Evaluation of the Levels of Serum Albumin among Healthy Subjects, Gingivitis and Periodontitis Patients and Their Correlations

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Abstract:-

➢ *Aim*

To evaluate the levels of serum albumin in healthy subjects, gingivitis and periodontitis patients and their correlation.

➢ *Materials and Methods*
- This study was conducted upon 60 subjects of both gender with age range of 25-50 years and the inclusion with exclusion criterias were considered.
- Three groups were made with almost equal division of patients approximately 20 patients each in the group ; Clinically healthy subjects, gingivitis and periodontitis patients.
- At baseline dental examinations were carried out with Bleeding on probing, Probing depth, Gingival index, Loss of clinical attachment were measured. By Albumin estimation kit – Bromocresol green method (BCG) the Serum albumin concentration was measured.

➢ *Results*
- The levels of mean serum albumin among healthy, gingivitis and periodontitis group was 4.03 ± 0.35, 4.09 ± 0.20, 3.72 ± 0.14 respectively. Three groups were compared for mean serum albumin levels using Kruskal Wallis test and results were found statistically significant ($p<0.001$).
- The mean serum albumin levels in subjects among groups with Gingival index 0-1, 1.1-2 and 2.1-3 was 4.07 ± 0.32, 4.04 ± 0.29, 3.80 ± 0.22 respectively. The difference of the mean serum albumin level among different gingival index score was found to be statistically significant ($p<0.05$).
- The mean serum levels in subjects with loss of attachment less than 5 mm was 3.76 ± 0.12 and in subjects with attachment loss more than or equal to 5 mm was 3.68 ± 0.15. The comparison was done using Mann-Whitney U test and the differences in the mean serum albumin level was not significantly different($p>0.05$) .

➢ *Conclusion*

Serum albumin concentration and the study groups had found an inverse association in this clinical trial. Also there was a finding that serum albumin level is reducing with an increase in gingival index and in loss of attachment.

Keywords:- *Gingivitis , Periodontitis, Serum Albumin.*

I. INTRODUCTION

Periodontitis is an inflammatory condition in which progressive destruction of periodontal tissues occurs and group of specific micro organisms are causative agents for these destructions like pocket formation with clinical attachment loss, recession, furcation involvement. The causative microraganisms are *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis, Prevotella intermedia* which play important role in destruction of periodontal structures and producing host response[1]. So the sequeal of periodontitis is inflammatory host response against pathogenic bacteria's by which destruction of alveolar bone and connective tissue occurs.

The albumin concentration decreases in inflammatory conditions as it reduces its rate of synthesis and it also decreases in chronic conditions in which there is release of inflammatory cytokines such as IL-1, IL-6, and TNF – α[2].

Albumin the most abundant of serum proteins, it is from 100-700 mg/dl. In the oral cavity it is selectively absorbed by different materials. In young adults, the plasma protein is produced in liver at the rate of 12 to 25 gm per day. It take part in many physiological processes like vasodilation, antioxidant reactions and endothelial cell apoptosis[3]. During inflammation and systemic disease such as malnutrition, liver disease, kidney disorders, blood loss conditions and malabsorption, the level of serum alumin decreases[4]. Increased levels are seen in dehydration. Considering overall factors, the serum albumin is an acute phase protein which is a good indicator for the prediction of various inflammatory acute and chronic disorders[5].

So, the purpose of the study is to evaluate the correlation between serum albumin concentration and periodontal disease. Level of the serum albumin will act as a indicator to predict the severity of an underlying disease[6,7].

II. MATERIAL AND METHODS

The study was conducted in the Outpatient department, Department of Periodontics, K.D.Dental College and Hospital, Mathura. An ethical clearance was obtained before conducting the study from the institutional ethical committee.

