ejbps, 2022, Volume 9, Issue 5, 213-218. Research Article SJIF Impact Factor 6.044

EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES

http://www.ejbps.com

ISSN 2349-8870
Volume: 9
Issue: 5
213-218
Year: 2022

EFFICACY OF SCALING AND ROOT PLANING IN OBESE AND NON-OBESE INDIVIDUALS WITH STAGE-I PERIODONTITIS– A CLINICAL AND BIOCHEMICAL STUDY

Dr. Nikee Upadhyay[1]*, Dr. Monali Shah[2], Dr. Richa Peshwe[3]

[1]M.D.S-Periodontology, K. M. Shah Dental College & Hospital, Sumandeep Vidyapeeth, Vadodara, Gujarat.
[2]Professor and Head, Department of Periodontology, K.M.Shah Dental College& Hospital, Sumandeep Vidyapeeth, Vadodara, Gujarat.
[3]Second year Post-Graduate Student, Department of Periodontology, K.M.Shah Dental College& Hospital, Sumandeep Vidyapeeth, Vadodara, Gujarat.

***Corresponding Author: Dr. Nikee Upadhyay**
India

Article Received on 15/03/2022 **Article Revised on 04/04/2022** **Article Accepted on 25/04/2022**

ABSTRACT

Aim: The aim was to evaluate and compare the effect of scaling and root planing on serum resistin and serum triglycerides levels in obese and non-obese individuals with stage-I periodontitis. **Settings and Design:** A clinical and biochemical study conducted after the approval from Institutional Ethics Committee to evaluate the efficacy of phase-I periodontal therapy on biochemical parameters (serum resistin levels and serum triglycerides levels) in obese and non-obese individuals with stage-I periodontitis. **Methods and Material:** A total of 48 subjects, aged above 18 years, diagnosed with stage-I periodontitis were divided into two groups as 24 obese individuals in Group 1 and 24 non-obese individuals in Group 2. Both groups were treated with scaling and root planing at baseline and 2 months follow-up. Clinical parameters such as Gingival Index (GI), Plaque Index (PI), Clinical Attachment Level (CAL) and Clinical Periodontal Sum Score (CPSS) and biochemical parameters such as serum resistin and serum triglycerides levels were assessed at baseline and two months after scaling and root planing. **Statistical analysis used:** Unpaired t -test, Paired t -test and Mann Whitney U test were used to analyse the change in clinical and biochemical data. **Results:** On intergroup comparison, highly significant improvement ($P<0.001$) in all clinical parameters (PI,CAL,CPSS) was seen, whereas GI ($P=0.018$) showed statistical difference at baseline to 2 months. Both biochemical parameters including serum resistin and triglycerides showed highly significant improvement in both non-obese (0.007 ± 0.01) and obese patients (0.001 ± 0.02), while serum triglycerides levels of obese patients were 0.01 ± 0.01 and for non-obese patients were 0.11 ± 0.07 compared from baseline to 2 months. In non-obese patients, overall superior results were observed in terms of clinical and biochemical parameters. **Conclusions:** Reduction in periodontal inflammation was highly significant in non-obese patients than obese patients after Phase I periodontal treatment.

KEYWORDS: Stage-I periodontitis, resistin, triglycerides, periodontal therapy, obesity.

INTRODUCTION

Chronic Periodontitis is a chronic inflammatory disease caused by a Gram negative anaerobic microorganisms, leading to soft tissue destruction and loss of alveolar bone characterized by stimulation of host inflammatory system which causes the production of pro-inflammatory mediators such as Interleukin-6 (IL-6) and Tumor Necrosis Factor-alpha (TNF-α).[1,2] Although sub-gingival plaque bio-film is an initiator of periodontitis, the tissue breakdown is mostly mediated by exaggerated host response to bacteria and their end products. The exaggerated inflammatory response leads to release of pro inflammatory cytokines like resistin, reactive oxygen species (ROS), and proteolytic enzymes.[3] Resistin could be one of the molecular links connecting obesity, periodontitis, and diabetes and may serve as a marker that links periodontal disease with other systemic diseases.[4] Resistin expression also increases the conversion of monocytes into macrophages.[5] In this manner, resistin plays a significant part in monocyte-macrophage function, and increased serum resistin levels have been related with periodontitis.[6,7]

