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Selected Salivary Antioxidant Levels in Relation with Periodontal Diseases

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Abstract

Objective: Gingivitis and periodontitis are the most common types of periodontal diseases, which are chronic inflammatory conditions encompassing many other conditions. These arise because of the interaction between a pathogenic bacterial biofilm and inflammatory chemicals and cells produced from the host.

Materials and Methods: A sample of 50 individuals (18 males and 32 females) aged 19-30 years old, treated at the health center of Efraz, Samarra city, was recruited. Plaque index was measured to determine dental plaque thickness. A calculus index was measured as well. Salivary uric acid and salivary total protein content were assessed chemically using unstimulated saliva. The statistical package for social science (SPSS) version 21 was used to examine all data.

Results and Conclusion: No associations were found between periodontal diseases and uric acid and salivary total protein content.

Keywords: antioxidant, saliva, periodontitis, total protein, uric acid.

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Introduction

Gingivitis and periodontitis are the most prevalent of the various chronic inflammatory conditions known as periodontal diseases. These result from the interaction of a pathogenic bacterial biofilm with inflammatory chemicals and cells coming from the host [1,2]. Porphyromonas gingivalis, Actinobacillus actinomycetemcomitans, and Bacteriodes forsythus are some of the bacterial pathogens that colonize the gums and cause periodontal disease [3].

These species have the capacity to turn on host defense mechanisms that degrade the epithelium and other gum systems while simultaneously turning off healing mechanisms [4,5]. Recruited activated neutrophils become immobilized and release reactive oxygen species, which have the potential to kill the pathogen but also harm the host tissue nearby [6,7].

There is interest in investigating potential substances within oral fluids via which it may be possible to determine the presence and severity of periodontal diseases as well as to identify the individuals who are at risk for them [8]. Saliva is an oral fluid that may be collected fast without the use of any specific tools or techniques [9,10]. Proteins in saliva may yield determination of risks to oral diseases [11-16]. The aim of this work was to determine if salivary components may correlate with periodontal disease.

Material and Methods

Subjects: Fifty participants were selected from the Efraz health center in Samarra, with ages ranging from 19 to 30. The study was done between January and February 2020.

Dentistry 3000
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Saliva collection: Patients were requested to chew on a rubber band that had previously been sterilized 120 minutes before to the collection of their saliva samples. Saliva samples of 3 mL were taken, placed in 6 mL sterile Falcon tubes, and kept chilled at 5oC for one hour [17]. The samples were spun at 2,800 rpm for 10 minutes to separate the supernatant from the substrate, which was then frozen at -20oC. The sample was then centrifuged at 3,000 rpm after being defrosted at room temperature in groups of 20 samples. The supernatant was once more separated, and the levels of glucose, amylase activity, urea, albumin, and total protein were measured.

Oral assessment: A customized periodontal explorer and a plane mouth mirror were used for the oral examination. Dental plaque thickness was determined by using the plaque index [18]. Calculus index [19] was used to quantify the component of both periodontal and dental calculus.

A calibrated periodontal probe with a standard force was used throughout the examination to quantify the depth of the pocket and to check for calculus buildup on the subgingival surfaces of the patient's teeth [20]. The score index varied from zero (no bleeding, pocketing, or factors that retain plaque) to four (extensive disease, pockets larger than 5.5 mm).

Results

Table 1 shows the numbers and the percentage of both genders in three groups of plaque index. The first group (mild) had 11 males and 22 females, the second group (moderate) had 6 males and 9 females, while the third group (severe) had 1 male and 1 female.

Table 1. Percentages of gender distribution according to severity of periodontal disease.

Severity in periodontal tissues (PII index)	**Males**		**Females**		**Total**
	No.	%	No.	%	
mild	11	61.1	22	68.8	33
moderate	6	33.3	9	28.1	15
severe	1	5.6	1	3.1	2
Total	18		32		50

Table 2 shows the numbers and the percentage of both genders in three groups of gingival indexes. The first group (mild) had 15 males and 28 females, the second group (moderate) had 3 males and 3 females, while the third group (severe) had 0 male and 1 female.

Table 2. Percentages of gender distribution according to severity of periodontal disease.

