**Journal of Advanced Medical and Dental Sciences Research**

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

# Original Research

## Periodontitis, Socio demographic factors and physical inactivity: A cross-sectional observation study

Dr. Shipra Sepolia[1], Dr. Parul Verma[2]

[1]Lecturer, Department of Periodontics and Implantology, Indira Gandhi Government Dental College, Jammu;
[2]Senior Lecturer, Department of Conservative and Endodontics, Institute of Dental Sciences, Sehora, Jammu

***ABSTRACT:***

**Background**: The prevalence of periodontal disease is significantly higher in a large majority of population but these are exacerbated in populations of men with less income, low educational levels and smokers. Apart from causing periodontal diseases, there cause bad breath and tooth loss, but may be association with systemic diseases like- cardio-vascular disease, stroke, metabolic hyperglycemia, pneumonia, non-alcoholic hepatic diseases, rheumatoid arthritis, osteoporosis, diabetes, obesity, pre-term births and low- birth weight of infants. **Aim**: The aim of the study was to assess an association between periodontitis and physical activity. **Materials and methods**: A total of 300 study participants were selected based upon inclusion criteria i) Age range of 20 to 50 years; b) Subjects willing for the study; whereas the exclusion criteria of the study were- a) Subjects suffering from medically compromised systemic conditions such as- HIV, infective endocarditis, diabetes mellitus, hypertension, pregnancy and b) Subjects on drugs or medications such as- anti-inflammatory agents, tetracycline, Vitamin C for an approximate duration of six months or use of drugs which cause enlargement of gingival tissues, for example, Dilantin, Phenytoin, calcium channel blockers like- Nifedipine, cyclosporine, amlodipine. A validated questionnaire was used to collect information on social and demographic features, life style variations and periodontal findings. Collected data was statistically analyzed using the multivariate regression analysis. **Results**: A significant association was observed between stress levels in individuals with less physical activity or exercising capability and increase in periodontal health. **Conclusion**: An active life style should be followed for maintaining good oral and periodontal health status and should be encouraged in patients diagnosed with inactive life style.

**Keywords**: Periodontitis, life style, inactivity, oral health.

Received: 16 September, 2020 Accepted: 22 November, 2020

**Corresponding author:** Dr. Shipra Sepolia, Lecturer, Department of Periodontics and Implantology, Indira Gandhi Government Dental College, Jammu, India

**This article may be cited as:** Sepolia S, Verma P. Periodontitis, Socio demographic factors and physical inactivity: A cross-sectional observation study. J Adv Med Dent Scie Res 2020;8(12):88-94.

## INTRODUCTION

Periodontitis is the second most common oral disease following dental caries.[1] Various risk factors that are responsible for periodontitis, include number of systemic diseases, stress, nutritional status, smoking and physical inactivity.[2,3]

Hypertension is a life-style disease which can be prevented by adopting a healthy and active life-style. The risk of development of both hypertension and diabetes have been found to increase with progression of age. The American Heart Association (AHA) has demonstrated that there is a 3.6 times higher risk of cardiovascular disease in patients suffering from diabetes when compared to general population. [1]

Periodontitis is a disease of inflammatory origin that results in loss of supporting tooth structure and periodontal pocket formation which ultimately causes the teeth to become mobile and may eventually, be exfoliated. A periodontal pocket is measured by using periodontal probe and is assessed by measuring gingival edge from base of periodontal pocket. [1]

It has been reported by many investigators that the presence of hypertension causes periodontal disease.[1] There appears to be a relationship between oral health status, in particular, periodontal disease and

cardiovascular health as supported by evidence of transient bacteraemia and elevation of inflammatory markers. It has been suggested that the presence of periodontal disease predisposes to acceleration in progression to atherosclerosis and increased stroke, myocardial infarction and eventually, death due to cardiovascular event. These have been classically assessed by measuring- a) loss of teeth; b) periodontal depth of pockets and clinical loss of attachment and. [4] Hypertension is a systemic condition responsible for increase in hospitalization and associated morbidity. It is also a risk factor for causation of stroke as well as cardiovascular disease. It is related to dysfunctioning of endothelial cells and with other factors such as- smoking and hyperlipidemia aids in promotion of atherosclerosis disease. There appears to be an inflammatory etiological factor influencing hypertension. Numerous studies have demonstrated an increase in levels of C-reactive proteins in periodontal compromised individuals specially, in aggressive and generalized disease, in comparison with healthy subjects. [5, 6]