Obesity is also associated with hyperlipidemia-a state of abnormal lipid profile, which is characterized by elevated blood concentrations of triglycerides, elevated cholesterol levels and elevated low-density lipoprotein-cholesterol (LDL-c) and decreased levels of high-density lipoprotein-cholesterol(HDL-c) as well as Obesity alters the immunological responses of the host, increasing

infection vulnerability. Adipocytes can produce a wide range of inflammatory mediators, resulting in a systemic pro-inflammatory state that impairs wound healing.[8]

According to Saxlin T et al. there was an association of high serum triglycerides levels and low HDL-c levels with periodontal infection among obese subjects. Hence obese subjects with high serum triglycerides levels could be at higher risk of periodontal infection.[9] There are very few studies available in the literature comparing resistin, triglycerides and periodontitis, but the role of resistin and triglycerides remains controversial. Hence, with this background, the aim of this study was to compare the effect of scaling and root planing on serum resistin levels and serum triglycerides levels in obese and non-obese individuals with chronic periodontitis.

SUBJECTS AND METHODS

A clinical and biochemical study conducted after the approval from Institutional Ethical Committee to evaluate the efficacy of scaling and root planing on serum resistin levels and serum triglycerides levels in obese and non-obese individuals with stage-I periodontitis. Patients with age above 18 years having minimum 20 natural teeth remaining and clinical attachment loss of 3mm on at least 2 or more teeth per quadrant or more than 30% sites with clinical attachment loss 3mm or more were included in the study. The criteria of BMI for obese and non-obese was kept >30, <30 respectively. Subjects having any systemic diseases and conditions, consuming any form of tobacco, using supplements of antioxidant, long-term steroid medications, taking any anti-inflammatory or antibiotics or underwent periodontal treatment during past 6 months were excluded from the study.

CLINICAL PROCEDURE

Complete medical and dental records were taken at the first appointment. Oral examination was done and the clinical parameters were recorded using an UNC-15 probe which included: Clinical Periodontal Sum Score(CPSS), Gingival Index(GI), Plaque Index(PI), Clinical attachment level (CAL) blood sample was also collected for evaluating serum resistin level and serum triglycerides level. Then after the participants were treated with non-surgical periodontal therapy which included scaling and root planing (SRP). Oral hygiene instructions were given and the participants were kept on follow up. In the consequent appointment (after 2 months) SRP was repeated and clinical parameters along with serum resistin and triglyceride level were recorded.

BIOCHEMICAL PROCEDURE

Under strict aseptic conditions 5 ml of venous blood was drawn from ante-cubital fossa with a disposable needle and a syringe following the standard protocol. In the laboratory, serum preparation was done by centrifuging the clotted blood sample at 2500 - 3000 rpm for 8-10 minutes to separate the serum from the blood. The separated serum was stored in the refrigerator at 4-6°C until it was analyzed.

The patients were recalled after 2 months and blood was again collected for serum resistin and serum triglycerides level.

SERUM RESISTIN AND SERUM TRIGLYCERIDES ESTIMATION

Collected samples were transferred to the laboratory where the resistin levels and triglycerides levels were recorded using serum resistin ELISA kit and serum triglycerides assay kit (Figure 1). All the steps were carried out according to manufacturer’s instructions to determine the serum resistin levels and serum triglyceride levels in the samples collected (Figure 2, Figure 3).

Figure 1: Reagents for the assessment of serum resistin and serum triglycerides.

