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Evaluation And Comparision Of Serum Amyloid A Protein Level As Marker Of Systemic Inflammation Before And After Scaling And Root Planing In Subjects With Gingivitis And Periodontitis

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Abstract

Background

Periodontitis and chronic inflammatory disease results in increase in the acute phase reactant proteins and Serum amyloid A protein being one of them ,that has been reported to be a clinically valuable marker of cardiovascular risk. Hence this study was designed to compare Serum amyloid A protein level as marker of systemic inflammation before and after scaling and root planing in subjects with gingivitis and periodontitis.

Methods

A total of 40 subjects were selected from those visiting Out Patient Department of Periodontology,

Bharati Vidyapeeth Deemed to be University Dental College and Hospital, Pune. The subjects were divided into two groups: Group 1 (20 subjects) of chronic Gingivitis and Group 2 (20 subjects) of Chronic Generalized Periodontitis. At baseline clinical findings and indices (Plaque index, Gingival Index and pocket probing depth) were recorded and then the subjects were sent to the Laboratory for hematological analysis of Serum Amyloid A (SAA) protein level. After which thorough scaling, root planing was carried out. 4 weeks after scaling and root planing same parameters were recorded.

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Results

The result of study showed that subject's in both the groups (Group-1 and Group 2) had statistically significant decrease in level of Serum Amyloid A protein,4 weeks after scaling and root planing .

Conclusion

Both the groups have shown elevated levels of SAA protein which may serve as a risk factor for cardiovascular disease.

Keywords: Periodontitis, Acute phase proteins, Cardio vascular disease, Serum Amyloid A

Introduction

Periodontitis is a destructive disease that affects the supporting structures of the teeth including the periodontal ligament, cementum and alveolar bone. It represents a chronic, mixed infection of gram negative and gram positive bacteria. In the light of extensive microbial plaque associated with periodontal infection, the chronic nature of this disease and the exuberant local and systemic response to the microbial assault, it is reasonable to hypothesize that this infection may influence the overall health and the course of some systemic diseases [1]. Periodontitis triggers an array of events which involves innate and adaptive immunity as well as inflammatory response in the host [2]. The characteristics of this response is infiltration of the periodontal tissue with multiple inflammatory cells which include polymorph nuclear Neutrophils , macrophages ,lymphocytes and plasma cells [3]. Even though periodontitis is localized to the periodontal tissue ,this disease appears to be sufficient to influence the acute phase response systematically. Numerous investigations have proposed that chronic periodontitis is potential a risk factor for atherothrombotic vascular disease [4,5].The link between atherosclerotic vascular disease (ASVD) and carotid intima-media thickness (cIMT). Acute phase proteins (APP) are defined as proteins whose serum concentrations is altered at least 25% in response to inflammation and includes proteins of the complement , coagulation and fibrinolytic system , anti proteases transport proteins , inflammatory mediators and others. APP are the sensitive markers for evaluating the status of inflammation [6,7]. Increased levels of associated with APP are increased risk for cardiovascular events in both health and Coronary heart disease patients and have been suggested to associate with infectious disease such as Periodontitis [8,9]. There are many Acute phase proteins. Strong acute phase proteins include C- reactive proteins, a2macroglobulin, Serum Amyloid A (SAA) which responds rapidly to inflammatory stimuli and their serum levels may increase several hundred folds[10].Serum amyloid A (SAA) proteins, compose a group of a polipo proteins principally produced by the liver in response to cytokine release by stimulated monocytosis and macrophages after an acute-phase stimulus such as infection [11]. It has been reported that elevated Serum amyloid A (SAA) protein levels may be a clinically valuable marker of cardiovascular risk [5]. The levels of this protein have been shown to positively correlate with the progress of atherosclerosis, implying that a prolonged elevation of SAA concentrations resulting from periodontitis may directly or indirectly contribute to the progress of cardiovascular disease. SAA, which is physically

inflammatory mediators in blood is well established,

systemic inflammatory markers(such as CRP,SAA,

Interleukins etc.) and increases in clinical event such

as Myocardial infarction(MI) and non hemorrhagic stroke, and in surrogate markers such as increased

between

levels

of

associations

consistent

with

present on HDL, may play an important role in binding lipoproteins to the vessel wall, thus contributing to lipoprotein oxidation and the progress of atherosclerotic lesions. Hence this study was designed to evaluate and compare Serum amyloid A protein level as marker of systemic inflammation before and after scaling and root planing in subjects with gingivitis and periodontitis.

