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Dental caries and total antioxidant status of unstimulated mixed whole saliva in patients aged 16-23 years

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ABSTRACT

Purpose: The purpose of the studies performed was an attempt to establish a potential relationship between total antioxidant status of unstimulated whole saliva, patients' ages, oral hygiene status and dental caries.

Material and methods: The study involved 120 non-smokers. Mean age of the study subjects was 18.40±1.74 years. Clinical examination was performed to evaluate the state of hard and soft oral tissues, and oral hygiene status. Additionally, biochemical tests and statistical studies were carried out. Laboratory examinations involved measuring the total antioxidant status level in supernatant using the Total Antioxidant Status (TAS) test from Randox. In statistical analysis, Spearman Rang correlation coefficient, Kruskal-Wallis test, Mann – Whitney test, logistic regression and ROC curve were used. The analysis was conducted using Statistica 9 software.

Results: Mean D, M, F and DMFT values were 4.04±3.96; 0.09±0.34; 5.00±3.90; 9.05±5.30, respectively. Mean OHI – S was 0.95±0.76. Mean TAS value in the studied population was 0.82±0.26 mmol/l. In the group of subjects without active dental caries, the level of the total antioxidant potential was higher, with a value of 0.89±0.16 mmol/l, and in the study group subjects who had tooth decay it was 0.80±0.28 mmol/l. It was found that TAS was higher in younger subjects.

Conclusions: The conducted studies seem to allow for the following conclusions:
TAS level in the supernatant of unstimulated whole saliva decreases with age; TAS level in the supernatant of unstimulated whole saliva is the highest in patients without caries, and the oral hygiene status does not have significant influence on TAS.

Key words: Total antioxidant status, dental caries, D value, age, OHI-S

INTRODUCTION

The oral cavity constitutes a unique, complex, open and dynamic environment. It plays an incredibly important role in the defense mechanisms of the organism, as well as in maintaining homeostasis between internal and external factors. The indispensable factor contributing to maintaining good oral health status is a heterogeneous systemic secretion, the saliva. Mixed unstimulated saliva includes 99.4% water and 0.6% organic and inorganic substances [1-4]. On the basis of results of studies performed by 3 study teams, 1,166 saliva proteins were catalogued. According to the authors, the healthy people saliva proteins catalogue will allow for the use of saliva as study material in the diagnostics of patients suffering, not only from oral cavity health problems, but also systemic diseases [5].

Saliva plays a range of roles in the human organism, among which one of the most important is the defense function, thanks to the specific and unspecific antibacterial factors included in it, as well as to the antioxidant defense system [1, 6-8]. The integrated antioxidant defense system provides a dynamic balance between prooxidants, that is the compounds possessing at least one unpaired electron, and factors characterized with antioxidant properties. It plays an extraordinarily significant role in protecting the organism against the influence of adverse factors and in the maintenance of systemic homeostasis. Due

Table 1. **Mean DMFT, DMF-S, D, M, and F values, Ds, Ms, Fs values, GI and OHI-S in reference to gender.**

Examined value	Men N = 66	Women N = 54	Total N = 120	Statistical significance
	$\overline{X}$ ± SD	$\overline{X}$ ± SD	$\overline{X}$ ± SD	
D value	4.13±4.58	3.92±3.08	4.04±3.96	H = 0.35 p = 0.55
M value	0.06±0.29	0.12±0.39	0.09±0.34	H = 1.78 p = 0.18
F value	4.15±3.40	6.03 ±4.23	5.00 ±3.90	H = 6.76 p = 0.009
DMFT value	8.27±5.48	10.00±4.961	9.05±5.30	H = 3.82 p = 0.05
Ds value	5.15±6.04	5.14±4.63	5.15±5.43	H = 0.53 p = 0.46
Ms value	0.30±1.48	0.64±1.95	0.45±1.71	H = 1.78 p = 0.18
Fs value	6.25±5.19	9.51±8.45	7.72±7.01	H = 4.46 p = 0.03
DMF-S value	11.71±8.52	15.31±9.30	13.33±9.02	H = 4.94 p = 0.02
OHI - S	1.13±0.72	0.72±0.75	0.95±0.76	H = 9.46 p = 0.002
GI	0.10±0.09	0.09±0.08	0.09±0.09	H = 0.81 p = 0.36

H – test function value when using Kruskal-Wallis test
$\overline{X}$ – mean, SD – standard deviation

to the fact that neither all the interactions taking place between the separate elements of the integrated antioxidant defense system nor all the compounds with antioxidant properties are believed to have been identified, the measurement of the total antioxidant status facilitates acquisition of more reliable information [8-11, quoted after 12-14].

It therefore seemed purposeful to attempt to confirm the potential existence of a relationship between the total antioxidant status of unstimulated mixed saliva, the age of patients, oral hygiene status and the progression of dental caries.

MATERIAL AND METHODS

163 people aged 16-23 years were randomly selected for the study. The following inclusion criteria were used: generally healthy patients without any topical lesions that could affect the salivary glands function, not taking any medicines and non-smokers. 15 subjects refused to have their mixed unstimulated saliva collected, 21 subjects refused to have their oral health status checked, and 7 subjects did not conform with the instructions received beforehand. Thus, the remaining 120 subjects were ultimately included in the study (54 women and 66 men from Lublin). The mean age of the subjects was 18.40±1.74 years. The subjects were divided into 2 groups – adolescents (aged 16-18) and young adults (age 19-23). At the time of the study the subjects were healthy. The condition of hard dental tissues was evaluated using mean DMFT (Decayed, Missing, Filled Teeth Value) and DMF-S (Decayed, Missing, Filled Surface Value) values, as well as the values of the separate components of these values, using a dental mirror in artificial light. Evaluation of the state of gingiva was conducted using the Gingival Index (GI) [15, 16]. The health status of the soft dental tissues was evaluated by visual examination of oral mucosa. Oral hygiene was examined using the Simplified Oral Hygiene Index according to Green and Vermillion (OHI-S). Plaque Test preparation was used in order to stain the bacterial plaque and dental deposits. The preparation was applied on the buccal and labial surfaces of teeth [16,26,11,31] and on the lingual surfaces of teeth [36, 46] using an applicator (in the case of a missing tooth the preparation was applied on an adjacent tooth). After rinsing with water, the stained bacterial plaque and dental deposits were visualized using halogen lamp emitting a visible spectrum of 470-510 nm wavelength. Clinical examinations and laboratory tests were performed and the obtained results statistically analyzed. Oral hygiene status was evaluated using OHI-S (Oral Hygiene Index Simplified) Unstimulated mixed whole saliva was collected in the morning at least 1.5 hours after breakfast or beverage or tooth brushing. The subjects were instructed not to chew gum and not to use mouth fresheners. The saliva was centrifugated and than frozen at the temperature of -70^{0}C. Total antioxidant status was evaluated using Total Antioxidant Status (TAS) test [17] from Randox, in accordance with the manual. Determination of TAS depends on the reaction involving ABTS (2,2'-azino-