Study Groups comprises of 60 subjects, with almost equal division of patients approximately 20 patients each in the three groups i.e. Healthy subjects, Gingivitis and Periodontitis of age group of 25 -50 years of age. Those who met the inclusive and exclusive criteria were divided as the following:
1. Group I (Healthy subjects): Patient will be selected on the basis of absence of loss of attachment, probing depth and bleeding on probing.
2. Group II (Gingivitis): Patient will be selected on the basis of absence of probing depth, absence loss of attachment and presence of bleeding on probing.
3. Group III (Periodontitis): Patient will be selected on the basis of presence of probing depth, clinical attachment loss and bleeding on probing.

❖ *Inclusion Criteria*
1. Systemically healthy individuals.
2. Both male and female patients will be included.
3. Minimum number of teeth present would be 18.
4. Individuals with age group 25-50 years will be considered.
5. Patients with probing depth >5mm at least 8 sites will be considered in periodontitis.

❖ *Exclusion Criteria*
1. Patient with any systemic disease.
2. Malnourished patients.
3. Patients with xerostomia and undergoing radiotherapy.
4. Any pregnant or lactating female.
5. Patient taking any protein health supplements.
6. Patient who had been on antibiotic therapy during the preceding 6 months.
7. Smokers / tobacco chewers.

❖ *Armamentarium*
1. Mouth mirror
2. Williams graduated probe
3. Surgical gloves
4. Mouth mask
5. Suction tip
6. Alcohol swab
7. Disposable syringe 2 ml
8. Tourniquet
9. Plain vacutainer
10. Centrifugation machine
11. Albumin estimation kit – Bromocresol green method (BCG) used for estimation of serum albumin
12. Autoanalyser

The Patients selected for this study were preinformed about the study and the written consent of the patient was taken. The patient was then subjected to an initial examination consisting of:
a. Complete medical history
b. Periodontal examination with following clinical parameters
1. Gingival index
2. Bleeding on probing
3. Probing depth
4. Loss of clinical attachment

❖ *Serum Albumin Estimation*
1 ml of blood is withdrawn from antecubital vein for serum albumin estimation. The collected blood sample was transferred into plain vacutainer and was allowed to clot for 5-7 minutes. After clotting the sample was centrifuged at 2500 rpm for 10 minutes for separation of serum which was then collected in a sterile test tube. The extracted serum was used for estimation of albumin levels in blood.

Continuous variables like age, serum albumin, Gingival Index, Bleeding on probing, Probing depth and CAL were summarized as mean and standard deviation. Inferential statistics were performed using Chi square test, one way Analysis of Variance, Spearman's correlation analysis, Kruskal Wallis test and Mann Whitney U test. Graphs were prepared using Microsoft Excel.

III. RESULTS

The Present study aimed at estimating Serum Albumin level in Healthy subjects (Group I), Gingivitis (Group II) and Periodontitis (Group III) patients. A total of 60 subjects, with almost equal division of 20 patients each of the three groups.

Clinical parameters that were assessed at the same time intervals are as follows:
1. Gingival Index
2. Probing Depth
3. Clinical Attachment Level
4. Bleeding on Probing

The levels of mean serum albumin among healthy, gingivitis and periodontitis group was 4.03 ± 0.35, 4.09 ± 0.20, 3.72 ± 0.14 respectively. There was also significant inverse relationship seen between loss of attachment and serum albumin levels in periodontitis group. The mean serum albumin levels among the three groups were compared using Kruskal Wallis test and they were found to be statistically significant ($p<0.001$). On conducting Post hoc pairwise comparison by Mann Whitney U test, the levels of serum albumin in periodontitis were found to be significantly lower than healthy and gingivitis group. But there was no significant difference found in serum albumin levels of healthy and gingivitis group.

