immune disorders, patients on immune modulating agent (steroids), under any antibiotic treatment for the past 6 months and those who refused to participate were also excluded from the study.

Measurement of periodontal status

Periodontal examination was assessed by using CPITN once, irrespective of gestational term. The status was recorded using mouth mirror and the CPITN-E probe (probe35) in the presence of sufficient room light. According to this index, dentition is divided into 6 parts (sextants) for the assessment of CPITN scores. Number of sextant was recorded only if there were 2 or more teeth present. When only one tooth was present in a sextant, it was included in the adjacent sextant. An appropriate highest score for each sextant was recorded in a "box chart" in the Performa. As soon as the highest scored criterion was determined, there was no need to examine for the presence of lower score criteria.

Following CPITN criteria was used to record scores.

Score 0: No signs of disease=

Score 1: Bleeding observed during and after probing

Score 2: Calculus or other plaque retentive factors such as ill-fitting crowns or poorly adapted restorations either seen or felt during probing.

Score 3: Pathological pocket of 4-5mm present (when gingival margin is on the black area of probe).

Score 4: Pathological pocket of 6mm or more present (black area of CPITN not visible)

Periodontal examination was performed by a single examiner to avoid inter-examiner bias. The examiner was pre-calibrated (kappa > 88%) and trained for the periodontal examination using CPITN, which was standardized with the Department of Oral Health Sciences, Shaikh Zayed Medical Complex. Intra examiner reliability was calculated thrice during the study, which was calculated to have a kappa of > 90% each time.

The data were entered into a personal computer using the Statistical Package for Social Science (SPSS) software version 11.0. Descriptive statistics including mean, standard deviations and frequency distributions were performed. The level of significance for Exact Chi-square test was set at $p<0.05$ with confidence interval 95%.

RESULTS

Table 1 shows the maternal characteristics of all the subjects recruited for the study. According to the result, subjects' age ranged from 18-35 years, where majority of subjects were of age 25 years (13%). These subjects had a minimum ten years and a maximum sixteen years of formal education. Majority of mothers (36%) had a formal education of 12 years (Intermediate level). Socio-economic status of the whole study sample was observed to be middle with an average earning of Rs.12,000/- month for approximately 6 family members. The highest income recorded was Rs. 20, 000/ month/ 2 person and the lowest income recorded was Rs. 4,000/ month/ 4 person. However, this fulfilled the study criteria (above poverty line).

Table 1: Characteristics of the Study Population (n=325)

Variables	Mean ± SD
Maternal age (Years)	26.59 ± 3.86
Maternal education (Years)	13.1 ± 2
Monthly income (Rupees)	12456.1 ± 13789.8
No. of Family members (n)	6.2 ± 3.4
Pre-pregnancy BMI (kg/m^2)	26.3 ± 4.7
Pregnancy weight gain (kg)	7.8 ± 1.3
Total no. of pregnancies (n)	2.3 ± 1.3
Total no. of deliveries (n)	1 ± 1.1
Gestational period at periodontal examination (weeks)	38.02 ± 1.95

According to the IOTF (International Obesity Task Force) classification [13] women having BMI at the time of conception ranging from 25-29.9 kg/m^2 are classified as Class I over weight. It can be seen in Table 1 that the mean pre-pregnancy BMI of this study sample falls into the category of Class I over weight with a pregnancy weight gain ranging from

7-8kg. Majority of the subjects (40%) had a normal pre-pregnancy BMI ranging from 18.5-24.9 kg/m^2

Moreover the subjects had experienced less than 5 pregnancies and less than 5 deliveries. Majority of mothers (40%) were experiencing 2nd pregnancy out of which 82% were delivering 1st live birth. At the time of periodontal examination gestational period was also recorded; its mean value is shown in Table 1.

Figure 1 presents the level of periodontal health of this study population, according to which, majority of study population was observed to have a CPITN score of 2 (presence of calculus). Although CPITN score= 4 (pockets of > 6mm) was observed to be less prevalent (18 %) than CPITN scores= 2, but the presence of combined shallow and deep periodontal pockets (scores 3 and 4) were more prevalent (37.6%) even more than presence of calculus (26.4%) i.e., CPITN= 2. Only approximately 17 % of the population had healthy periodontal status and almost 19% had bleeding gums (CPITN=1). However, statistically the prevalence of CPITN scores with different level of periodontal status remained constant through out (p>0.05).

