

# The Assessment of Periodontal Parameters, Salivary Total Protein and Albumin Contents in Patients Taking Warfarin

Azizi A.<sup>a\*</sup>, Lawaf Sh.<sup>b</sup>

<sup>a</sup> Dept. of Oral Medicine, Faculty of Dentistry, Ahwaz University of Medical Sciences, Ahwaz, Iran

<sup>b</sup> Dept of Prosthodontics, Faculty of Dentistry, Ahwaz University of Medical Sciences, Ahwaz, Iran

## KEY WORDS

Salivary total protein;  
Salivary albumin;  
Gingival index;  
Clinical attachment level;  
Periodontal disease;  
Warfarin

Received May 2009;  
Received in revised form Aug 2009;  
Accepted August 2009

## ABSTRACT

**Statement of Problem:** In thrombosis and embolism therapy, one of the therapeutic options is the use of anticoagulants. Patients who take anticoagulants are susceptible to bleeding and cannot brush or floss their teeth. They are prone to periodontitis. Periodontal diseases are associated with periodontal cell destruction and consequently their cell contents would be found in the saliva.

**Purpose:** The assessment of albumin and total protein contents and determination of its correlation with periodontal parameters in patients who take warfarin are the goals of the present study.

**Materials and Method:** In this case-control study, the subjects were classified into 2 groups of patients who took warfarin (case group) and those who did not take any medication (control group). In both groups, periodontal parameters such as plaque index (PI), gingival index (GI), pocket depth (PD), bleeding on probing (BOP) and clinical attachment loss (CAL), and total protein and albumin were assessed. T-test and Pearson test were used to analyze the data.

**Results:** Although salivary albumin was significantly higher in the case group in comparison with the control one, total salivary protein contents were not observed differently between the two groups. Compared with the control group, periodontal clinical parameters were high in the case group and obvious significant differences were seen ( $p < 0.05$ ).

**Conclusion:** Appropriate oral and gingival hygiene instruction is necessary due to the high periodontal clinical parameters in patients who take warfarin.

\* **Corresponding author:** Azizi A., **Address:** Dept. of Oral Medicine, Faculty of Dentistry, Ahwaz University of Medical Sciences, Ahwaz, Iran; **Tel:** 0611-3345240; **Fax:** 0611-3364366;  
**E-mail:** drarashazizi@yahoo.com

## Introduction

Along with the recent diversification of medical care, the number of the patients who take warfarin and visit their dentists has increased. Warfarin, which is a prophylactic and therapeutic drug for thrombosis and embolism, is indicated as the postoperative treatment

of prosthetic valve surgery, myocardial infarction, arterial fibrillation and pulmonary embolism [1]. One of the most frequently observed adverse reactions of warfarin is bleeding [2-3].

As to the oral cavity, warfarin takers have gingival bleeding after tooth brushing and as a result they

hesitate to brush their teeth [4]. Therefore, the periodontal condition would deteriorate day by day. Although gingival bleeding is relatively mild, its incidence is high. Thus, it is conceivable that gingival bleeding due to warfarin would increase the severity of periodontal diseases. Patients with heart disease, taking warfarin and currently affected with periodontal disease were selected. Albumin is the most abundant serum protein, accounting for more than 50% of all plasma proteins. Albumin is synthesized exclusively in the liver. In the oral cavity, albumin is regarded as a serum ultra-filtrate to the mouth [5-6] and it may also diffuse into the mucosal secretions [7]. Salivary albumin has been shown to be increased in medically compromised patients whose general condition has gotten worse. Immunosuppression, radiotherapy, and diabetes are examples of the states in which high concentrations of salivary albumin have been detected [8]. It may be hypothesized that salivary albumin can be used to assess the integrity of the mucosal function in the mouth [9].

Since periodontal diseases are associated with destruction of periodontal cells and the release of cell contents to the saliva, the salivary albumin and total protein in patients who take warfarin can indicate astonishing results.

This study aimed to assess the periodontal disease and salivary total protein and albumin content in patients who take warfarin.

### Materials and Method

The present case-control study surveyed 20 cases who took warfarin, (13 male and female with a mean age of  $60.3 \pm 12.7$  years) and 22 controls (14 male and female, with a mean age  $58.2 \pm 8.2$  years). The control group consisted of healthy subjects without a past history of systemic or cardiovascular problem. Smokers were excluded from both groups.