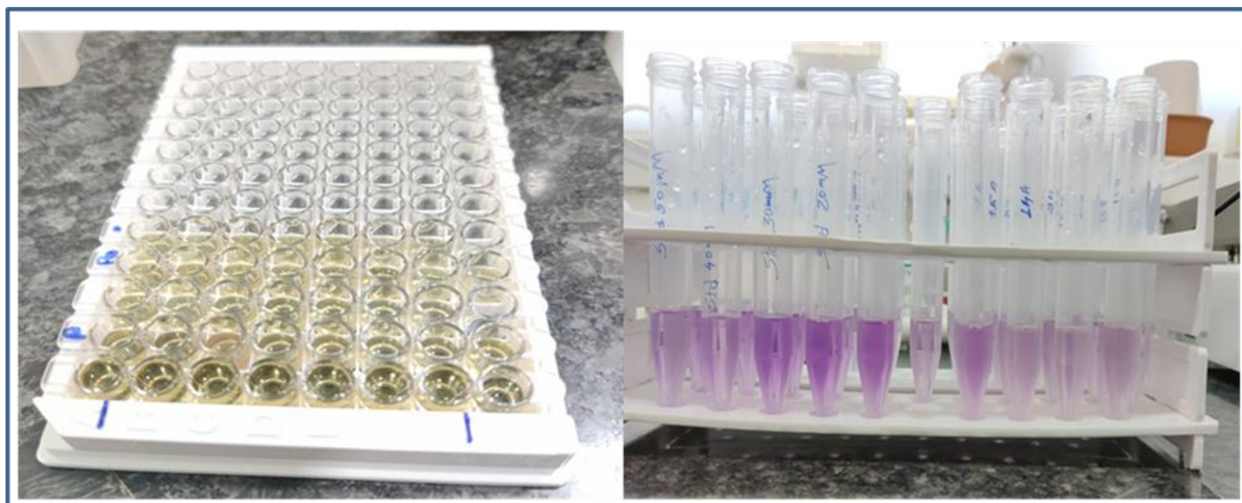

Figure 2: Collected samples.

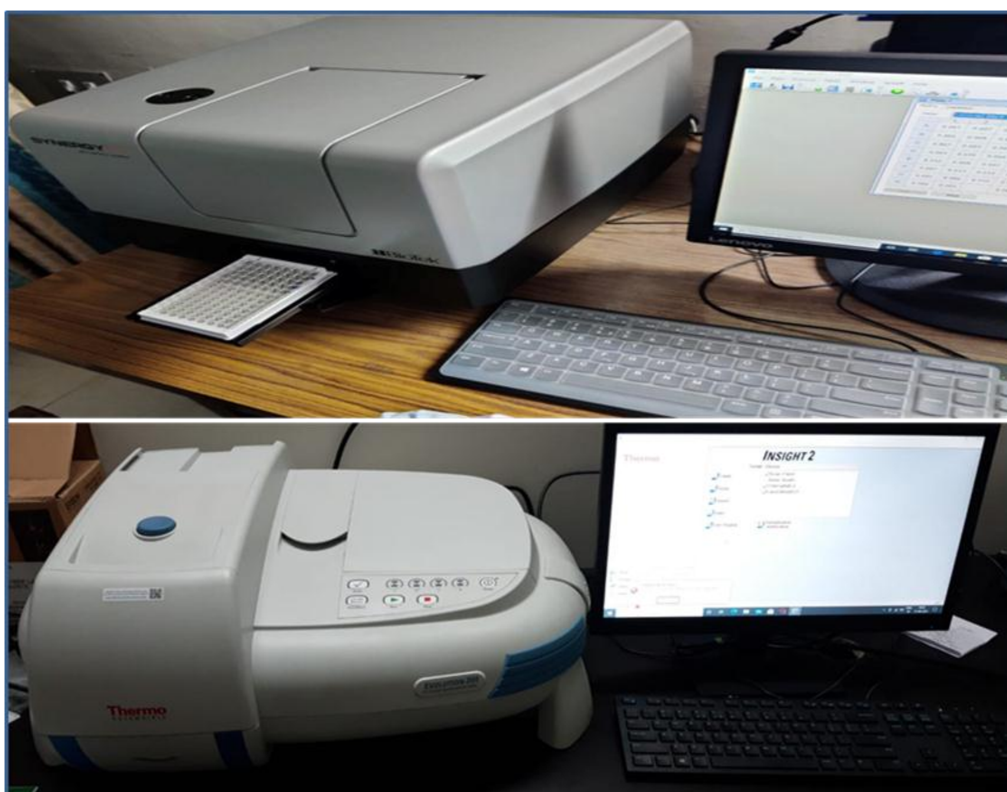

Figure 3: ELISA machine and Spectrophotometer for the assessment of serum resistin and serum triglycerides.

STATISTICAL ANALYSIS

Unpaired t -test was used to analyze baseline data of both the groups. Paired-t test was used to analyse intragroup change in clinical as well as biochemical data. Intergroup comparison was performed using Mann Whitney U test for the change in clinical and biochemical data.

RESULTS

The study included 48 subjects, diagnosed with stage-I periodontitis, in which 24 were obese and 24 were non obese. Both periodontal and biochemical parameters were assessed at baseline and after 2 months. All patients completed the study period and their results were analyzed.