Materials and method

A total of 40 subjects were selected from those visiting Out Patient Department of Periodontology, Bharati Vidyapeeth Deemed to be University Dental College and Hospital, Pune. The inclusion criteria was systematically healthy subjects ,subjects with age above 25 years , subjects of both the sex , subjects who have not undergone scaling or root planning within last 6 months , subjects with gingivitis (Loe and Silness gingival index, 1963) and Chronic generalized periodontitis subjects with a probing depth of 5-6 mm. The exclusion criteria included ,subjects with systemic diseases, pregnant or lactating women, subjects with antibiotic therapy in the last 6 months, subjects with a recent history of immunization and subjects who are smokers. The 40 subjects selected were then divided into two group : Group 1 consisted of 20 subjects of chronic Gingivitis and Group 2 consisted 20 subjects of Chronic Generalized Periodontitis and informed written consent for the study was obtained. . The relevant data and clinical findings were recorded on special Performa designed for this study so as to have a systematic and methodical recording of all the information and observations. Following indices were recorded: Plaque (Tureskey-Gilmore-Glickman modification of index Quigley Hein 1970), Gingival Index given by Leo and Sillness, 1963 and pocket probing depth .At baseline,

detailed clinical record and indices were recorded . After which the subjects were sent to the Laboratory for hematological analysis of Serum Amyloid A (SAA) protein level. After recording all the preoperative clinical and hematological parameters in Group 1 and Group-2, thorough scaling, root planing and polishing was carried out and oral hygiene instructions were given. All the subjects were recalled 4 weeks after scaling and root planing. Again the same clinical parameters and indices were recorded and the subjects were then again sent to laboratory for Hematological evaluation of Serum Amyloid A (SAA) protein level. The results obtained were arranged in a master chart and subjected to statistical analysis.

Results

The results thus obtained were arranged in master charts and statistical analysis was carried out. Intra group statistical analysis was performed using Paired "t" test. The comparison of Group-1 and Group-2 from baseline to 4 weeks after scaling and root planing was performed using unpaired "t" test.

An intra group comparison of Serum Amyloid A protein levels at baseline and 4 weeks after scaling and root planing in Group-1(i.e., generalized chronic gingivitis) was done . The mean value for Serum Amyloid A (SAA) protein level at baseline was 111.7 with a standard deviation of 7.981 and 4 weeks after scaling and root planning was 106.8 with a standard deviation of 4.830. Using Paired t test, P value was found to be <0.001, indicating that there was a statistically highly significant decrease in the Serum Amyloid A (SAA) levels from baseline to 4 after completion of scaling and root planing weeks in subjects Generalized chronic gingivitis.(Table I ,Graph I).Comparison of serum amyloid A protein

