Original Article

International Journal of Dental and Health Sciences
Volume 04,Issue 03

EVALUATION OF SERUM AND SALIVARY CALCIUM LEVELS IN PERIODONTITIS AND NON PERIODONTITIS PATIENTS: A CLINICAL STUDY

Amit Chillar[1], C S Baiju[2], Himanshu Khashu[3] ,Sumidha Bansal[4], Gunjan Gupta[5]

1. Post Graduate student, Dept Of Periodontology, SRCDSR, Faridabad, Haryana
2. Prof & HOD, Dept Of Periodontology, SRCDSR, Faridabad, Haryana
3. Professor, Dept of Periodontology, SRCDSR, Faridabad, Haryna
4. Professor, Dept of Periodontology, SRCDSR, Faridabad, Haryana
5. Reader, Dept of Periodontology, SRCDSR, Faridabad, Haryana

ABSTRACT:

Aim:To assess and to correlate serum and salivary calcium in periodontitis patients and to find the correlation between salivary calcium and serum calcium in periodontitis and non periodontitis patients.

Materials & Method: Total 80 patients were included in the study out of which 40 were included in periodontitis group and 40 were included in non periodontitis group.

Conclusion: Salivary calcium increases in periodontitis affected subjects and hence its estimation can be done for determining the presence of periodontal disease. Also further studies cab be taken up for evaluating the retrograde effect of treatment of periodontal disease on levels of calcium.

Key words: Serum calcium,Periodontitis,salivary,Non-periodontitis.

INTRODUCTION

Human body is a simple yet very complex system having a simple principle that is to stay in state of health and to be disease free. To stay in state of health all the organ systems should work in a harmonious relation for efficient working of body. For this various compounds are needed in form of nutrients for the production of energy, maintain homeostasis and proper functioning of organs. The amount of such elements in the body are maintained at a certain level in health but can increase or decrease in disease. One such element is calcium. Its functions are to:

- Regulate the heartbeat
- Conduction of nerve impulses
- Stimulate hormone secretions
- Clotting of blood
- Building and maintain healthy bones.

Calcium is a major component in mineralization of bones and shells, it is the most abundant metal by mass in many animals.

The National Osteoporosis Foundation says , “Calcium plays an important role in building stronger, denser bones early in life and keeping bones strong and healthy later in life.” Approximately 99

*Corresponding Author Address: Dr. Gunjan Gupta. E-mail: drgunjangupta22@gmail.com

percent of body's calcium is stored in the bones and teeth.[1] The rest of the calcium in the body has other important uses, such as some exocytosis, especially neurotransmitter release, and muscle contraction.

The levels of calcium are seen to be altered in the periodontal diseases. Earlier the researchers have studied the normal calcium levels in saliva and blood and changes in its level in disease as periodontal disease is established to be involving gums and jaw by the active detrimental action of microorganism embedded in calcified matrix. Calcium plays an important role in both health and disease on one hand it regulates the health of bone and on the other hand it helps in making calcified mass of organisms.

In an earlier study on comparative evaluation of serum and salivary calcium in chronic periodontitis patients, it was observed that serum calcium is increased while salivary calcium is decreased. Other than this, different studies were undertaken by many researchers and concluded that the salivary calcium is found to be increased in the cases of chronic periodontitis.

AIM OF THE STUDY

1- To assess and to correlate serum and salivary calcium in periodontitis patients.

2- To find the correlation between salivary calcium and serum calcium in periodontitis and non periodontitis patients.

MATERIALS AND METHODS

Patients for the study were selected from the out patient department of Sudha Rustagi College of Dental Sciences and Research. Total 80 patients were included in the study out of which 40 were included in periodontitis group and 40 were included in non periodontitis group.

Inclusion criteria included patients with chronic generalized periodontitis for periodontitis group , patients without any periodontal involvement of disease were considered for non periodontitis group and both male and female patients were included. Exclusion criteria included patients with systemic diseases or complications, patients with known calcium disorders, patients on calcium supplementation and calcium channel blockers, and patients with xerostomia and undergoing radiotherapy.

During the first visit of patient, the patient was diagnosed and classified as a periodontitis or a non periodontitis patient based on Periodontal screening and recording, probing depth, Clinical attachment loss, furcation involvement and tooth mobility.

In both the groups , salivary calcium as well serum calcium were evaluated. For salivary calcium estimation, 5 ml stimulated salivary sample was collected and for serum calcium estimation, 2 ml venous blood was collected.

Serum and Salivary calcium was estimated using a Calcium estimation kit – O- CresolphthaleinComplexone (OCPC) methodand Spectrophotometer with 578nm wavelength (ERBA manheim).