For saliva collection, the subjects' oral cavities were rinsed with water and then paraffin wax was chewed for several minutes. Through this method,

10ml of the saliva samples was collected from each subject and immediately kept in a refrigerator. It was centrifuged at 3000 rpm for 15min and the supernatant was delivered into tubes (1mL/tube). The tubes were stored frozen at  $-80^{\circ}\text{C}$ , thawed on measurement, and analyzed.

For determining the salivary total protein and salivary albumin, the researcher evaluated the oral cavity and periodontal condition. Plaque index (PI) and gingival index (GI) based on Silness and Loe's method, probing depth (PD), bleeding on probing (BOP), and clinical attachment level were assessed in both groups. To evaluate the clinical symptoms based on clinical parameters, the above parameters were measured as follows: 1) PI was used for evaluating the state of dental plaque adhesion. 2) GI was used for evaluating the spread and severity of gingival margin inflammation [10]. 3) PD was measured by a William's probe to indicate the length between the depth and gingival margin at a unit of 1mm [11]. 4) CAL was the distance from the periodontal pocket depth to the cemento-enamel junction. 5) BOP was evaluated based on the presence or absence of gingival bleeding on probing [12]. One to five measurements were carried out for the teeth using the 6 point method. The mean values of the individual subjects were analyzed by T-test and Pearson correlation test.

### Results

The mean age of the patients taking warfarin was 60.3 and that of the control group was 58.6. The mean salivary total protein and albumin in the case group were 86.3 and 520 mg/L, while in the control group, the mean salivary total protein and albumin were 695.3 and 156.1 mg/L respectively. There was no significant difference in the salivary total protein between the two groups. Salivary albumin was significantly higher in the test group in comparison with the control one ( $p < 0.01$ ). The mean values of periodontal parameters are shown in Table 1.

All PI, GI, PD, BOP and CAL parameters were

**Table 1** Mean values of clinical periodontal parameters in each group

	PI	GI	PD (mm)	BOP (%)	CAL (mm)
Control group	0.36±0.18	0.06±0.03	1.98±0.13	2.2± 2.35	2.03±0.18
Case group	0.78±0.37	0.61±0.29	2.42±0.37	15.97±10.32	3.01±0.43

significantly higher in the case group compared with the control group, and the difference was significant ( $p < 0.05$ ). A significant correlation was shown in salivary albumin, GI and CAL. But there was no significant correlation between the total protein and albumin with other clinical parameters.

### Discussion

In the present study, the periodontal parameters and salivary albumin and total protein in patients taking warfarin and control group were assessed. The results showed that periodontal parameters and salivary albumin were higher in patients who take warfarin as compared to the control group. Transudation of the serum components into the oral cavity. Although some researchers have reported the levels of the salivary total protein and albumin, the values are variable [13-15]. Meurman et al. examined 252 ambulant patients over 20 years of age and reported that the mean salivary total protein and albumin levels were 1600 and 204 mg/L, respectively [14]. Mellanen reported that mean total protein and albumin were 700 and 126.4 mg/L, respectively in HIV infected patients. Therefore, HIV infection may affect the mucosal integrity [13].

Our data of mean salivary total protein and albumin obtained in case groups were 695.3 and 156 mg/L, respectively, being almost consistent with those reported by Mellanen [13]. As to the salivary total protein level, no significant differences were found between the two groups. Although it was higher in the case group, it was not significant.

The case group showed a significantly higher albumin level as compared to the control group. In addition, salivary flow might be a critical issue, but we considered it could be neglected in our study

because the saliva was obtained by paraffin stimulation, not by natural secretion. In the oral cavity, albumin is regarded as a serum ultra-filtrate to the mouth [5-6] and it may also diffuse into the mucosal secretions [7].

It seems that the increase of salivary albumin in the case group may result in degeneration, destruction and lysis of periodontal cells. It may be hypothesized that salivary albumin can be used to assess the integrity of mucosal function in the mouth [16]. Henskens also reported that in patients with periodontitis, salivary albumin increases [17]. This study showed that the case group patients taking warfarin had less favorable periodontal condition compared with the control group. The quality of coagulation cycle was not efficient in patients who took warfarin, so they were susceptible to bleeding. They did not have enough tendencies to brush or floss their teeth. Therefore, periodontal disease was more prevalent in these patients.