levels in Chronic periodontitis (i.e., Group II) at baseline and 4 weeks after scaling and root planning was done The mean value for Serum Amyloid A (SAA) protein level at baseline was 127.3 with a standard deviation of 22.389 and 4 weeks after scaling and root planing was 109.35 with a standard deviation of 3.801. Using Paired t test, P value was found to be <0.001, indicating that there was a statistically highly significant decrease in the Serum Amyloid A (SAA) levels from baseline to 4 weeks after completion of scaling and root planing in subjects with generalized chronic periodontitis.(Table II ,Graph II).Intergroup comparison of Serum Amyloid A protein levels at baseline and 4 weeks after scaling and root planing was carried . The SAA protein level with a mean of 111.70 ±7.981 in the Group -1 and 127.30±22.389 in the Group-2 at baseline show a statistically significant difference with a P value of P = 0.006. The SAA protein level were elevated in Group II (i.e., Generalized chronic periodontitis) compared to as Group1 (i.e., Generalized chronic gingivitis). The SAA protein levels were measured 4 weeks after scaling and root planing in chronic Gingivitis subjects (Group-1) with mean of 106.80 ± 4.830 and chronic generalized periodontitis (Group-II) with mean of 109.35±3.801. There was no statistical difference between the two groups as the P value was 0.071, which means there was no significant difference of SAA protein levels 4 weeks after scaling and root planing between both the groups.(Table III ,Graph III). The Serum amyloid A protein level with a mean of 4.90 with standard deviation of 5.097 in the Group -1((i.e., Generalized chronic gingivitis) and 17.95 with standard deviation of 19.521 in the Group-2((i.e., Generalized chronic gingivitis) at baseline - 4

loid A **Discussion**

Periodontitis is an infectious disease of gram negative species resulting in bacteraemia and leading to systemic involvement [12]. Epidemiological studies suggest that periodontitis is associated with increased risk for systemic diseases like cardiovascular disease and atherosclerosis. It has been reported that elevated SAA levels may be a clinically valuable marker of cardiovascular risk, particularly in patients with periodontitis [13].Serum amyloid A (SAA) proteins levels have been shown to positively correlate with the progress of atherosclerosis, implying that a prolonged elevation of SAA concentrations resulting from periodontitis may contribute to the progress of cardiovascular disease. Treatment of gingivitis and periodontitis may lead to а decrease in the inflammatory markers in the blood which may be beneficial in the control of atherosclerosis .Alterations in these factors at cellular and molecular levels are known systemic risk predictors for CVD.

weeks show a statistically highly significant difference

with a P value of $P = \langle 0.001. ($ Table IV , Graph IV).

Carlos Martin Ardila and Isabel Cristina Guzmán, conducted a study on the levels of serum amyloid A (SAA) proteins and highly sensitive C reactive protein levels as a markers of systemic inflammation in patients with chronic periodontitis. They concluded that serum amyloid A (SAA) and highly sensitive C reactive protein concentrations in patients with chronic periodontitis were elevated, suggesting that both are good markers of inflammation in such patients [14].Ingrid Glurich et al .conducted а comparative study on systemic inflammation in cardiovascular and periodontal disease. Their study showed increased in levels of serum amyloid A protein and C reactive protein in both periodontal

disease and cardiovascular patients. therefore they concluded that localized persistent infection may influence systemic levels of inflammatory mediators. Changes in inflammatory mediator levels potentially inflammation-associated impact atherosclerotic processes [5].Graziani F et al., conducted a study to describe the levels of serum inflammatory markers after the non- surgical and surgical treatment of chronic periodontitis (CP).Fourteen Chronic periodontitis cases were selected who received full-mouth non-surgical treatment and, after 6 months, at least two surgical sessions. Blood samples were collected at different points after treatment to check the levels of C-reactive protein (CRP), serum amyloid-A (SAA) and D-dimers. The study concluded reductions of the pockets, gingival bleeding and plaque after non-surgical therapy and surgical therapy resulted in more reduction of the periodontal pocket . Greater increase of C-reactive protein and Serum amyloid A protein was observed in the first 24 hours decreased after 30 days [15].Adnan and Ali Almaghlouth et al ,conducted a study where the aim was to assess whether nonsurgical periodontal therapy changes the levels of inflammatory markers (15 cytokines and 9 acute-phase proteins (SAA being one of them)) and lowers their peaks. The study concluded that subjects with untreated periodontitis may show high peaks for several inflammatory markers in serum simultaneously. Nonsurgical periodontal treatment with or without antibiotics reduced most of these peak levels [16].

The result of study showed that subject's in both the groups (Group-1 and Group 2) had statistically significant decrease in level of Serum Amyloid A protein,4 weeks after scaling and root planing , which were similar to the above studies .