The results that were obtained from the above mentioned tests were statistically analyzed. All the tests and recordings were done during the first visit of patient and further treatment for the presenting complaint was done on the subsequent recall visit.

RESULTS:

All the 80 subjects screened for the levels of serum and salivary calcium were divided into two groups i.e. subjects with chronic periodontitis and subjects without chronic periodontitis. The test result for periodontitis group showed a mean of 9.18 mg/dl and 7.095 mg/dl serum and salivary cacium levels respectively, while in non periodontitis group the mean calcium levels were found to be 9.1 mg/dl and 4.34 mg/dl as serum and salivary calcium levels respectively.

When the means of both the periodontitis and non periodontitis groups were compared and equity of means was calculated, the mean difference was found to be 0.08 and 2.73 for serum and salivary calcium levels respectively. The difference between the levels of serum calcium between the periodontitis and non periodontitis group was non significant while the difference in salivary calcium of both the groups was highly significant . (Table I)

	EQUITY OF MEANS		
	MEAN DIFFERENCE	p-VALUE	SIGNIFICANCE
SERUM CALCIUM	0.08	0.62	Not significant (p>0.05)
SALIVARY CALCIUM	2.73	0.00	Highly significant (p<0.005)

TABLE: I

The group of patients when divided according to age in young adults (<35 yrs) and older adults (>35 yrs), the mean salivary calcium for younger adults was found to be 5.23 mg/dl with standard deviation of 1.51 while that of older adults it was found to be 6.21 mg/dl with standard deviation of 1.79. (Table II, VI)

AGE	MEAN	STANDARD DEVIATION
Less than 35 yrs	5.23	1.51
More than 35 yrs	6.21	1.79

TABLE :II

The group of patients when divided according to gender, the mean salivary calcium for males was found to be 5.83 mg/dl with standard deviation of 1.83 while that of females it was found to be 5.56 mg/dl with standard deviation of 1.54. (Table III, VI)

GENDER	MEAN	STANDARD DEVIATION
Male	5.83	1.83
Female	5.56	1.54

TABLE: III

The group of patients when divided according to age in young adults (<35 yrs) and older adults (>35 yrs), the mean serum calcium for younger adults was found to be 9.11 mg/dl with standard deviation of 0.69,

while that of older adults it was found to be 9.17 mg/dl with standard deviation of 0.75. (Table IV, VI)

AGE	MEAN	STANDARD DEVIATION
Less than 35 yrs	9.11	0.69
More than 35 yrs	9.17	0.75

TABLE: IV

The group of patients when divided according to gender, the mean serum calcium for males was found to be 9.17 mg/dl with standard deviation of 0.78 while that of females it was found to be 9.09 mg/dl with standard deviation of 0.61. (Table V, VI)

GENDER	MEAN	STANDARD DEVIATION
Male	9.17	0.78
Female	9.09	0.61

TABLE: V

		EQUITY OF MEANS		
		MEAN DIFFERENCE	p-VALUE	SIGNIFICANCE
SERUM CALCIUM	AGE	0.550	0.733	Not significant (p>0.05)
	GENDER	0.0784	0.633	Not significant (p>0.05)
SALIVARY CALCIUM	AGE	0.9775	0.01	Highly significant (p<0.005)
	GENDER	0.2692	0.493	Not significant (p>0.05)

TABLE: VI

DISCUSSION:

Risk factors play an important role in the periodontal disease progression.[2] Various studies have shown that only 5 to 20% of population suffer from severe form of destructive periodontitis. Initiation and progression of periodontal infections are clearly modified by local and systemic conditions called risk factors.[3] Hence the clinical researchers are now devoting their time in predicting who is at the high and low risk of developing the disease.

Sewon et al with their series of studies have shown that oral mineralization potential of saliva plays an important role in periodontal destruction.[4] They have shown that the subjects who develop periodontitis have higher salivary calcium level in comparison with subjects free from periodontitis and they have suggested that an elevated levels of salivary calcium is a characteristic

feature of periodontitis affected subjects.[5]

Erwin D. Mandell6 has shown earlier that the salivary calcium level plays an important role in calculus formation. He suggested that the mean calcium concentration of saliva was significantly higher in heavy calculus formers in comparison to light calculus formers.

The results of this investigation indicated that non periodontitis patients had lower salivary calcium level when compared to the group of patients with periodontitis, suggesting that increased calcium level is a characteristic feature of periodontal disease and these results are in accordance with the results of Sewon et all [4,5] who studied the relationship of salivary calcium level in periodontitis.

The results of our investigation showed that subjects of periodontitis group had higher salivary calcium levels while serum calcium levels were found to be almost similar in both periodontitis and non periodontitis group.

Maijer and Klassen [7] reported that patients with active periodontal involvement had increased production of ionized Ca in stimulated saliva compared with normal subjects.