The periodontal parameters were lower in them as compared to the normal ones. Our study also showed that salivary albumin had a significant correlation with gingival index. Gingival index is considered to be a parameter reflecting the severity and extension of inflammation to the gingival periphery, indicating intra-oral inflammation as suggested by Cinquini, who reported that albumin and Aspartat transaminase were transuded from the damaged cell to the saliva [18]. Also in our study, there was a significant correlation between salivary albumin and clinical attachment loss as a parameter reflecting bone absorption and it was in agreement with the results of the study conducted by Cesco [12].

### Conclusion

Periodontal clinical parameters in patients who take

warfarin are higher than healthy subjects; therefore, good oral and gingival instruction is necessary in these patients.

## References

- [1] Goldman MD, Ausiello D. Cecil text book of medicine. 22nd ed., New York; Saunders Co: 2004. p. 162-163.
- [2] Albers GW. Antithrombotic agents in cerebral ischemia. *Am J Cardiol* 1995; 75: 34-38.
- [3] Greenberg M. Burket's oral medicine. 10th ed., New York; Hamilton: 2003. p. 376.
- [4] Caraco Y, Rubinow A. Enhanced anticoagulant effect of coumarin derivatives induced by doxycycline coadministration. *Ann Pharmacother* 1992; 26: 1084-1086.
- [5] Oppenheim FG. Preliminary observations on the presence and origin of serum albumin in human saliva. *Helv Odontol Acta* 1970; 14: 10-17.
- [6] Rantonen PJ, Meurman JH. Correlations between total protein, lysozyme, immunoglobulins, amylase, and albumin in stimulated whole saliva during daytime. *Acta Odontol Scand* 2000; 58: 160-165.
- [7] Schenkels LC, Veerman EC, Nieuw Amerongen AV. Biochemical composition of human saliva in relation to other mucosal fluids. *Crit Rev Oral Biol Med* 1995; 6: 161-175.
- [8] Henskens YM, Strooker H, van den Keijbus PA, Veerman EC, Nieuw Amerongen AV. Salivary protein composition in epileptic patients on different medications. *J Oral Pathol Med* 1996; 25: 360-366.
- [9] Meurman JH, Pyrhönen S, Teerenhovi L, Lindqvist C. Oral sources of septicaemia in patients with malignancies. *Oral Oncol* 1997; 33: 389-397.
- [10] Newman M, Takei H, Kolkkevold P. Carranza's clinical periodontology. 10th ed., New York; Saunders Co: 2006. p. 115-116.
- [11] Hisano A, Nakaya H, Sato T. Study on a saliva test for periodontal disease in the elderly. *J JPN Soc Periodontol* 2002; 44: 261-272.
- [12] Cesco Rde T, Ito IY, de Albuquerque RF Jr. Levels of aspartate aminotransferase (AST) in saliva of patients with different periodontal conditions. *J Clin Periodontol* 2003; 30: 752-755.
- [13] Mellanen L, Sorsa T, Lähdevirta J, Helenius M, Kari K, Meurman JH. Salivary albumin, total protein, IgA, IgG and IgM concentrations and occurrence of some periodontopathogens in HIV-infected patients: a 2-year follow-up study. *J Oral Pathol Med* 2001; 30: 553-559.
- [14] Meurman JH, Rantonen P, Pajukoski H, Sulkava R. Salivary albumin and other constituents and their relation to oral and general health in the elderly. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2002; 94: 432-438.
- [15] Ruhl S, Hamberger S, Betz R, Sukkar T, Schmalz G, Seymour RA, et al. Salivary proteins and cytokines in drug-induced gingival overgrowth. *J Dent Res* 2004; 83: 322-326.
- [16] Meurman JH, Pyrhönen S, Teerenhovi L, Lindqvist C. Oral sources of septicaemia in patients with malignancies. *Oral Oncol* 1997; 33: 389-397.
- [17] Henskens YM, van der Velden U, Veerman EC, Nieuw Amerongen AV. Protein, albumin and cystatin concentrations in saliva of healthy subjects and of patients with gingivitis or periodontitis. *J Periodontal Res* 1993; 28: 43-48.
- [18] Cinquini I, Calisti L, Fierabracci V, Marrapese E, Egéa JC, Masiello P, Giuca MR. Enzymatic markers of salivary cell injury in saliva of type 1 diabetic children. *Clin Oral Investig* 2002; 6: 21-23.