

The Composition of Unstimulated Whole Saliva of Healthy Dental Students

Farzaneh Agha-hosseini, DDS, PhD; Iraj Mirzaii Dizgah, PhD;
Sara Amirkhani, DDS



Abstract

The purpose of this study was to determine the unstimulated whole saliva biochemical parameters in healthy dental students of Tehran University of Medical Sciences (TUMS) living in the students' dormitory with a mean age of 22 years. Five ml whole saliva samples were obtained by expectoration. The saliva composition was measured by a spectrophotometer and affiliated kits. The data was analyzed through the student's unpaired t-test using the SPSS program. In the male students (n=50) the mean concentrations of glucose (mmol/l), inorganic phosphate (mmol/l), total protein (mg/ml), magnesium (mmol/l), chloride (mmol/l), and calcium (mmol/l) were 0.75 ± 0.44 , 1.52 ± 0.63 , 6.69 ± 2.89 , 1.27 ± 0.45 , 27.60 ± 11.06 , and 2.17 ± 0.76 , respectively. In the female students (n=50) they were 0.73 ± 0.47 , 1.58 ± 0.63 , 7.26 ± 3.78 , 1.37 ± 0.44 , 30.42 ± 12.74 , and 1.87 ± 0.78 , respectively. There were no significant differences between the whole saliva values in male and female students.

Keywords: Saliva, composition, unstimulated

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Introduction

Saliva is critical to the preservation and maintenance of oral health, and any changes in its amount or quality may alter the oral health status.¹⁻⁴ Advantages in the use (easy access and non-invasive collection) have caused saliva to be a unique fluid as a diagnostic medium during recent years. It is used to aid in the diagnosis of cancer, autoimmune, cardiovascular, renal, endocrine, psychotic, infectious⁵ and dental diseases⁶⁻⁸, and assessment of the severity of some illnesses.⁹ Consequently, it is necessary to have a knowledge base concerning the norm of saliva.

The present study was undertaken to determine the unstimulated whole saliva glucose, inorganic phosphate, total protein, magnesium, chloride, and calcium in healthy dental students under physiological conditions.



Methods and Materials

Subjects

In a case series study 100 (50 male, 50 female) healthy dental students of Tehran University of Medical Sciences (TUMS), who lived in a students' dormitory with a mean age of 22 years (range 19-24), volunteered for the study after verbal and written consent. Volunteers were all non-smokers had no oral or systemic diseases, and were not taking any medications at the time of the study. The investigation was approved by the ethics committee of TUMS, Iran.

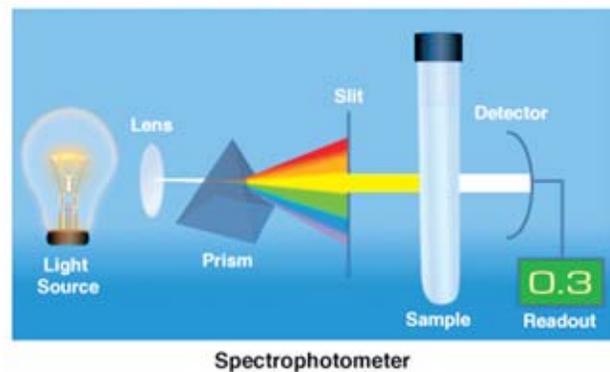
Saliva Collection

Five ml unstimulated salivary samples were obtained by expectoration in the absence of chewing movements into dry plastic vials with the test subjects sitting in a relaxed position.

The samples were immediately stored at -70°C. Samples were collected at the same time of day (9:00-11:00 a.m.), at least two hours after the last intake of food or drink.

Measurement of Salivary Variables

Whole saliva was assessed colorimetrically by a spectrophotometer and using affiliated kits (ZiestChem Diagnostics, Iran) for the concentrations of inorganic phosphate, calcium, magnesium, chloride, glucose, and total protein.



The total protein concentration was measured by the Biuret method¹⁰ using +bovine serum albumin as standard; inorganic phosphate by photometrical measurement of the blue color formed after the addition of ammonium molybdate and stannous chloride^{11,12}; calcium by Arsenazo reaction¹³; magnesium by the xylidyl blue complex¹⁴ chloride by the thiocyanate red complex¹⁵ and glucose by the enzymatic, colorimetric-GOD-PAP method.¹⁶

Statistical Methods

The student's unpaired t-test was used to compare the salivary components in male and female students. P values <0.05 were considered statistically significant

Results

The mean values and standard deviation of inorganic phosphate, calcium, magnesium, chloride, glucose, and total protein concentrations of unstimulated whole saliva are shown in Table 1.