Group	Serum Albumin levels (g/dl)		P^c value, S	Post hoc pairwise comparison by Mann Whitney U test
	Mean	SD		
Healthy	4.03	0.35	**<0.001, S**	**1,2>3**
Gingivitis	4.09	0.20		
Periodontitis	3.72	0.14		
Total	3.95	0.29		

Table 1

Fig 1

The mean serum albumin levels in subjects among groups with Gingival index 0-1, 1.1-2 and 2.1-3 was 4.07 ± 0.32, 4.04 ± 0.29, 3.80 ± 0.22 respectively. The difference of the mean serum albumin level among different gingival index score was found to be statistically significant ($p<0.05$). On conducting post hoc pairwise comparison by Mann Whitney U test, the levels of serum albumin in subjects among group with GI 2.1-3 was found to be significantly lower than in GI 1.1-2 and GI 0-1 group. But there was no significant difference found in serum albumin levels among moderate and mild group.

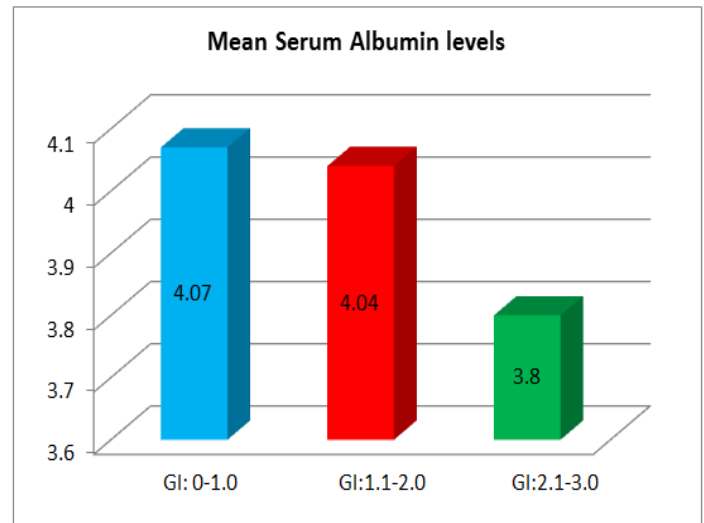| Group	Serum Albumin		P^c value, S	Post hoc pairwise comparison by Mann Whitney U test
	Mean	SD		
GI 0-1.0 (n=11)	4.07	0.32	**0.004, S**	**1,2>3**
GI 1.1-2.0 (n=23)	4.04	0.29		
GI 2.1-3.0 (n=26)	3.80	0.22		
Total	3.94	0.29		

Table 2

Fig 2

The mean serum levels in subjects with loss of attachment less than 5 mm was 3.76 ± 0.12 and in subjects with loss of attachment more than or equal to 5 mm was 3.68 ± 0.15. The comparison was done using Mann-Whitney U test and the differences in the mean serum albumin level was not found to be significantly different ($p>0.05$).
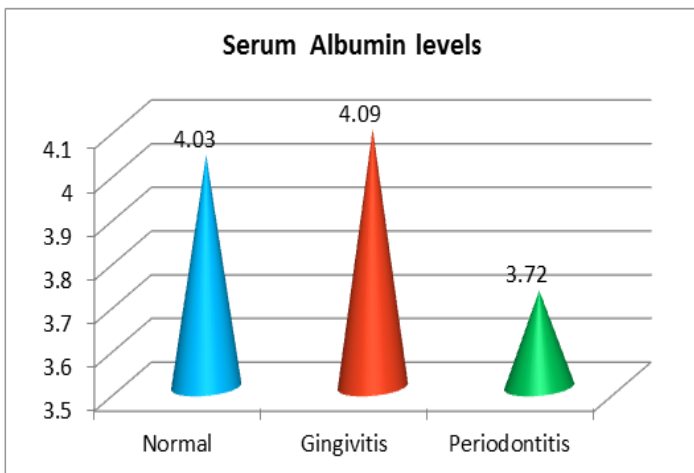
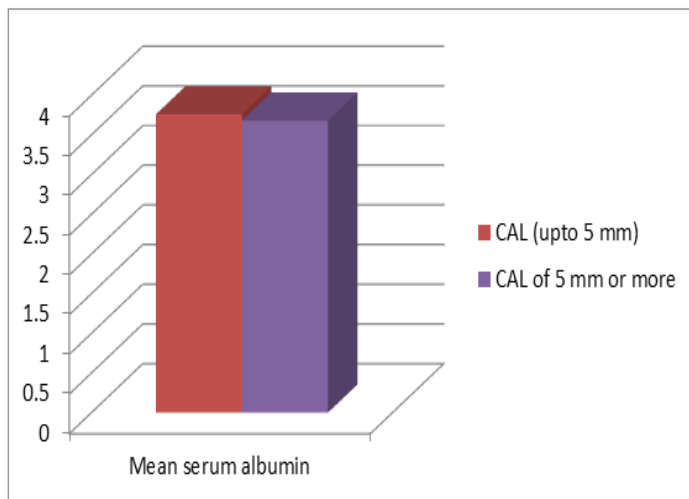| Clinical Attachment loss	Serum Albumin Mean (SD)
CAL < 5 mm (n=8)	3.76 (0.12)
CAL >= 5mm(n=12)	3.68 (0.15)
P^e value, Significance	0.164, NS

