

Study of some salivary changes in cutaneous psoriatic patients

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ABSTRACT

الأهداف: تقييم أية تغيرات تطرأ في مستويات بعض مكونات اللعاب، ودرجة حموضة اللعاب، ومعدل تدفقه، بالإضافة إلى تحليل مدى ارتباط ذلك بشدة الإصابة بمرض الصدفية.

الطريقة: أُجريت هذه الدراسة في قسم الأمراض الجلدية، دمشق، سوريا وذلك خلال الفترة من فبراير إلى يونيو 2010م، حيث تم تقسيم المشاركين في الدراسة إلى مجموعتين وهما: مجموعة المرضى المصابين بالصدفية (20 مريضاً)، ومجموعة التحكم التي تشمل المرضى الغير مصابين بالصدفية (20 مريضاً). لقد تم جمع عينات اللعاب من جميع المشاركين ومن غير استعمال محفزات لإفراز اللعاب، ومن ثم تم تحليل كلا من: الصوديوم، والبوتاسيوم، والكلوريد، وأُنزيم ألفا أميلاز. كما تمت دراسة معدل التدفق اللعابي، ودرجة الحموضة. ولقد تمت الاستعانة بمؤشر شدة الصدفية ومدى انتشار منطقة المرض من أجل تقييم شدة الإصابة، بالإضافة إلى اختباري تي ستودنت ومعامل الارتباط لمقارنة الفروق بين المجموعتين اللتين تضمنتهما الدراسة.

النتائج: لقد كانت قيم درجة الحموضة ومعدل التدفق اللعابي طبيعية في كلي المجموعتين، غير أن مستويات البوتاسيوم وأميلاز اللعاب كانت أعلى في مجموعة المصابين بالصدفية (متوسط البوتاسيوم = 21.38 ملمول/ل، متوسط الأميلاز = 64.26 وحدة دولية/ل) مقارنةً بمجموعة التحكم (متوسط البوتاسيوم = 17.69 ملمول/ل، متوسط الأميلاز = 43.14 وحدة دولية/ل). بالمقابل لم يكن هناك ارتفاع واضح في المكونات اللعابية الأخرى التي تم تحليلها في الدراسة، ولم تشير نتائج الدراسة إلى وجود علاقة واضحة بين شدة ومدة الإصابة بالمرض من جهة والعوامل المتغيرة، كما لم يكن هناك علاقة بين عمر وجنس المشاركين والعوامل المتغيرة في هذه الدراسة.

خاتمة: أثبتت هذه الدراسة ارتفاع كلاً من مستويات البوتاسيوم وأميلاز اللعاب في المرضى المصابين بالصدفية وذلك مقارنةً بمجموعة التحكم، ومع ذلك فلا علاقة لهذا التغيرات مع شدة أو مدة الإصابة بهذا الداء الجلدي. ونحن بحاجة إلى المزيد من الدراسات لدعم النتائج التي توصلنا إليها في هذه الدراسة.

Objective: To assess any alteration in the levels of some salivary components, and to correlate the same with the severity of the disease.

Methods: Unstimulated whole saliva samples were collected and analyzed in 20 randomly selected Syrian uncomplicated psoriatic patients presenting to the Dermatological Diseases Hospital, Damascus University, Syria between February and June 2010, and in 20 healthy matched controls. Sodium (Na⁺), potassium (K⁺), chloride (Cl⁻), and alpha amylase (sAA) was analyzed. The salivary flow rates (SFR) and pH was also studied. The Psoriasis Area and Severity Index was used to assess the severity of the disease. Student t-test and correlation coefficients (r) were used to compare differences between groups.

Results: The SFR and pH were normal in both groups. Psoriatics had significantly higher K⁺ and sAA concentrations (K⁺ mean = 21.38mmol/L, sAA mean = 64.26 IU/ml) than the controls (K⁺ mean = 17.69mmol/L, sAA mean = 43.14 IU/ml), whereas there was no significant rise in the other salivary ions studied. Neither the severity nor the duration of the disease showed correlation to the according variables. No differences were observed between the age and the gender for each of the studied variables.

Conclusion: Psoriasis patients have higher concentration rates of salivary potassium ions and sAA compared with the controls. However, these salivary changes are not related to the severity or the duration of this dermatological disease. Further studies are required to support these results.