The process of ageing takes place through continuous changes in physiological and biological mechanisms occurring within the human body. Oral changes associated with ageing process includes- alterations in epithelium leading to reduced keratinisation, Changes in periodontium (cemental resorption and loss of alveolar bone). As common age-related systemic diseases or conditions manifest, they may present as diabetes mellitus or hypertension which are both associated with occurrence of periodontitis, especially in elderly population.[7] Glycemic control as evident in type 2 diabetes mellitus can also help in alleviating the chronic inflammatory response in periodontal conditions.[8] Obesity is a multi-systemic condition. It contributes to development of diseases such as- hypertension, diabetes, atherosclerosis, cardiovascular and cerebrovascular disease. [9]

Exercise may be defined as 'a planned structured activity which helps in improving capability and capacity of human body.' Regular physical activity helps in increasing capacities involving general physical health. Regular activity helps in increasing propioception, improving the cardio-vascular physiological mechanisms and total pulmonary capacity as well as reduction in adipocytic tissue. [10, 11, 12]

Regular physical activity has been demonstrated to cast a protective role against development of risk of chronic periodontal disease. However, increased muscular stress or physical activity can produce pro-inflammatory mediators such as- tumor necrosis factor-α (TNF- α), IL (Interleukin)-6, IL-10, thus, producing detrimental effects on the body. [13, 14, 15]

Regular physical exercising may lead to adaptations in a person's physiologic and morphological behaviour that involves maintenance of homeostasis. 'Inflammation' is an adaptive response triggered against any infectious process. Thus, inflammation acts by restoring homeostasis usually. However, when it is unregulated can lead to disease process such as the onset of periodontitis.[16] It has been seen that performing regular physical exercise helps in improvement of one's quality of Life (QoL) and causes enhancement of general physical health and well-being.[17,18]

## MATERIALS AND METHODS

**Study design**: This cross-sectional and prospective study was conducted on individuals within the age range of 20 to 50 years. Patients were selected from those visiting the dental Out Patient department (OPD) and from dental screening camps organized at different locations. A validated questionnaire was distributed to all study participants who were categorized into 150 rural and 150 urban subjects. Inclusion criteria for eligibility of subjects were- 1) Patient age range between 20 to 50 years; b) those subjects who were willing for the study; while the exclusion criteria included- a) subjects who were suffering from medically compromised systemic conditions such as- HIV, infective endocarditis, diabetes mellitus, hypertension, pregnancy etc and b) Subjects on specific medications such as- anti-inflammatory agents, tetracyclins, Vitamin C for a duration of six months or those drugs responsible for the enlargement of gingival tissues, for example, Dilantin or Phenytoin, calcium channel blockers like-Nifedipine, cyclosporine, amlodipine.

The questionnaire contained information on socio and demographic profile of individuals such as- age, sex, location or address, marital status, monthly income, level of education and occupation. The questionnaire was also used to collect information on oral health related habits such as- frequency of visits to dentists, methods used for brushing of teeth, devices used for brushing or cleaning of teeth and presence of habits such as- tobacco and paan chewing. The "Eight itemed health practice" scale was used for evaluating life-style. These eight items were concerning- a) Presence of smoking habit; b) Consumption of alcohol, c) habit of consuming regular breakfast; d) total hours of sleep; e) total amount of working hours; f) whether there are any signs of mental stress; g) whether the individual exercises regularly or performs physical activity and h) nutritional intake.

If score was graded as-a) good (Code = 1) and b) bad (Code = 2) for health related practices. Based on the scores obtained, three categories were assigned- a) Scores 0 to 3 for poor lifestyle; b) Scores 4 and 5 as with moderate lifestyle and c) Score of 6 or higher as subjects with good lifestyle.

### Assessment of clinical periodontal status

Periodontal tissue health status was measured as per the World Health Organization (WHO) tool-Community Periodontal Index or CPI". The CPI scores ranged as follows- a) Healthy periodontium-

Score 0; b) Bleeding from gingival- Score 1; c) Presence of calculus and bleeding from gingival tissues- Score 2; d) Periodontal pocket depth of 3.5 to 4.5 mm- Score 3 and e) Periodontal pocket depth of more than 5 mm- Score 4. Index teeth examined were-central incisors and first and second molars in all four quadrants of oral cavity.