The mean age of obese participants was 42.67 ± 7.56 which involved 19 males (79.2%) and 5 females (20.8%), while the mean age of non-obese participants was 37.71 ± 9.03 involving 15 males(62.5%) and 9 females(37.5%). On comparison of BMI and WC between the groups showed a significant difference (p value <0.001, <0.001 respectively). The mean BMI of obese participants was 31.75 ± 1.66 whereas for non - obese participants was 22.91 ± 1.12. The mean value for WC in obese participants was observed 0.95 ± 0.01 whereas for non-obese participant it was 0.87 ± 0.05 **(Table 1)**

2 months after SRP, intergroup comparison between obese and non-obese group, using Mann Whitney U test showed highly significant results (P < 0.001) for all biochemical and clinical parameters except for GI. CPSS in obese was 4.62 ±1.50 and in non obese group it was 7.66± 1.52). PI in obese group was 0.48 ± 0.12 and in non-obese group was 0.70 ± 0.10. GI in obese group was found to be 0.55 ± 0.09 while in non-obese it was 0.63 ± 0.13. In non-obese population CAL was 0.11 ± 0.13 where as in obese group it was 0.05 ± 0.05. Resistin level in obese group was found to be 0.001 ± 0.02 while in non obese it was 0.007 ± 0.01. Triglycerides level in obese was 0.01 ± 0.01 and in non-obese it was 0.11 ± 0.07. Intergroup analysis of change in baseline to follow up showed significant improvement in favour of non-obese group except for GI (p=0.018).

On intergroup comparison of clinical periodontal parameters i.e. CPSS, PI, GI, CAL using Mann Whitney test did not show significant difference at baseline, whereas 2 months after Scaling and Root Planing CPSS, PI, GI and CAL showed significant difference (p<0.001, p <0.001, p =0.018, p<0.001 respectively). **(Table 1, 2)**

In biochemical parameters, amongst obese and non-obese individuals at baseline only serum triglycerides showed significant difference whereas 2 months after Scaling and root planing both the biochemical parameters showed highly significant difference (p<0.001). **(Table-2)**

Intragroup comparison of clinical and biochemical parameters revealed highest variability in PI scores (2.25±0.30 to 1.56±0.30) in non-obese individuals and highest variability in GI (2.52±0.22 to 1.96±0.19) scores in obese individuals. (**Table 3)**

Table 1: Baseline Characteristics In Obese and Non-Obese Group.

Parameters	Obese	Non-obese	P value
Age	42.67±7.56	37.71±9.03	0.045*
BMI	31.75±1.67	22.91±1.12	<0.001**
WC(cm)	0.95±0.01	0.87±0.05	<0.001**
PI	2.39±0.26	2.25±0.30	0.112
GI	2.52±0.22	2.43±0.24	0.219
CAL	3.14±0.27	3.09±0.36	0.600
CPSS	39.08±4.28	38.67±3.91	0.726
SERUM RESISTIN	0.01±0.01	0.01±0.01	0.085
SERUM TRIGLYCERIDES	2.46±0.07	0.55±0.08	<0.001**

level of significance: P <0.05 -significant, P < 0.001- highly significant**. BMI-Body mass index; WC-Waist circumference; CPSS- clinical periodontal sum score, PI – plaque index, GI – gingival index, CAL – clinical attachment level, p-probability value.*

Table 2: Intergroup Comparison of Mean Difference (Baseline-2 Months).

Parameters	Obese	Non-obese	P value
PI	0.48±0.12	0.70±0.10	<0.001**
GI	0.55±0.09	0.63±0.13	0.018*
CAL	0.05±0.05	0.11±0.13	<0.001**
CPSS	4.62±1.50	7.67±1.52	<0.001**
RESISTIN	0.001±0.02	0.007±0.01	<0.001**
TRIGLYCERIDES	0.01±0.01	0.11±0.07	<0.001**

Table 3: Intragroup Comparision of Parameters In Obese and Non Obese Individuals.