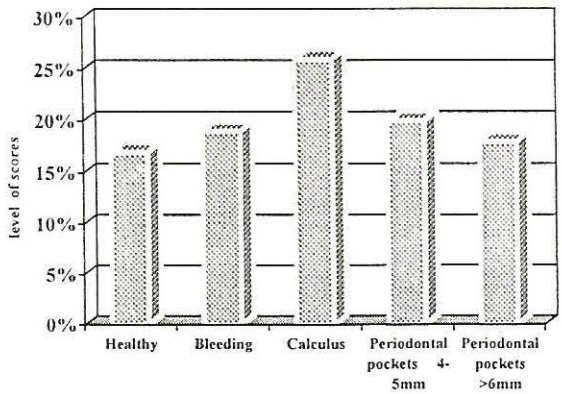

Fig. 1: Prevalence of periodontal status during pregnancy

Counting the mean number of sextants with disease gives clearer indication of periodontal disease severity and the amount of treatment required. Table 2 enumerates the mean number of sextants with CPITN score. This table shows that only half a sextant is involved with shallow and deeper periodontal pockets and almost 3 sextants with healthy periodontal status.

Table 2: Mean Sextants of the study population with periodontal condition.

Periodontal Variables	Mean ± SD
Healthy	2.91 ± 2.39
Bleeding	1.05 ± 1.44
Calculus	1.19 ± 1.33
Pocket 4-5mm	0.63 ± 1.08
Pocket >6mm	0.16 ± 1.11

p > 0.05

Table 3: Mean CPITN score related to demographic variables.

Variables	CPITN score Mean ± SD	p-value
Age group (years)		
18-21	2.07 ± 1.36	0.8
22-25	1.99 ± 1.29	
26-29	2.17 ± 1.35	
30-35	1.87 ± 1.40	
Education (years)		
< 12	2.12 ± 1.33	0.7
> 12	1.95 ± 1.35	
BMI at conception (kg/m^2)		
< 18.5 (under weight)	2.00 ± 1.07	0.4
18.5-24.9 (normal)	2.03 ± 1.33	
25-29.9 (Class I Over weight)	1.93 ± 1.38	
30-34.9 (Class II Over weight)	2.16 ± 1.27	
35-39.9 (Class II a Over weight)	2.21 ± 1.53	
> 40 (Class III Obese)	2.67 ± 2.31	
Monthly income (Rs. / month)		
< 5,000	2.10 ± 1.40	0.3
5000-10,000	2.08 ± 1.28	
> 5,000	1.93 ± 1.43	
Gestational term at periodontal examination (weeks)		
27-30	2.25 ± 1.26	
31-34	2.07 ± 1.64	0.5
35-37	1.85 ± 1.49	
38-41	2.05 ± 1.30	

Comparing CPITN scores with the women' age, educational status, socio-economic status, nutritional status and the gestational period on the day of periodontal examination it may be observed (Table 3) that no significant change is observed in the level of CPITN score with the change in

women' demographic characteristics. There were also no changes observed (p=0.5) on periodontal condition of the women examined at different gestational periods. Figure 2 represents this unchanged trend.

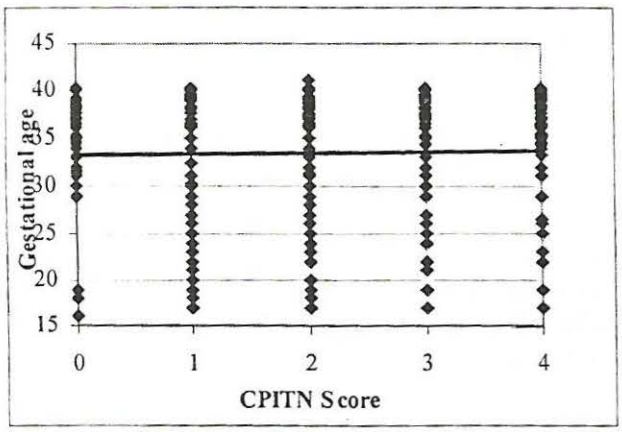

Fig. 2: Trend of CPITN with gestational age

DISCUSSION

No study has been conducted to assess periodontal condition of women during pregnancy in Pakistan. Even the National Oral Pathfinder Survey of Pakistan (NOPS), does not mention the prevalence of periodontal health status of this vulnerable group of our country. This paper presents the results of a cross-sectional study to assess periodontal status of women during pregnancy.

In the presence of rigorous selection criteria, it was contemplated that the subjects recruited for the study may have a better periodontal status. However, even after excluding all other confounding factors responsible for periodontal disease (such as systemic conditions and diseases, smoking, steroids, anemia, old age, lower socio-economic, nutritional and educational status), it was observed that only approximately 17% of the study population had healthy gums (CPITN= 0); others either had CPITN= 1 (19%), CPITN= 2 (26%) or had CPITN= 3 and 4 (periodontal pockets) of approximately 38%, out of which 18% were found to have deep periodontal pockets of > 6mm. According to the CPITN, bleeding gums (score 1) is the sign of gingivitis and the presence of calculus (score 2) indicates periodontal disease of a moderate level.