Pocket depths were measured at following six sites in-mesio-buccal, mid-buccal, disto-buccal, mesio-lingual, mid-lingual and disto-lingual by making use of a CPITN (Community Periodontal Index for Treatment Needs) probe. Periodontitis was defined as-"periodontal pocket depth with an average CPI score measuring 3 to 4 mm or more'. [19]

**STATISTICAL ANALYSIS:**

Multivariate regression analysis was used for evaluating independent association variables related to different life-style factors.

**RESULTS**

On performing statistical analysis, following observations were made:

a) Loss of attachment or gingival attachment and depths of periodontal pockets: On comparison of periodontal pocket depths of greater than 5 mm, extreme statistical significance of 0.0004 was seen. On comparing the clinical loss of attachment (greater than 4 mm), again an extremely significant statistical difference of 0.0001 was obtained (table 1).

b) Oral health practices among study subjects: Non-significance was observed between habits histories of smoking and alcohol consumption (P = 0.5 and 0.45, respectively). However, significant difference was observed between hours of sleep that a person spends with a P value of 0.05. However, on again comparing hours of breakfast, total numbers of working hours per day, type of diet and the frequencies of performing exercise demonstrated non-significant Probability values of 1.2, 0.4, 0.2 and 0.3, respectively. While the stress levels demonstrated significant difference of 0.4 (table 2).

c) Social and demographic characteristics: A significant statistical difference (P = 0.08) was obtained on comparing the gender distribution. Also, extreme significant P values of 0.002 and 0.0003 were noted between age groups and marital status, respectively. Non-significant P values of 0.2 and 0.3 were obtained on comparing educational level and occupational statuses. Monthly income generated showed no significance (P = 0.9) (table 3).

Table 1: Showing age adjusted mean ± SD values of different sites with pocket depths and severe loss of attachment

| Variables or parameters studied | Missing teeth ( 0 to 9) (n = 100) | Missing teeth ( 10 to 19) (n = 100) | Missing teeth ( 20 to 31) ( n =100) | P values |
|---|---|---|---|---|
| a) Mean numbers of sites | 160 ± 2.5 | 110 ± 1.5 | 47 ± 1.7 | |
| b) Periodontal pocket depth (≥ 5 mm) | 8.9 ± 1.5 | 14 ± 2.1 | 15.1 ± 1.5 | 0.0004 |
| c) Loss of attachment (≥ 4 mm) | 30.1 ± 1.7 | 39.4 ± 1.9 | 63.2 ± 2.7 | < 0.0001 |

Table 2: Table showing distribution of patients as per the health practice index scale

| Variables or studied parameters | Urban subjects (n %) | Rural subjects (n %) | P values |
|---|---|---|---|
| I. Smoking habit | | | |
| a. Active smoker | 8.1 | 12.1 | |
| b. Past smoker | 4.2 | 6.1 | 0.5 |
| c. Never smoked | 89 | 83 | |
| II. Alcohol consumption | | | |
| a. Every other day | 2.1 | 3.1 | |
| b. 3 to 5 times per week | 1.0 | 1.2 | |
| c. 1 to 2 times per week | 9.1 | 2.7 | 0.45 |
| d. 1 to 3 times per week | 5.1 | 8.2 | |
| e. Between 1 to 10 times per year | 5.2 | 3.2 | |