These results are however in contrast with the results obtained by Sewon and Makela [8] in 1990 who found that higher calcium levels was related to good dental health but there was no relation to periodontal bone destruction.

The results of our study are in contrast with the findings of an experimental study done by Kuraner in 1991. Our study depicted significant increase in salivary calcium in periodontitis patients while increase in serum calcium remained insignificant , whereas earlier study by Kuraner et all showed decrease in salivary calcium while increase in serum calcium. The reason of difference between the observation of present study and the study by Kuraner can be because of different methods of saliva collection i.e. stimulated in present study and unstimulated in previous study. The reason for insignificant change in the values of serum calcium in present study is because all the factors other than periodontitis that could have influenced the outcome ofresults were excluded like hyper parathyroidism, hypo parathyroidism etc. Also in the previous study bound form of calcium was evaluated while in our study only the free ionic calcium present in circulation was observed.

Age related differences have been noted in salivary electrolyte levels (Sevon and Laine, 2008) including calcium levels (Yalcin et al, 2005), age was considered as a covariate. While in the present study the subjects were divided into two groups on the basis of age i.e. young adults (<35 yrs) and older adults i.e. > 35 yrs of age and it was found that the older adults had higher mean salivary calcium levels. Hence, the effect of age could not be completely eliminated as a possible confounder. The higher mean age of the case group could also be linked with

increasing prevalence of periodontal disease and risk of tooth loss with increasing age(Grossi et al, 1994; Al – Shammari et al, 2005).

A possible drawback could be that the collection of true unstimulated saliva may be difficult to standardize due to variance in local stimuli and daily variation (mandell and wotman, 1996; polland et all , 2003) [11], which was the reason why we used stimulated saliva for analysis like many other studies (Sewon and Makela, 1990.[8] Therefore, if unstimulated saliva has to be taken then it may be of value to conduct such experiments by collecting individuals saliva samples at different time periods, which may help reduce time related intra individual differences in salivary composition (Larsen et al, 1999).

The difference between mean serum and salivary calcium among males and females was not found to be statistically significant. So we need a larger sample size to establish any corr3elation between the calcium level and gender.

The results of study would have been more significant with the evaluation of smoker, dietary recall as it determines subclinical nutritional deficiencies and other co variates like calcium supplementation and they affect serum as well as salivary calcium.

CONCLUSION:

In the present study salivary calcium was found to be significantly increased in subjects with chronic periodontitis while the increase in the levels of serum calcium was found to be insignificant. The possible reason that can explain the findings is that as it is a well established fact that the chronic periodontitis is a localized inflammatory destructive disorder and is characterized by bone loss, mobility, inflammation etc. Hence it might lead to leaching out of calcium in the local environment due to localized demineralization of bone because of the localized destructive disorder and leading to increased calcium in localized area i.e. saliva. Also increased calcium in saliva has been seen to increase calculus formation that in turn provides larger surface area for more plaque accumulation and leads to further increase in bone destruction and increased salivary calcium levels.

Therefore, under the limitations of the study and using the available resources it can be concluded that salivary calcium increases in periodontitis affected subjects and hence its estimation can be done for determining the presence of periodontal disease. Also further studies cab be taken up for evaluating the retrograde effect of treatment of periodontal disease on levels of calcium.

REFERENCES:

1. Committee to Review Dietary Reference intakes for Vitamin D and Calcium, food and nutrition Board, Institute of medicine. Dietary reference intakes for calcium and

Vitamin D. Washington, DC: *National Academy Press*, 2010.

2. Giovanni E. Salvi, Hernia P. Lawrence, Steven Offenbacher. Influence of risk factors on pathogenesis of periodontitis. *Perio 2000*: 1997:14, 173-201.
3. Robert J. Genco. Current view of risk factors for periodontal diseases. *J. Periodontol* 1996:67, 1041-1049.
4. LissiSewon, Eva Soderling and Karjalainen. A mineral related feature of young plaque characteristic to periodontitis affected adults. *J. Periodontol* 1990:61, 42-44.
5. Sewon L, Karjalainen SM, Sainio M, Seppa D. Calcium and other salivary factors in periodontitis affected subjects prior to treatment .*J ClinPeriodontol* 1998; 25, 915-919.
6. Irwin D. Mandel. Biochemical aspects of calculus formation. *J. Perio Res*, 1974:9, 211-221
7. R. Maijer and G.A. Klassen. *J. Canad. Dent . Assn.* 9, 333(1972).
8. Sewon L, Makela M. A study of the possible correlation of high salivary calcium levels with periodontal and dental conditions in young adults. Arch Oral Bio 1990; 3:211S- 2112S.