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Psoriasis is a common T-cell mediated chronic skin disorder affecting approximately 2% of the population.^{1,2} Neither age, nor gender appears to influence the incidence of psoriasis.³ Although the cause of psoriasis is unknown, various triggers such as environmental factors, trauma, infections, and stress may precipitate new episodes.⁴ This disease is also associated with a higher prevalence of depression, anxiety, and substance abuse.⁵ Elbows, knees, the sacral area, and the scalp is commonly affected. Nail involvement is frequent, psoriatic arthritis is common, and oral involvement is rare, but can be seen in cutaneous psoriasis.⁶ The severity of this disease may vary depending on various triggers, summer and winter, patients themselves, and other factors.⁵ The Psoriasis Area Severity Index (PASI) is currently the most popular tool in clinical studies. It is a measure of the average redness, thickness, and scaliness of the lesions (each graded on a 0-4 scale), weighed by the area of involvement. The final result of this method of assessment ranges from 0.0 to 72.⁷ Saliva is the biological fluid, which bathes the oral cavity. It is produced by a number of specialized glands and includes a large number of inorganic and organic compounds, which act as a "mirror of the body's health."⁸ It contains electrolytes, proteins, enzymes, glucose, mucin, and water. Its function varies from antibacterial and antifungal action, buffering, digestion to others.⁹ Whole saliva, however, is most frequently used for diagnosis of systemic diseases.⁸ The latest clinical and laboratory findings on diagnostic markers of oropharyngeal carcinoma in oral fluid could be the beginning of their wider use as a diagnostic medium. Oral fluid can also be used to diagnose other malignancies such as breast cancer.¹⁰ There have been few isolated studies on alteration of saliva in psoriasis, but this subject has not been pursued extensively.¹¹ A few relatively significant changes in the ionic concentration of salivary potassium (K⁺) and sodium (Na⁺) have been reported following experimental task demands in the form of university work, lectures in the final examination, and academic work by students.¹² Salivary K⁺ has mainly been linked to a psychological stressor, while salivary Na⁺ has been related to a physical stressor.¹³ The major salivary enzyme is alpha amylase, most of which is secreted by the parotid gland and its optimum pH is 6. Salivary amylase shows digestive, antibacterial, and buffering properties.⁹ Animal studies have suggested that salivary-alpha amylase (sAA) is secreted after beta-adrenergic stimulation.¹⁴ In humans sAA levels have been reported to rise in response to physical stress as well as to psychological stressors.¹⁵ Thus, salivary amylase activity can be utilized as an excellent index for psychological stress.¹⁶ Syrjanen's study¹⁷ on the stimulated parotid saliva of psoriatic patients found a significant elevation

of salivary IgA, α -amylase, and Na⁺ in psoriatics when compared with the controls, whereas Singh & Rajashekar in 2006¹¹ reported a significant rise in salivary Na⁺, not in K⁺ levels, however K⁺ levels correlated significantly with severity of the disease. In contrast, Wanjura in 1987¹⁸ found in his study on selective ultraviolet-phototherapy (SUP) patients a significant reduction of the saliva Na⁺ content not only with psoriasis, but with other patients receiving radiation therapy as well. The correlation between amylase level and psychiatric symptoms was highly significant in Inagaki et al's¹⁹ research. In sAA response to competition study in 2006, Kivlighan & Granger²⁰ observed that change in α -amylase may be influenced by a confluence of factors that include contextual, behavioral, and psychological factors and processes.

The present study aimed to investigate changes in uncomplicated psoriatic patients' unstimulated whole saliva electrolytes (Na⁺, K⁺, Cl⁻), sAA, pH, and salivary flow rate (SFR) and their possible association with the severity of this disease.

Methods. Forty Syrian subjects participated in our study. They were divided into the following 2 groups: Case group - 20 randomly selected uncomplicated psoriatic patients (10 male, 10 female, mean age 33.7±12.3, ranging from 15-65 years) presenting to the Dermatological Disease Hospital, Damascus University, Damascus, Syria. All of them were attending the hospital clinic for the first time. Control group - 20 age and gender matched control healthy subjects, free from skin disease, presenting to the Dental College Clinics in Damascus University, for dental treatment. The above groups were chosen free from any systemic disease (with the exception of psoriasis for the case group), and had not received any systemic medical treatment for at least 3 months prior to saliva sampling. All subjects were examined between February and June 2010 after intuitional ethical approval was obtained. Age, gender, smoking status, family history of psoriasis, and duration of the disease were recorded. Disease severity was assessed using the PASI. An unstimulated whole saliva sample was collected for 5 minutes from each subject in the morning, at least 2 hours after eating, drinking, smoking, teeth brushing, or chewing gum, by spitting saliva into a degreed sterilized test tube surrounded with ice. After SFR and pH measurements for each subject, every collected sample was divided into 2 steam sterilized Eppendorf tubes and stored frozen at (-28°C) until assay. The samples were analyzed at the Laboratory of the Dermatological Disease Hospital in Damascus University. Before the chemical analysis, all divided samples were removed to room temperature to be dissolved then filtered using the HERMLE Z 230

A system (Hermle-labortechnik, Wehingen, Germany). The MEDICA's EasyLyte Plus Na/K/Cl Analyzer (Medica Corporation of Bedford, MA, USA) was used to assess Na⁺, K⁺, Cl⁻ concentrations. The sAA was assayed by LISA 500 Plu system, using a Biomerio Company's kit after dilution (x200) by physiological serum (Hycel-diagnostics, France). Color-fixed indicator sticks were used for pH saliva assessment.

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS Inc, Chicago, IL, USA) for Windows release 13.0. Student t-test and correlation coefficient (r) was used to compare differences between groups. Statistical significance was set at $p < 0.05$ and confidence levels at 95%.