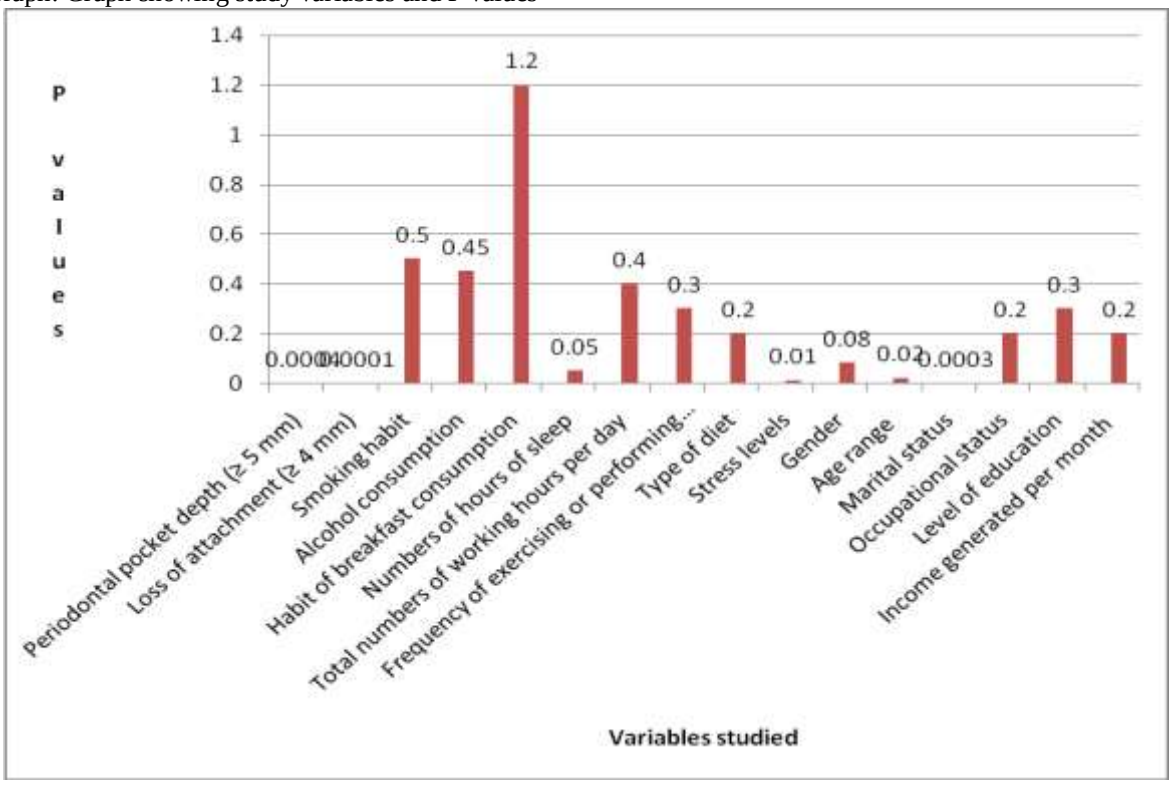
| | | | |
|---|---|---|---|
| f. Never consumed alcohol | 83 | 89 | |
| III. Habit of breakfast consumption | | | |
| a. Everyday | 91 | 93 | 1.2 |
| b. Occasionally | 9.2 | 5.6 | |
| c. Never | 2.1 | 6 | |
| IV. Numbers of hours of sleep | | | |
| a. Greater than 8 hours of sleep | 7.2 | 13.1 | |
| b. Seven to eight hours of sleep | 45 | 42 | 0.05 |
| c. Up to six to seven hours of sleep | 21 | 20 | |
| d. Less than five hours of sleep | 2.1 | 4.1 | |
| V. Total numbers of working hours per day | | | |
| a. Twelve hours | 13 | 10 | |
| b. Ten hours | 16.5 | 10.9 | 0.4 |
| c. Nine hours | 13 | 8.5 | |
| d. Eight hours | 34 | 40 | |
| e. Less than seven hours | 24 | 31 | |
| VI. Frequency of exercising or performing physical activities | | | 0.3 |
| a. Every day | 30 | 11 | |
| b. 2 to 4 times per week | 7.2 | 1.5 | |
| c. Twice per week | 6.2 | 10.2 | |
| d. Once per month | 3.0 | 2.9 | |
| e. Never | 62 | 69 | |
| VII. Type of diet | | | |
| a. Nutritionally balanced | 76 | 70 | |
| b. No concern regarding intake of balanced nutrition | 22<br>4.5 | 26<br>06 | 0.2 |
| c. Excess consumption of junk food | | | |
| VIII. Stress levels | | | |
| a. Excess stress levels | 4.5 | 17.1 | |
| b. Mild amount of stress levels | 38 | 23 | 0.01 |
| c. Minimal stress levels | 62 | 60 | |

Table 3: Table showing distribution based upon social and demographic characteristics

| Variables or parameters studied | Urban subjects (n %) | Rural subjects (n %) | P values |
|---|---|---|---|
| I. Sex: | | | |
| a. Males | 49 | 52 | 0.08 |
| b. Females | 51 | 48 | |
| II. Age range (in years): | | | |
| a. 20 to 36 years | 54 | 53 | 0.002 |

| | | | |
|---|---|---|---|
| b. 36 to 50 years | 46 | 47 | |
| III. Marital status | | | |
| a. Married | 80 | 79 | 0.0003 |
| b. Single | 20 | 21 | |
| IV. Occupational status: | | | |
| a. Unemployed | 44 | 42 | |
| b. Unskilled | 5.2 | 2.7 | 0.2 |
| c. Skilled | 13.8 | 14.2 | |
| d. Semi-professional | 7 | 0.1 | |
| V. Level of education | | | |
| a. Primary school | 4.2 | 35 | |
| b. Middle level school | 68 | 26 | 0.3 |
| c. High school | 26 | 20 | |
| d. Diploma or undergraduate | 21 | 17 | |
| e. Postgraduate level | 44 | 5.9 | |
| VI. Income generated per month (in Rupees) | | | |
| a. Less than 5000 | 17 | 62 | |
| b. 5001 to 20, 000 | 49 | 38 | 0.2 |
| c. 20,001 to 50, 000 | 25 | 02 | |
| d. D. Greater than 50, 000 | 11 | 11 | |