Summary

The following observations from our study were obtained:

- There was a statistically significant decrease in Serum amyloid A protein (SAA) level from baseline to 4 weeks after scaling and root planing in chronic generalized gingivitis subjects (Group-1) and Chronic generalized periodontitis subjects (Group-2).
- There was a statistically significant difference in Serum Amyloid A protein level at baseline between both the groups i.e, Chronic generalized gingivitis subjects (Group-1) and Chronic generalized periodontitis subjects (Group-2) ,with higher in Group 2(i.e., Generalized chronic periodontitis).
- There was no statistically significant difference in Serum Amyloid A protein level at 4 weeks after scaling and root planing between both the groups i.e., chronic generalized gingivitis subjects (Group-1) and Chronic generalized periodontitis subjects (Group-2).

Conclusion

Results of our study have showed that Generalized chronic gingivitis and periodontitis which have an elevated Serum Amyloid A protein level may serve risk factor for cardiovascular a disease. as Intervention therapy may decrease the level in Chronic Gingivitis subjects but Chronic Periodontitis subjects may require additional periodontal therapy to fully reduce the inflammatory burden of the disease thereby lowering the risk and improving the overall health and wellbeing of the patient. The above found results will also help us in increasing the awareness among the medical faculty about the role of gingivitis and periodontitis as a risk factor for cardiovascular disease so that it can be successfully

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treated by a multidisciplinary approach. To elucidate the exact relationship between gingivitis, periodontitis and cardiovascular disease, further longitudinal and interventional studies with larger sample size should be carried out. An applied research is required in this area to unveil the exact mechanism underlying the causation of increased Serum Amyloid A protein (SAA) level leading to increased cardiovascular risk and also to provide a better understanding of the relationship of periodontitis and atherosclerosis.

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Table 1: Comparison of Serum Amyloid A protein level sat baseline and 4weeks after scaling and root planning in

 Group-1(i.e., generalized chronic gingivitis)

Time interval	N	Mean	Std. Deviation	t value	P value
Baseline	20	111.70	7.981		<0.001**
4weeks	20	106.80	4.830	4.298	

PairedtTest

(p<0.05-Significant*,p<0.001-Highlysignificant**)

Graph 1: Bar graph showing Comparison of Serum Amyloid A protein level sat Base line and 4 weeks after scaling and root planning in Group-1(i.e., generalized chronic gingivitis)



Table II: Comparison of Serum Amyloid A protein levels at baseline and 4 weeks after scaling gandroot planning in Group-2(i.e., generalized chronic periodontitis)

Time interval	N	Mean	Std. Deviation	T value	P Value
Baseline	20	127.30	22.389	4.112	<0.001**
4weeks	20	109.35	3.801		

PairedtTest

(p<0.05-Significant*,p<0.001-Highlysignificant**)

Graph 11: Bar graph showing Comparison of Serum Amyloid A protein levels at baseline and 4weeks after scaling and root planning Group-2(i.e., Generalized chronic periodontitis)



Table III: Comparison of Serum Amyloid A protein levels at baseline and 4weeks after scaling and root planning in

 Group-1 ((i.e., Generalized chronic gingivitis) and Group-2(i.e., Generalized chronic periodontitis)

		Ν	Mean	Std. Deviation	T value	P value
Baseline	Gingivitis	20	111.70	7.981	2,935	0.006
Dusenne	Periodontitis	20	127.30	22.389	2.755	0.000
4weeks	Gingivitis	20	106.80	4.830	1 855	0.071
	Periodontitis	20	109.35	3.801	1.000	

Graph III: Comparison of serum amyloid A protein levels in terms of {Mean (SD)} at different time intervals among both the groups using unresided test

both the groups using unpaired test

Baseline



4 Weeks





		Ν	Mean	Std. Deviation	Z value	P value
Mean	Gingivitis	20	4.90	5.097	3.300	<0.001**
difference	Periodontitis	20	17.95	19.521	0.000	

(p<0.05-Significant*,p<0.001-Highlysignificant**)