Parameters	Groups	Baseline	Follow up	P value
PI	Obese	2.39±0.26	1.91±0.25	<0.001**
	Non-Obese	2.25±0.30	1.56±0.30	<0.001**
GI	Obese	2.52±0.22	1.96±0.19	<0.001**
	Non-Obese	2.43±0.24	1.80±0.25	<0.001**
CAL	Obese	3.14±0.27	3.10±0.27	<0.001**
	Non-Obese	3.09±0.36	2.99±0.35	<0.001**
CPSS	Obese	39.08±4.28	34.46±3.66	<0.001**
	Non-Obese	38.67±3.91	31.00±4.59	<0.001**
Serum Resistin	Obese	0.012±0.01	0.013±0.01	0.753
	Non-Obese	0.014±0.01	0.007±0.01	<0.001**
Serum triglycerides	Obese	2.46±0.07	2.44±0.08	<0.001**
	Non-Obese	0.55±0.08	0.44±0.08	<0.001**

DISCUSSION

Present study was aimed to assess the comparative effect of scaling and root planing on serum resistin levels and serum triglycerides levels in obese and non-obese individuals with stage-I periodontitis. On comparing the demographic variables the age was found to be similar in both the groups whereas there was no equal distribution of male and female participants. Obese group involved 19 males, 5 females and non-obese group involved 15 males and 9 females. Individuals above 18 years of age were included in the study, the prevalence of obesity in this age group is due to abrupt food habits (consuming food and beverages with high glycemic index), environmental factors, sleep habits, decreased structured physical activity and increased screen based sedentary behavior.[10]

According to Jimenez M et al.[11], obese individuals were characterized based on WC and BMI jointly, since WC has shown superiority to BMI in predicting obesity related disorders.

In this study BMI for obese population was higher than non-obese population which was highly significant ($p<0.001$). WC was also found to be higher in obese group than in non-obese group ($p<0.001$) which was similar to the study conducted by Swathi et al.[12], in which the adiposity parameters like BMI, WC were increased in obese group as compared to non-obese.

Gingival index when compared at baseline did not show significant difference but 2 months after scaling and root planing, the intergroup comparison showed significant result between obese and non-obese group ($p=0.013$). Suresh S. et al.[13] found that gingival index (GI) 2 months after non - surgical periodontal treatment (NSPT) showed a more reduction in normal weight individuals with chronic periodontitis compared to obese or overweight individuals with chronic periodontitis.

On intergroup comparison of clinical parameters at baseline, the mean clinical periodontal sum score (CPSS) was recorded according to Matilla et al.[14], plaque index (PI), gingival index (GI) and clinical attachment level (CAL) scores were higher in obese or overweight individuals with chronic periodontitis when compared to non-obese individuals with chronic periodontitis. This was comparable with the study by Suvan et al.[8], who stated that obesity was associated with pocket probing depth (PPD), While 2 months after scaling and root planing (SRP) it showed a more reduction in non-obese individuals with chronic periodontitis compared to obese individuals with chronic periodontitis which was in accordance with previous studies done by Goncalves T E et al.[15] and Akram Z et al.[16], which reported that obesity impairs the clinical response to non -surgical periodontal therapy.

Obesity is considered to be a modifying factor of resistin levels in individuals with chronic periodontitis. Intergroup comparison of mean serum resistin levels 2 months after scaling and root planing was also found to be significant, with more reduction in normal weight individuals with stage-I periodontitis on comparison with obese or overweight individuals with stage-I periodontitis. This finding was comparable with study done by Goncalves T E et al. who suggested the modulatory effect of obesity on serum resistin level, which may generate a systemic and local pro-inflammatory state in obese individuals with periodontitis.[15] and J Suvan at al. stated that obesity has an impact on immunological responses of the host which makes it prone to develop an infection. The inflammatory mediators are secreted by adipocytes, result in a systemic pro-inflammatory state that impedes wound healing.[8]

In present study level of serum triglycerides showed significant difference at baseline and 2 months after SRP ($p<0.001$ respectively) in both the groups. In study done by Saxlin T, among obese subjects, a high serum triglyceride levels were found to be associated with the teeth having deepened periodontal pockets.[9]

Whereas Serum resistin levels in non- obese participants showed significant reduction only 2 months after scaling and root planing ($P<0.001$). According to Patel S P et al.[17] the increase in resistin levels in chronic periodontitis could be due to the expression of resistin by polymorphonuclear leukocytes and macrophages in inflammatory conditions such as periodontitis.

When comparing obese and non-obese patients after Phase-I periodontal treatment, the reduction in periodontal inflammation was statistically significant in favour of non-obese individuals.

The limitations of the study were small sample size as well as short follow up period. Periodontal parameters can also be assessed for the co-relation with other inflammatory markers and parameters of obesity.

CONCLUSION

After Phase-I periodontal therapy i.e. scaling and root planing an appreciable reduction was observed in periodontal as well as biochemical parameters in both obese and non-obese group. Moreover, statistically significant reduction was obtained with the periodontal and biochemical parameters in non-obese group as compared to obese group.