Table 3

Fig 3

IV. DISCUSSION

This study aimed at estimating the serum albumin level with mean age of 35-42 years, ranging between 25 and 50 years, whereas the studies conducted by Ogawa et al (2006)[9] measured the serum albumin level in elderly individuals with age group of 70 years, Kolte et al (2012)[6] measured the albumin level in age group ranging from 40-70 years. Very few studies have estimated the serum albumin level in young adults.

Investigation by Corti *et al* has been reported that there is a linkage between serum albumin and mortality rate that's decreasing serum albumin level have increasing mortality rate. More the mortality rate increases when the Serum albumin level goes below 4g/dl. A quartile of serum albumin levels has shown significantly different 10 year survival rate , reported by Shibata *et al*. So, substantial influence of periodontal disease has been found on patient's general health and serum albumin level[8].

Magagnotti et al. 2000, Nishida et al. 2000, Giordano et al. 2001, Amarasena et al. 2005 had reported the relationship between serum albumin and patient's nutritional condition. So, according to these all studies, if nutritional status of the patient is not favourable than it indicates the lower serum albumin level and also having possibilities of periodontal disease progression[9].

In this study, serum albumin levels were 4.03 ± 0.35 among healthy subjects, 4.09 ± 0.20 among gingivitis and 3.72 ± 0.14 g/dl among periodontitis patients. The levels in healthy and gingivitis group were found to be significantly higher than periodontitis group. But there was no statistically significant difference found between gingivitis and healthy group. The study results showed an inverse relationship between serum albumin concentrations and periodontal disease which is similar to the study conducted by Kolte et al (2010)[6] which showed levels of serum albumin 4.74 g/dl (0.276) in healthy group and 4.61 g/dl (0.273) in periodontitis group. The serum albumin level is a important clinical parameter and an aspect of the general inflammatory condition of elderly people[11].

Our study also reported that decrease in serum albumin level was significant with increase in gingival index scores. The serum albumin levels were found to be inversely proportional to gingival index scores. Gingival index is a parameter which reflects inflammation severity and extension to the gingival periphery, as suggested by Cinquini.[12].

In present study, the relationship between the Groups i.e loss of attachment < 5 mm and ≥5 mm and mean serum albumin level was not found to be statistically significant. This could be attributed to narrow range of variation, having the minimum loss of attachment as 4.27 mm, and maximum as 6.00 mm with a mean of 5.09 ± 0.54.

In view of the above findings, it could be suggested that, the study not confirm the cause of the relationship between serum albumin in subjects of gingivitis and periodontitis. In order to explore the correlation, more Prospective and Interventional studies with large sample size could be performed.

In conclusion, More Longitudinal and Interventional studies with large sample size may be required to find out the cause to effect relationship between serum albumin concentration and periodontal disease.

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