The student's unpaired t-test analysis showed no significant differences between the whole saliva parameters in 50 male and 50 female dental students in a TUMS dormitory.

Table 1. The mean values and standard deviation of inorganic phosphate, calcium, magnesium, chloride, glucose, and total protein concentrations of unstimulated whole saliva in dental healthy students of TUMS.

SEX	Total protein (mg/ml)	Glucose (mmol/l)	Calcium (mmol/l)	Magnesium (mmol/l)	Chloride (mmol/l)	Inorganic phosphate (mmol/l)
Male (n=50)	6.69±2.89	0.75±0.44	2.17±0.76	1.27±0.45	27.60±11.06	1.52±0.63
Female(n=50)	7.26±3.78	0.73±0.47	1.87±0.78	1.37±0.44	30.42±12.74	1.58±0.63

Inorganic Phosphate Concentration

The mean whole saliva inorganic phosphate concentration was 1.52±0.63 and 1.58±0.63 mmol/l in males and females, respectively.

Chloride Concentration

Chloride concentration was 27.60±11.06 and 30.42±12.74 mmol/l in males and females, respectively.

Calcium Concentration

Calcium concentration of the whole saliva averaged 2.17±0.76 and 1.87±0.78 mmol/l in males and females, respectively.

Magnesium Concentration

The mean whole saliva magnesium concentration was 1.27±0.45 and 1.37±0.44 mmol/l in males and females, respectively.

Glucose Concentration

The average glucose concentration was 0.75±0.44 and 0.73±0.47 mmol/l in males and females, respectively.

Total Protein Concentration

The mean whole saliva total protein concentration was 6.69±2.89 and 7.26±3.78 mg/ml in males and females, respectively.

Discussion

Saliva has become useful as a noninvasive systemic sampling measure for medical diagnosis and research.⁴ Consequently, it is necessary to have a knowledge base concerning the norm of saliva. The aim of the present study was to determine the unstimulated whole saliva glucose,

inorganic phosphate, total protein, magnesium, chloride, and calcium in healthy dental students under physiological conditions.

The saliva chemical composition evaluation is greatly hampered by the striking variations under physiological conditions. It is well-known results are influenced by age, diet, and diurnal factors. The method and circumstances of the saliva collection are also important factors.¹⁷ In order to obtain resting saliva it is necessary to minimize external stimuli. To eliminate the effects of these variations on the secretion, all examinations in this report were undertaken at the same time of day at least two hours after the last intake of food or drink. Volunteers were all non-smokers, had no oral or systemic diseases, and were not taking any medications at the time of the study. They were also healthy students who lived in the students' dormitory with a mean age of 22 years. Samples were obtained by expectoration in the absence of chewing movements with the test subjects sitting in a relaxed position.



There are some reports about the mean concentration of unstimulated and stimulated human saliva compositions with different values.^{3,18-23}

The mean inorganic phosphate level in our determinations agrees with the data of Macgregor and Edgar, 1986. The concentration of calcium was similar to other reports.^{8,18} The total protein of mixed saliva in our study was higher than the others.^{8,19,20} These variations may depend on the

analytical method used, saliva collection, age, and other physiological conditions.

Our data also indicated there are no significant differences between the whole saliva composition in male and female students.

Conclusion

Our findings may be used as norms for salivary composition and to aid in the diagnosis of medical disorders.

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About the Authors

Farzaneh Agha-hosseini, DDS, PhD



Dr. Agha-hosseini is an Associate Professor in the Department of Oral Medicine of the School of Dentistry at Tehran University of Medical Sciences in Teheran, Iran. Her interests include oral biology, lichen planus, and oral squamous cell carcinoma.

e-mail: aghahose@sina.tums.ac.ir

Iraj Mirzali Dizgah, PhD



Dr. Mirzali Dizgah is a member of the faculty in the Dental Research Center at Tehran University of Medical Sciences in Teheran, Iran. His interests include oral biology and behavioral sciences. Currently, he is involved in a variety of neuroscience research projects including opiate addiction and salivary diagnostic methods.

e-mail: emirzali@razi.tums.ac.ir

Sara Amirkhani, DDS



Dr. Amirkhani is a Research Assistant at the School of Dentistry at Tehran University of Medical Sciences in Teheran, Iran.

e-mail: srmirkhani@yahoo.com