REFERENCES

1. Diaz Romero RM, Ovadía R. Diabetes and periodontal disease: A bidirectional relationship. Med Biol., 2007; 14: 69.
2. Devanoorkar A, Kathariya R, Guttiganur N, Gopalakrishnan D, Bagchi P. Resistin: A potential biomarker for periodontitis influenced diabetes mellitus and diabetes induced periodontitis. Dis Markers, 2014; 2014: 930206.

3. Offenbacher S, Jared HL, O'reilly PG, Wells SR, Salvi GE, Lawrence HP, Socransky SS, Beck JD. Potential pathogenic mechanisms of periodontitis-associated pregnancy complications. Annals of periodontology, 1998; 3(1): 233-50.
4. Azuma K, Katsukawa F, Oguchi S, Murata M, Yamazaki H, Shimada A, Saruta T. Correlation between serum resistin level and adiposity in obese individuals. Obesity research, 2003; 11(8): 997-1001.
5. Patel L, Buckels AC, Kinghorn IJ, Murdock PR, Holbrook JD, Plumpton C, et al. Resistin is expressed in human macrophages and directly regulated by PPAR gamma activators. BiochemBiophys Res Commun, 2003; 300: 472-6.
6. Furugen R, Hayashida H, Yamaguchi N, Yoshihara A, Ogawa H, Miyazaki H, et al. The relationship between periodontal condition and serum levels of resistin and adiponectin in elderly Japanese. J Periodontal Res., 2008; 43: 556-62.
7. Saito T, Yamaguchi N, Shimazaki Y, Hayashida H, Yonemoto K, Doi Y, et al. Serum levels of resistin and adiponectin in women with periodontitis: The hisayama study. J Dent Res., 2008; 87: 319-22.
8. Suvan JE, Petrie A, Nibali L, Darbar U, Rakmanee T, Donos N, D'Aiuto F. Association between overweight/obesity and increased risk of periodontitis. Journal of clinical periodontology, 2015; 42(8): 733-9.
9. Saxlin T, Suominen-Taipale L, Kattainen A, Marniemi J, Knuuttila M, Ylöstalo P. Association between serum lipid levels and periodontal infection. Journal of clinical periodontology, 2008; 35(12): 1040-7.
10. Vilano S. et al 2017) (Kaneshiro B, Vilano SE. Obesity in Adolescents. Obstetrics and Gynecology, 1, 2017; 130(3): E127-40.
11. Jimenez M, Hu FB, Marino M, Li Y, Joshipura KJ. Prospective associations between measures of adiposity and periodontal disease. Obesity, 2012; 20: 1718-25.
12. Swathi Pradeep P, Pradeep Avani Raju. Gingival crevicular fluid and serum levels of resistin in obese and non-obese subjects with and without periodontitis and association with single nucleotide polymorphism at -420. JISP., 2014; 18: 555-59.
13. Suresh S, Mahendra J, Singh G, Kumar AR, Thilagar S, Rao N. Effect of nonsurgical periodontal therapy on plasma-reactive oxygen metabolite and gingival crevicular fluid resistin and serum resistin levels in obese and normal weight individuals with chronic periodontitis. Journal of Indian Society of Periodontology, 2018; 22(4): 310-6.
14. Mattila KJ, Asikainen S, Wolf J, Jousimies-Somer H, Valtonen V, Nieminen M. Age, dental infections, and coronary heart disease. Journal of dental research, 2000; 79(2): 756-60.
15. Gonçalves TE, Zimmermann GS, Figueiredo LC, Souza MD, da Cruz DF, Bastos MF, da Silva HD, Duarte PM. Local and serum levels of adipokines in patients with obesity after periodontal therapy: one-year follow-up. Journal of clinical periodontology, 2015; 42(5): 431-9.
16. Akram Z, Baharuddin NA, Vaithilingam RD, Rahim ZH, Chinna K, Krishna VG, Saub R, Safii SH. Effect of nonsurgical periodontal treatment on clinical periodontal variables and salivary resistin levels in obese Asians. Journal of oral science, 2017; 59(1): 93-102.
17. Patel SP, Raju PA. Gingival crevicular fluid and serum levels of resistin in obese and non-obese subjects with and without periodontitis and association with single nucleotide polymorphism at−420. Journal of Indian Society of Periodontology, 2014; 18(5): 555.