

Association between Periodontitis and Hyperlipidemia

Sumit Tiwari¹, Bhavana Singhal², Shakuntala Saini³

^{1,2,3}Department of Biochemistry, S.M.S. Medical College, Jaipur, Rajasthan, India

Abstracts: ***Background:** Periodontitis is a local chronic inflammatory condition of the supporting structures of the teeth resulting from a dental plaque biofilm attached to teeth surfaces. Recent studies have indicated that this oral disease may have effects on systemic health. **Aim:** The aim of the present study was to evaluate the association between periodontitis and hyperlipidemia. **Material and Methods:** This study was carried out on 120 periodontitis patients and 40 healthy individuals attending Out patient department of Dental surgery at SMS Medical College and Hospital, Jaipur, Rajasthan. **Results:** This study showed significantly higher levels of triglycerides, total cholesterol, LDL-cholesterol and significantly low level of HDL-cholesterol in periodontitis patients, in comparison to control.*

Keywords: Periodontitis, Cholesterol, Trglyceride

1. Introduction

Today, most population suffer from elevated blood lipids [1]. Hyperlipidemia is considered as one of the main risk factor of cardiovascular diseases [2, 3]. Among the factors involved in increased levels of blood lipids, genetics, high fat-diet and lack of physical exercise are the main factors. One question raised recently is whether periodontal disease could be a risk factor for development of hyperlipidemia.

Recent studies have illustrated a correlation between high serum lipid levels and periodontitis by proving the effect of periodontal disease as an underlying factor for hyperlipidemia finally leading to atherosclerosis [4].

Periodontitis is a common oral chronic infection leading to gingival inflammation, destruction of periodontal tissues and deterioration of alveolar bones and finally loss of teeth [5,6]. Considering the wide range of microbial plaques associated with this disease, its chronic nature and local and systemic immunological responses of the host, it is reasonable that periodontal infection affects overall health and could be involved in the development of systemic disease such as hyperlipoproteinemia and hypertriglyceridemia. Therefore, the aim of the present study was to examine the relationship between chronic periodontitis and serum lipid levels.

2. Materials and Methods

This case-control study was consisted of 120 patients of clinically proven Periodontitis (case group) and 40 healthy individuals (control group). Study was conducted in the Department of Biochemistry and Department of Dental Surgery at SMS Medical College and Hospital, Jaipur.

The patients were informed about the purpose and methods of study.

The subjects were divided according to BPE score.

Code 0- No disease

Code 1- Bleeding on probing (no gingival pockets <3mm)

Code 2- No periodontal pocketing <3mm, but calculus present with or without plaque retentive factors such as "overhanging" restoration

Code 3- Shallow periodontal pockets 4-5 mm

Code 4- Deep periodontal pockets >6mm

In our study we excluded code 2. The score was identified by examination of specified index teeth or all teeth.

In addition subjects had no history of periodontal treatment 6 months prior to the study, were not afflicted with any systemic diseases were not taking any medications for reduction of serum lipids and were also nonsmokers. Fasting blood samples were collected to determine serum lipid levels using routine enzymatic methods.

In addition the community periodontal index of treatment needs (CPITN) index was also determined using WHO probe.

Statistical Analysis

Student t-test and chi-square test were applied for intergroup comparisons between the variables (serum lipid levels) and the significance level was set at <0.05. Statistical analysis was performed using the SPSS software (version 20, Chicago,IL,USA).

3. Results

160 subjects participated in the study, including 120 cases (code 1,3,4) of periodontitis and 40 controls (code 0). The clinical characteristics of the case and control groups are illustrated in Table -1. On applying post HOC test (TUCKEY Test) for TG and total cholesterol all groups were significantly different from each other except code 3 and code4. Mean triglyceride, total cholesterol was significantly more in code 3 as compared to code 0 and 1.

For HDL all groups were significantly different from each other except code 3 and code 4. Mean HDL was significantly less in code 3 as compared to code 0 and 1 and also code 4 has significantly lower mean HDL as compared to code 0.

For LDL all groups were significantly different from each other except code 0 and code1. Mean LDL was significantly more in code 3 as compared to code 0 and 1 and code4 has

significantly higher mean LDL as compared to code 0 and code 3.

Table 1: Serum Lipid levels in Periodontitis patients and control

Parameters	Code0	Code1	Code3	Code4
Triglyceride	75.23±28.35	117.05±23.69	169.30±16.88	172.70±10.44
Total cholesterol	162.78±20.44	196.95±35.47	247.25±27.97	251.18±49.89
HDL	49.23±5.81	46.13±6.46	39.63±6.86	38.43±7.02
LDL	92.28±16.62	98.80±24.80	155.95±21.85	181.15±20.16

Table 2: Comparison of lipid profile between different Codes

Parameters	Code 0vs 1	Code 0vs3	Code 0vs 4	Code 1 vs 3	Code 3vs 4
Triglyceride	<0.001	<0.001	<0.001	<0.001	0.88
Total cholesterol	<0.001	<0.001	<0.001	<0.001	0.95
HDL	<0.001	<0.001	<0.001	0.84	0.95
LDL	0.51	<0.001	<0.001	<0.001	<0.001

4. Discussion

This study showed significantly higher levels of triglycerides, total cholesterol, LDL-cholesterol and significantly low level of HDL-cholesterol in periodontitis patients, in comparison to control. Other studies have confirmed a relationship between chronic periodontitis and serum lipid levels [7-10], yet these studies had different study designs, sample sizes and different methodologies for diagnosing periodontal disease and assaying serum lipid levels. On the other hand, some studies have rejected this relationship [11-15].