Hormonal changes during pregnancy are believed to predispose women to gingivitis, mainly because of the effect of estrogen, the gums become inflamed, edematous, and sensitive, with a tendency to bleed easily, and existing gingivitis may worsen considerably during pregnancy if the plaque is not removed [5, 6]. Studies have indicated that periodontal pocket depths increase significantly during pregnancy and decrease at the end of pregnancy or after parturition, suggesting that periodontal progression is observed during pregnancy at its every stage. On the other hand, a few studies have demonstrated no serious gingival changes during pregnancy [14, 15].

The main draw back of cross-sectional studies is that they cannot establish the line order of the risk factor and complications i.e., in the case of present study, whether the true periodontal infection is present during pregnancy. Although, it has been reviewed that increased poor periodontal experience in pregnant women usually begins in the second or third month of their pregnancy, which increases in severity through the eighth month and begins to decrease in the ninth month, no attempt was made in this study to observe periodontal status progression with respect to pregnancy gestational terms. Most of the women were examined for their periodontal status at the time of delivery. The bias of not being able to measure the progression of periodontal disease are negligible or at least decreased in prospective studies in which the examinations are performed periodically from the onset of disease till the time just before delivery.

However, it has been reviewed that periodontal disease progresses in episodes of exacerbation and remission and termed this the "burst hypothesis". Such a progression may actually have a more continuous rather than episodic pattern [16]. Periodontal disease progression can be considered a continuous process that undergoes periods of exacerbation. Therefore, both the continuous and episodic hypotheses of disease progression have merit.

As observed in Figure 1, level of periodontal condition amongst the study population is comparable to that observed in National Oral Health Pathfinder Survey of Pakistan (NOPS), which was

also found to be at a moderate level [1]. Although, the pathfinder did not include pregnant women of the present study age group, comparing the results of present study with the results of pathfinder it was observed that there was no variation in the mean level of pregnancy related periodontal status and mean periodontal status of normal population of Pakistan.

Although the mean highest score observed in the present study is CPITN=2 (presence of calculus), it may be noticed in Figure 1 that presence of CPITN=3 and 4 is approximately 20% and 18% respectively. Thus a high level of periodontal debilitation is observed to be more prevalent as compared to the level of healthy periodontal status in the present study. However, on the positive side, a mean of almost 3 sextants with healthy status are observed (Table 2) and only one sextant each is observed to have signs of bleeding, calculus and periodontal pocketing of > 4mm. This suggests, that although the prevalence of diseased periodontal status is more during pregnancy, it may not be severe enough to cause any systemic effects. Further investigations are suggested to observe any adverse effects of periodontal disease during pregnancy on its systemic or delivery outcomes.

It has been reported that periodontal tissue changes during pregnancy including hyperaemia, oedema and marked tendency towards bleeding increase gradually until the 36th week of gestation[5, 6,17]. However, the present study did not observe any significant difference in the periodontal status of women examined at < 36 weeks of gestation and those examined at > 36 weeks of gestation (Table 3). Figure 2 shows that trend remains unchanged related to the gestational weeks at the time of periodontal examination.

There were also no changes in the periodontal status observed with respect to the maternal age, socio-economic (monthly income), nutritional (BMI) and educational status of the study population. Over all the level of periodontal status remained moderate in the entire study population, indicated by presence of calculus, regardless of their demographic status and the gestational term at the time of examination. However upon a closer scruitinization (Table 3), although not significant, with the increase in educational and socio-economic status there is a slight reduction in the mean CPITN score observed.

It may be noticed that the present study included only women with a formal education of more than ten years and socio-economic status of above poverty line. Hence, a higher level of periodontal debilitation may be anticipated in population with lesser educational and socio-economic level and vice versa. Studies have suggested that poor periodontal condition during pregnancy may be attributed to low socio-economic status, inaccessibility to dental clinics, and unawareness of oral hygiene [18, 19]. Lower levels of education are also significantly observed to be associated with poor gingival and periodontal health. This inverse relationship is possibly the result of poor or lower awareness of the importance of oral hygiene during pregnancy [20]. However, further research is suggested in this area.

CONCLUSION

In summary, it is suggested that the level of periodontal condition of women during pregnancy remain constant and moderately debilitated. However, although not severely involved, it is still evident that women during pregnancy with shallow and deeper periodontal pockets combined are more prevalent in this population. Thus, there is a need for special oral health programs for this group. For an over all moderate level of periodontal status, it is suggested that women must be encouraged to keep their oral hygiene and only in severe cases, such as periodontal pocketing, they may be targeted towards appropriate treatment such as scaling and root planing. Instruction regarding oral health should include teaching the pregnant women about expected physiologic changes in the mouth and interventions to prevent and relieve these discomforts. For example, instructing them for regular brushing and flossing. Moreover, it is known that children' oral health status and practices reflect those of their mothers'. If the future mothers of our society are healthy, their newborns will grow up into healthy children after all.