Severity in periodontal tissues (GI index)	Males		Females		Total
	No.	%	No.	%	
mild	15	83.3	28	87.5	43
moderate	3	16.7	3	9.4	6
severe	0	-	1	3.1	1
Total	18		32		50

Table 3 shows the means and standard deviations of the salivary total protein and uric acid in three groups of plaque index. The first group (mild) had 1.48 ± 0.12 of total protein and 1.05 ± 1.68 of uric acid, the second group (moderate) had 1.46 ± 0.13 of total protein and 2.33 ± 1.47 of uric acid, while the third group (severe) had 1.5 ± 0 of total protein and 1.16 ± 0.84 of uric acid.

Table 3. Comparison between salivary antioxidant constituents in different severity of periodontal disease.

Severity in periodontal tissues (PII index)	No.	Salivary antioxidant Constituents	
		Total protein	Uric acid
		Mean ± SD	Mean ± SD
Mild	33	1.48 ± 0.12	1.05 ± 1.68
Moderate	15	1.46 ± 0.13	2.33 ± 1.47
Severe	2	1.5 ± 0	1.16 ± 0.84
ANOVA test		p=0.83	p=0.18

Dentistry 3000
Vol 13 No 1 (2025) DOI 10.5195/d3000.2025.773

Table 4 shows the means and the standard deviations of the salivary total protein and uric acid in three groups of gingival indexes. The first group (mild) had 1.47 ± 0.12 of total protein and 1.79 ± 1.17of uric acid, the second group (moderate) had 1.46 ± 0.09 of total protein and 2.50 ± 1.52 of uric acid, while the third group (severe) had 1.6 ± 0 of total protein and 1.7 ± 0 of uric acid.

Table 4. Comparison between salivary antioxidant constituents in different severity of periodontal disease.

Severity of periodontal tissues (GI index)	**No.**	**Salivary antioxidant Constituents**	
		Total protein	**Uric acid**
		Mean ± SD	**Mean ± SD**
Mild	43	1.47 ± 0.12	**1.79 ± 1.17**
Moderate	6	1.46 ± 0.09	**2.50 ± 1.52**
Severe	1	1.6 ± 0	**1.7 ± 0**
ANOVA test		**p=0.09**	**p=0.36**

Discussion

Adults frequently suffer from chronic periodontal disease. Antioxidants are found in bodily fluids to combat free radicals. Saliva contains antioxidants, including uric acid and total protein. Additionally, the association between the activities of antioxidant enzymes and clinical periodontal health was examined. Previous research on the relationship between salivary antioxidant status and periodontal disease is limited and has produced contradictory results. Although there may be other reasons that contribute to inconsistencies, this may be the result of the writers' differing methodologies.

This study found no connection between salivary antioxidants and periodontal disease.

The antioxidant capacity of saliva in healthy and ill people was tested in this finding, which is like the finding by Moore et al. (1994) [21].

Additionally, serum and saliva samples from both sick and control groups were examined by Chapple et al. (1997) [22], and the two groups of serum antioxidant capacities were discovered to be comparable. These results disagreed with Priadarsini et al. [23] who found statistically significant increases in total protein levels in chronic periodontitis patients compared to healthy people. The elevated protein levels in the test groups may result from an inflammatory process that stimulates the sympathetic nervous system, which in turn increases some proteins' synthesis and secretion (as shown by elevated amylase levels). This would increase saliva's ability to protect against diseases.

According to a study by Basu et al. [24], the elevated levels may potentially be related to an enhanced leakage of plasma proteins into saliva because of inflammation.

Conclusion

The results indicate no significant association between salivary antioxidants and periodontal disease. Although saliva has important antioxidant activities, which are able to counteract with oxidative stress, the findings in this regard suffered from inconsistency. Discrepancies in the values might be due to variations in methodologies as well as factors like inflammation- induced secretion of proteins. Salivary antioxidants may play an important role in periodontal health, and further research with standardized approaches will be required to clarify their role.

Conflicts of interest

Dentistry 3000
Vol 13 No 1 (2025) DOI 10.5195/d3000.2025.773

The authors declare no competing interest.

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Dentistry 3000
Vol 13 No 1 (2025) DOI 10.5195/d3000.2025.773

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