Cutler et al. observed that chronic periodontitis has a significant relationship with the increase of serum TG and total cholesterol, which agrees with our study [16].

Losche et al [17] in a case-control study on 39 patients with periodontitis and 40 healthy individuals showed that serum levels of total cholesterol, Triglycerides and LDL were higher in patients compared with those in the control group. Other studies have found a positive correlation between periodontitis and increased serum lipid profile [18-20].

A case control study of 60 patients found no relationship between lipid profile and periodontal disease [1]. Another study performed on 56 individuals also was not able to demonstrate a significant relationship between periodontal disease and lipid profile [21].

Hamissi et al found that the presence of periodontal disease was significantly related with higher total cholesterol in the case group. Triglyceride, HDL and LDL did not show any difference between case and control group [15].

5. Conclusion

This study concluded that serum level of lipids is higher in periodontitis cases as compared to controls. Hyperlipidemia can lead to cardiovascular diseases, which have high mortality rates. Therefore, it is recommended that patients with heart disease should strongly consider periodontal treatment.

References

- [1] Machado AN, Quirino MR, Nas Cimento LF. Relation between chronic periodontal disease and plasmatic levels of triglycerides, total cholesterol. *Clin Infect Dis* 2005;38:88-92.
- [2] Stamler J, Stamler R, Neaton JD, Wentworth D, Daviglius ML, Garside D, et al. Low risk-factor profile and long-term cardiovascular and non cardiovascular mortality and life expectancy. *JAMA* 1999; 282:2012-8.
- [3] Glick M. Screening for traditional risk factors for cardiovascular disease. *J Am Dent Pract* 2005;6:78-85.
- [4] Taleghani F, Mahmoud Shamaei, Masoud Shamaei. Association between chronic Periodontitis and serum lipid levels. *Acta Medica Iranica* 2010;48(1):47-50.
- [5] Losche W. Periodontitis and cardiovascular disease: periodontal treatment lowers plasma cholesterol. 2007. [Retrieved 24 October 2009].
- [6] Cernochova P, Augustin P, Fassmann A, Izakovicova-Holla L. Occurrence of periodontal pathogens in patients treated with fixed orthodontic appliances. *Scripta Medica (brno)* 2008;81:85-96.
- [7] Katz J, Chaushu G, Sharabi Y. On the association between hypercholesterolemia, cardiovascular disease and severe periodontal disease. *J Clin Periodontol* 2001;28(9):865-8.
- [8] Katz J, Flugelman MY, Goldberg A, Heft M. Association between periodontal pockets and elevated cholesterol and low density lipoprotein cholesterol levels. *J Periodontol*. 2000;73(5):494-500.
- [9] Moeintaghavi A, Haerian-Ardakani A, Talebi-Ardakani M, Tabata-baie I. Hyperlipidemia in patients with periodontitis. *J Contemp Dent Pract*. 2005;6(3):78-85.
- [10] Taleghani F, Shamaei M, Shamaei M. Association between chronic periodontitis and serum lipid levels. *Acta Med Iran*. 2010;48(1):47-50.
- [11] Machado AC, Quirino MR, Nascimento LF. Relation between chronic periodontal disease and plasmatic levels of triglycerides, total cholesterol and fractions. *Braz Oral Res*. 2005;19(4):284-9.
- [12] Saxlin T, Suominen-Taipale L, Kattainen A, Marniemi J, Knuutila M, Ylostalo P. Association between serum lipid levels and periodontal infection. *J Clin Periodontol*. 2008;35(12):1040-7.
- [13] Sridhar R, Byakod G, Pudukalkatti P, Patil R. A study to evaluate the relationship between periodontitis,

- cardiovascular disease and serum lipid levels. *Int J Dent Hyg.* 2009;7(2):144-50.
- [14] Korhonen S, Saxlin T, Suominen L, Jula A, Knuuttila M, Ylostalo P. Serum cholesterol ratios and periodontal infection: results of the health 2000 Survey. *J Clin Periodontol.* 2011;38(9):787-94.
- [15] Hamissi J, Shahsavarani MT, Hamissi H. A comparison of serum lipid profile between periodontitis patients and healthy individuals. *Iran Red Crescent Med J.* 2011;13(4):283-4.
- [16] Cutler CW, Shinedling EA, Nunn M, Jotwani R, Kim BO, Nares S et al. Association between periodontitis and hyperlipidemia: cause or effect? *J Periodontol.* 1999; 70 (12): 1429-34.
- [17] Losche W, Karapetow F, Pohl A, Pohl C, Kocher T. Plasma Lipid and blood glucose levels in patients with destructive periodontal disease. *J Periodontol* 2000; 27: 537-41.
- [18] Losche W, Marshal GJ, Apatzidou DA, Krause S, Kocher T, Kinane DF. Lipoprotein-associated phospholipase A2 and plasma lipids in patients with destructive periodontal disease. *J Clin Periodontol* 2005; 32: 640-4.
- [19] Katz J, Flugelman MY, Goldberg A, Heft M. Association between periodontal pockets and elevated cholesterol and low density lipoprotein cholesterol levels. *J Periodontol* 2002; 73: 494-500.
- [20] Uchiumi D, Kobayashi M, Tachikawa T, Hasegawa K. Subcutaneous and continuous administration of lipopolysaccharide increase serum levels of triglyceride and monocyte chemoattractant protein-1 in rats. *J Periodontol Res* 2004; 39:120-8.
- [21] Daneshmand M. R, Shayesteh Y. The relationship between periodontal disease and blood lipid levels, A thesis for doctorate degree in dentistry, no.1403. Tehran University of Medical Sciences; 2002.