Graph: Graph showing study variables and P values




## DISCUSSION

There was a statistically significant difference obtained between gender distribution, studied age groups and marital history of study subjects in this study. Present study has demonstrated an extremely significant association between clinical loss of gingival attachment and periodontal pocket depths in individuals with lack of physical activity. These findings have been supported by a number of studies as discussed in following content. Also, stress levels in the subjects showed statistical correlation. However, no other life style related variable showed any statistical significance.

Notohartojo et al (2019) in their cross-sectional study found statistical correlation between hypertension and periodontal disease ($P < 0.001$). Also, a statistical correlation was noted between physical activity and periodontal health status ($P < 0.001$). [1]

Desvarieux et al (2003) showed the presence of atherosclerotic plaque in carotid artery in 46 %

patients with up to nine missing teeth while it was found to be 60 % in subjects with greater than ten missing teeth due to periodontitis.[4] Similarly, correlations have been observed between periodontitis and plasma interleukin-6 (IL-6) levels by few investigators. [20, 21, 22]

Alkan et al (2020) evaluated the association between periodontitis, exercising and obesity. They observed significant reduction in pocket depth and clinical loss of attachment, levels of serum depth, Tumor Necrosis Factors (TNF)-α and Leptin along with an increase in Resistin in gingival crevicular fluid (GCF) samples in patients diagnosed with chronic periodontitis after regular exercising.[23] Similarly, Fereira et al (2019) also reported a close association between diseases of periodontium and regular physical activity or exercises.[10]

Physical activity has been hypothesized to influence periodontal tissue health through their effects on glucose metabolic pathways. Any physical activity significantly helps in improving the glucose metabolism and causes reduction in resistance towards insulin and resultant, hyperglycemia. Hyperglycemia is closely associated with an increase in inflammatory process of entire body systems. It is closely related to depositions of glycation end-products within the periodontium causing inflammatory process. Thus, both systemic and local inflammation as the result of hyperglycemia has been hypothesized to increase damage to periodontal health. Thus, apart from metabolic diseases confounding factors include- pathological conditions such as hypertension, stroke and pulmonary diseases due to smoking habit. Presence of any physical activity causes reduction of inflammatory processes which have been demonstrated to exert significant effects on the overall development of periodontitis. There are studies which show an association between physical activity or work and plasma levels of markers of inflammation. [24,25]

Hence, it is important to bracket the oral diseases along with systemic conditions to aid in better management of these cases.

## CONCLUSION

The results of our study provided an indication that an active life style is an important confounding factor and significant predictor of periodontal health. It is a known fact that the oral microorganisms are primary etiologic factors for periodontal diseases, however numerous research papers that are emerging nowadays are demonstrating that confounding variables such as- environmental factors, social behaviours, and Genetic constitution may make contribution to this disease process.

Hence, subjects with inadequate life- style changes must be encouraged to undergo significant modifications in their way of lives and should comply with requirement for maintaining healthy gingival and periodontal conditions.

