



Comparative Analysis of Salivary Protein in Individuals with and without Periodontitis

Karthiga Devi. G, Geetha. R.V, Vishnu Priya. V, Gayathri. R

BDS second year, Assistant professor, Department of Microbiology, Associate professor, Department of biochemistry, Assistant professor, Department of biochemistry, Saveetha dental college and hospitals, Saveetha University, 162,p.h. road, Chennai, India.

*Corresponding author's E-mail: karthigadevig98@gmail.com

Received: 22-12-2016; Revised: 24-01-2017; Accepted: 18-02-2017.

ABSTRACT

The aim of the study is to evaluate and compare the salivary protein concentration in both normal and periodontitis patients. Saliva is essential for a lifelong conservation of dentition; its various functions are implicated in the maintenance of oral health and the protection of teeth. Saliva contains a large number of proteins that participate in the protection of the oral tissues, for instance lysozyme, lactoferrin, lactoperoxidase, immunoglobulins, agglutinin and mucin. Because, all these proteins and peptides have a broad spectrum of antimicrobial activity. There seems to be a considerable overlap in their functionality. Periodontitis is oral diseases that are characterized by chronic inflammation. Here, salivary protein and albumin concentrations were determined as markers for plasma protein leakage, occurring as a consequence of the inflammatory process. The major factors affecting the protein concentration and composition of whole saliva are the salivary flow rate, protein contributions of the glandular saliva.

Keywords: Salivary protein, periodontitis patients, salivary marker, dental health.

INTRODUCTION

Saliva lacks the drama of blood, the sincerity of sweat and the emotional appeal of tears. Despite the absence of charisma, practitioners are ending that saliva provides an easily available, non-invasive diagnostic medium for a rapidly widening range of diseases and clinical situations¹. Saliva has various functions in the oral environment like clearing of food debris and bacteria, buffering capacity on tissue damaging strong bases and acids, providing saturated solution of calcium needed in remineralisation of teeth; it also has antibacterial, antifungal and antiviral capacity². Biochemical analysis of saliva would be of great biomedical importance, since saliva is very easy to collect offering a cost-effective approach for screening of large populations, and could represent an alternative for the patient whose blood is difficult to obtain when compliance is a problem. Saliva, and not blood, is chosen in this study, as many reports have suggested that saliva can be alternative to blood³. Saliva contains a large number of proteins that have metabolic, immune response, transporting, and several other cellular functions. It's collection is non-invasive compared to the collection of other body fluids, and hence has a great potential for use in the diagnosis of systemic and localised disease^{4,5}.

In the oral cavity, proteins, especially albumin, are considered as a serum ultra filtrate to the mouth⁶. Salivary proteins have been shown to be increased in medically compromised patients whose general conditions get worse. Elderly subjects usually show less-effective immune response than the young ones. Periodontitis are oral diseases that are characterized by chronic inflammation. Here, salivary protein and albumin concentrations were determined as markers for plasma

protein leakage, occurring as a consequence of the inflammatory process. Hence, the aim of the present study was to analyze the salivary total protein concentration, both normal and periodontitis, using simple biochemical methods.

METHODS AND MATERIALS

This study involves 30 adult human subjects comprising of 15 normal and 15 periodontitis patients.

Collection of Saliva

Un stimulated whole saliva (Resting Saliva) from each subject was expectorated, into sterile tubes, 2 hours after breakfast, after a single mouth rinse with 15 ml of distilled water to wash out exfoliated cells. 5ml of saliva was collected from the patient, centrifuged and the supernatant obtained was stored at 4°C for subsequent analysis.

Estimation of salivary protein

Salivary protein estimation is based on the Biuret method. Protein forms a colored complex with cupric ions in alkaline medium. Based on this principle, salivary protein estimation was done by mixing undiluted saliva with the reagent (45 g of Rochelle salt and 15 g of copper sulfate in 400 mL of 0.2 N sodium hydroxide. Five grams of potassium iodide was added to make up to 1 L with 0.2 N sodium hydroxide). The colour produced was estimated using colorimeter.

RESULTS

The biochemical values of this study are subjected to statistical analysis to specify the statistical differences between the groups. Student's t-test is used to compare



and correlate different parameters in subgroups among the normal and periodontitis patients.

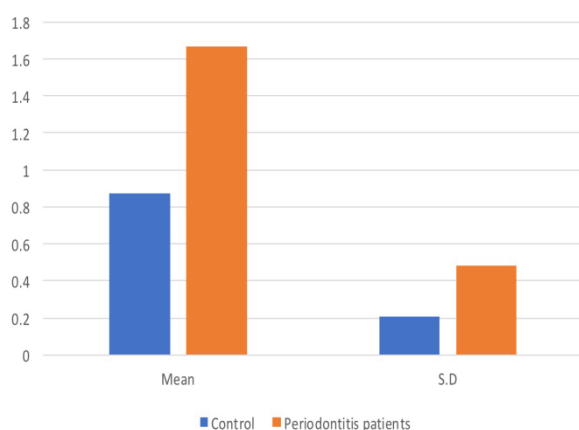


Figure 1: comparison of salivary protein among control and periodontitis individuals

Group	N	Mean g/ml	S.D	P value
Control	15	0.87g/ml	0.21	0.001
Periodontitis patients	15	1.67g/ml	0.48	0.001

DISCUSSION

In general, the major factors affecting the protein concentration and composition of whole saliva are the salivary flow rate, protein contributions of the glandular saliva and crevicular fluid proteins. Thus, the elevated protein levels are most likely due to enhanced synthesis and secretion by the individual glandular saliva. Also, glandular-derived proteins, Cystatin C and amylase showed significant rise in periodontitis subjects, proving the glandular origin of these proteins⁷. In addition, the rise in salivary albumin also plays a role in the rise of total proteins. Thus, in the present study, salivary total protein concentration is proved to be a valuable biochemical marker of periodontal disease.



There is a rise in the total salivary protein concentration in the periodontitis group. In total, the mean values in the controls and periodontitis are 0.87 g/mL (SD=0.21) and 1.67 g/mL (SD=0.48). The rise in these values is

statistically very highly significant ($P=0.001$). Both the groups showed 1.8 value rise in the periodontitis respectively, when compared with that of the controls.

Quantitative proteomic is used to investigate whole saliva from individuals with severe periodontitis and their proteomic profiles before and after periodontal treatment is compared. Results highlighted the predominant involvement of S100 proteins in the host response during periodontitis, identifying host defence components that have not been linked previously to this disease and suggesting new potential biomarkers for monitoring disease activity in periodontitis⁹.

CONCLUSION

A very highly significant rise in the salivary total protein concentration, suggests the role of these simple methods in assessing the parameters as markers for periodontitis, where plasma protein leakage occurs as a consequence of the inflammatory process. However, a longitudinal study would be required to draw definite conclusions and prove the role of saliva as a prognostic indicator.

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Source of Support: Nil, Conflict of Interest: None.