REFERENCES

1. Khan AA, Ijaz S, Syed A, Qureshi A, *et al*:

Oral Health in Pakistan- A situation analysis. *Dev Dent* 2004; 5 (2): 35-44.

2. Louro P M, Humberto H F, Paulo L F, Jaulo L F, *et al.* Periodontal disease in pregnancy & low birth weight. J Pediatr (Rio J) 2001; 77: 23- 28.
3. Peter S: Essentials of preventive and community dentistry. Second Ed; *ARYA* (Medi) Pub House, *New Dehli*: Sept 2003; 436-39.
4. Maher R: Dental disorder in Pakistan- a national pathfinder study. *J Pak Med Assoc* 1991 Oct; 41: 250-52.
5. Loe H, Silness J. Periodontal disease in pregnancy. I. Prevalence and severity. *Acta Odonto Scand.* 1963; 21: 533-51.
6. Hugoson A. Gingivitis in pregnant women. A longitudinal clinical study. *Odonto Revy.* 1971; 22: 65-84.
7. Sooriyamoorthy M, Gower DB: Hormonal influences on gingival tissue: relationship to periodontal disease. *J Clin Perio* 1989; 16: 201–8.
8. Lindhe J, Bjorn AL. Influence f hormonal contraceptives on the gingival of women. J Perio Res 1967; 2: 1-6.
9. Laine MA: Effect of pregnancy on periodontal and dental health. *Acta Odontol Scand* 2002; 60: 257-64.
10. Offenbacher S, Katz V, Fertik G, Collins J, *et al*: Periodontal infection as a possible risk factor for pre-term low birth weight. *J Perio* 1996; 67(10 Suppl): 1103–13.
11. Davenport ES, Williams CE, Sterne JC, Murad S, *et al*: Maternal periodontal disease and pre-term low birth weight: case– control study. *J Dent Res* 2002; 81, 313–18.
12. Moore S, Ide M, Coward PY, *et al.* A prospective study to investigate the relationship between periodontal disease and adverse pregnancy outcome. *Br Dent J* 2004; 197:251–58.
13. The guidance on best practice when advising on obesity. Prepared by: Practice Div Royal Pharma Society Great Britain; Rev. Ed. 2005: *London.*
14. Jonsson R, Howland B E, Bowden G H W. Relationships between periodontal health, salivary women steriods and Bacteriodes intermedius in males, pregnant and non-pregnant. *J Dent Res.* 1988; 67: 1062-69.
15. Maliza J E, Mosha H J, Masalu J R. Periodontal status of pregnant and post-partum mothers aged 18 years attending MCH clinics in Tango Municipality. *East Afr Med J.* 1993; 70: 799-808.
16. Socransky SS, Haffajee AD, Goodson JM, Lindhe J. New concepts of destructive periodontal disease. *J Clin Periodontol* 1984: 11: 21–32.
17. O'neil TCA. Plasma female sex hormones levels and gingivitis in pregnancy. *J Periodont.* 1979; 50: 279-82.
18. Ogunwade SA. Study of material chemoprohylaxis and pregnancy gingivitis in Nigerian women. *Clin Prev Dent.* 1991; 13: 25-33.
19. Taani D Q, Habashneh R, Hammad M M, Batieha A. The periodontal status of pregnant women and its relationship with socio-demographic and clinical variables. *J Oral Rehab* 2003; 30: 440–45.
20. Mark R H, Rajala M, Pavniok L. Periodontal treatment need of the Finnish population aged 30 years and over. *Comm Dent & Oral Epide.* 1983; 11: 25-32.

The Authors:

Dr. Ambrina Qureshi
Research Scholar (Community Dentistry)
Department of Oral Health Sciences,
Shaikh Zayed Federal Postgraduate Medical Institute, Lahore.

Dr. Amna Qureshi
Research Scholar (Oral Pathology)
Department of Oral Health Sciences,
Shaikh Zayed Federal Postgraduate Medical Institute, Lahore.

Dr. Shamta Sufia
Research Scholar (Community Dentistry)
Department of Oral Health Sciences,
Shaikh Zayed Federal Postgraduate Medical Institute, Lahore.

Dr. Ayesha Farooq
Research Assistant
Department of Oral Health Sciences,
Shaikh Zayed Federal Postgraduate Medical Institute, Lahore.

Dr. Ayyaz Ali Khan
Assistant Professor and Head
Department of Oral Health Sciences,
Shaikh Zayed Federal Postgraduate Medical Institute,
Lahore.

Address for Correspondence:

Dr. Ambrina Qureshi
Research Scholar (Community Dentistry)
Department of Oral Health Sciences,
Shaikh Zayed Federal Postgraduate Medical Institute, Lahore.
E-Mail: ambrinaqureshi@yahoo.com