## REFERENCES


1. Notohartojo IJ, Surati MAL, Setiawaty V. The association between hypertension, physical activity and brushing technique with periodontal disease. Bali Med J 2019;8(1):216-20.
2. Kim EJ, Han GS. Increased physical activity decreases prevalence of periodontitis: The Korean National Health and Nutritional Examination Survey (KNHANES VI) (2013-2015). Iran J Publ Health 2020;49(2):389-91.
3. Beavers RM, Brinkley TE, Nickas BJ. Effect of exercise training on chronic inflammation. Clin Chim Add 2010;411(11-12):785-93.
4. Desvarieux M, Demmet RT, Rundek T, Boden-Albala B, Jacobs DR, Pappanou PN et al. Relationship between periodontal disease, tooth loss and carotid artery plaque. The oral infections and vascular disease epidemiology study (INVEST). Stroke 2003;34:2120-5.
5. Rivas-Tumanyan S, Spielgelman D, Curban GC, Forman JP, Joshipura KJ. Periodontal disease and incidence of hypertension in the health professionals follow-up. Am J Hypertension 2012;25(7):770-6.
6. Ebersole JL, Machen RL, Steffen MJ, Willman DE. Systemic acute-phase reactants, C-reactive proteins and haptoglobin in adult periodontitis. Clin Exp Immunol 1997;107:347-52.
7. Soulissa AG. A review of the factors associated with periodontal disease in the elderly. J Indon Dent Ass 2020;doi:10.32793/jida.v3i1.448.
8. Tunes RS, Foss-Freitas MC, Nogueiro-Filho GR. Impact of periodontitis on the diabetyes-related inflammatory ststus. J Can Dent Assoc 2010;76:a35-42.
9. Dahiya P, Kamal R, Gupta R. Obesity, periodontal and general health: Relationship and management. Ind J Endocrinol Metab 2012;16(1):88-94.
10. Feriera RO, Correa MG, Magno MB, Almeida APCSC, Fagundes NCF, Rosing CK et al. Physical activity reduces the prevalence of periodontal disease: Systematic review and meta-analysis. Systematic Rev 2019;doi:10.3389.
11. Fernandes RA, Ritti-Dias RM, Balagopal PB, Conceicao RDO, santos RD, Cucato CG et al. Self-initiated physical activity is associated with high sensitivity C-reactive protein: a longitudinal study in 5030 adults. Atherosclerosis 2018a;273:131-5.
12. Garber CE, Blissmer B, deschenes MR, Franklin BA, Lamonte MJ, Lee IM et al. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal and neuromotor features in apparently healthy adults: guidance for prescribing exercise. Med Sci Sports Exerc 2011;43:1334-59.
13. De Souza BC, Ribas ME, Lopes AL, Teixeira BC, Lamers ML. Periodontal disease influences the recovery processes in the skeletal muscles in trained mices. J Phys Ed Sport 2017;19(2):572-81.
14. Keelan JA, Wong DM, Bud PS, Mitchell MD. Innate inflammatory responses of human deciduous cells to periodontopathic bacteria. Am J Ostet Gynaecol 2010;202(5):1-11.
15. Baek KJ, Choi Y, Ji S. Gingival fibroblasts from periodontitis patients exhibit inflammatory characteristics in vitro. Arch Oral Biol 2012;58(10):1282-92.
16. Bartolini BM, Rodrigues PHC, Brandao LUA, Lecize DS, Bertolini GCF, Nassar CA et al. Bone tissue behaviour of rats with experimental periodontitis

subjected to physical exercise. Rev Bras Med Esporte 2019;25(2):33-7.
17. Genco RJ. Current view of risk factors for periodontal disease. J Periodontol 1996;67(10 Suppl):1041-9.
18. Haskell WL, Lee IM, Pate RR. Physical activity and public health: Updated recommendation for adults from the American college of Sports Medicine and the American heart association. Med Sci Sports Exerc 2007;39(8):1423-34.
19. Abusleme L, Dupuy AK, Dutzan N. The subginigival microbiome in health and periodontitis and its relationship with community biomass and inflammation. Isme J 2013;7(5):72-80.
20. Loos BG, Craandyk J, Hoek FJ, Wertheim-van Dillen PM, van der Veldin U. Elevation of systemic markers realted to cardiovascular diseases in the peripheral blood of periodontitis patients. J Periodontol 2000;71:1528-34.
21. Mengel R, Bacher M, Flores-De-Jacoby L. Interactions between stress, interleukin-1 beta, interleukin-6 and cortisol in periodontally diseased patients. J Clin Periodontol 2002;29:1012-1022.
22. Joshipura KJ, Wand HC, Merchant AT, Rimm EB. Periodontal disease and biomarkers related to cardiovascular disease. J Dent Res 2994;83:151-5.
23. Alkam B, Guzeldemir-Akiakanat E, Odabas-Ozgun B, Ozgun T, Demirdizen-Taskiran A, Kir HM et al. Effects of exercise on periodontal parameters in obese women. Niger J Clin Pract 2020;23:1345-55.
24. Salvi GE, Lawrence HP, Offenbacher S, Beck JD. Influence of risk factors on the pathogenesis of periodontitis. Periodontol2000 1997;14:173-9.
25. Page RC, Beck JD. Risk assessment for periodontal diseases. Int Dent J 1997;47:61-7