Results. The sample contained 40 subjects (N=40) divided into 2 equal main groups (psoriasis group, control group). Each group comprised 10 men and 10 women, their ages ranged from 15-65 years (mean = 33.7 ± 12.3 years). Fourteen subjects (70%) of each group were non-smokers, while 6 subjects (30%) were cigarette smokers. Only 8 psoriatic patients (40%) and 4 control subjects (20%) had a family history of psoriasis. The mean of the disease duration in the psoriasis group was 10.4 ± 7.1 years, and the mean of PASI in this group was 14 ± 7.5 . We controlled the normality of the data using the Kolmogorov-Smirnov test. T-test, which was applied, as shown in Table 1, found no significant differences in SFR, salivary pH, Na⁺ concentrations, and Cl⁻ concentrations between the 2 groups. However, there were significant differences in K⁺ and sAA mean values between the psoriasis group and the control group. However, no significant differences were observed in

the according variables' mean values between male and female subjects for both groups. In addition, no relation between the age variable and each one of the studied variables was found for both the psoriasis group and the control group.

The correlation coefficient (r) as shown in Tables 2 & 3 indicates that neither the psoriasis severity (PASI) values nor the disease duration (in years) variable had a relation with each one of the studied variables (SFR, pH, Na⁺, K⁺, Cl⁻, and sAA) for the psoriasis patients.

Discussion. The SFR and pH values were normal in the psoriasis group and the control group, and there were no statistically significant differences between the 2 groups. These results agree with Syrjanen's study¹⁷ in 1983 on psoriatics' stimulated parotid saliva. Salivary ions, on the other hand, did not show any significant differences except for K⁺, which was greater in the psoriasis group than in the controls. This result does not agree with Syrjanen's study,¹⁷ nor with Singh & Rajashekar's study¹¹ in 2006, which reported elevation of Na⁺ concentrations without differences in the other salivary ions in psoriatics. Although the reasons for this K⁺ elevation are unknown, they may be related to the use of another method in our study in electrolytes analyses, and we think that the increase in K⁺ concentration correlates with psoriatics' psychological stressor. Thus, that calls for deeper investigation to assess the associations between psoriatics' psychological status and salivary indicators.

The sAA recorded significant differences between the 2 groups. This elevation is similar to Syrjanen's study result,¹⁷ which reported a rise in parotid α -amylase in

Table 1 - Psoriasis effects on salivary studied variables.

Studied variable	Psoriasis group			Control group			T-value	P-value
	N	Mean	SD	N	Mean	SD		
Salivary flow rate (ml/5 min)	20	4.78	0.99	20	4.93	1.03	-0.469	0.642
pH	20	7.05	0.76	20	7.25	0.72	-0.857	0.397
Sodium (mmol/L)	20	8.35	2.92	20	8.93	3.42	-0.572	0.571
Potassium (mmol/L)	20	21.38	6.09	20	17.69	3.76	2.303*	0.027
Chloride (mmol/L)	20	25.85	18.39	20	21.88	12.23	0.804	0.427
Amylase (IU/mL)	20	64.26	45.86	20	43.14	38.23	2.590	0.014

Table 2 - The relation between the disease duration (in years) and each of the salivary studied variables values in the Psoriasis group.

Studied variable	Disease duration		
	r	N	P-value
Salivary flow rate (ml/5 min)	-0.007	20	0.977
pH	-0.149	20	0.530
Sodium (mmol/L)	-0.028	20	0.908
Potassium (mmol/L)	0.352	20	0.128
Chloride (mmol/L)	-0.126	20	0.597
Amylase (IU/mL)	-0.306	20	0.189

Table 3 - The relation between Psoriasis Area and Severity Index values and each of the salivary studied variables values in the Psoriasis group.

Studied variable	Disease duration		
	r	N	P-value
Salivary flow rate (ml/5 min)	0.021	20	0.929
pH	-0.148	20	0.533
Sodium (mmol/L)	-0.005	20	0.984
Potassium (mmol/L)	0.166	20	0.485
Chloride (mmol/L)	-0.104	20	0.663
Amylase (IU/mL)	-0.314	20	0.178

psoriasis, thus, we believe that it may be related to the activation of the beta-adrenergic system and reflects the psychological stress in psoriatics. However, the results of Inagaki et al¹⁹ and Kivlighan & Granger,²⁰ which indicate a predominant role of the sympathetic nervous system in the secretion of sAA together with parasympathetic withdrawal, under psychosocial stress, support our suggestion that psychological factors (like stress) effects sAA secretions and concentrations. No differences were found between male/female or age for variables' mean values of both groups. The possible reason for these results is that neither age nor gender is associated with psoriasis. The severity and the duration of the disease reported no relation with each one of the studied variables in the psoriasis group. We believe this happened because the disease may have new episodes and, on the other hand, all patients in the psoriasis group were of the generalized type and their PASI scores were close.

This study was conducted on a small sample size 'as a pilot study,' so the results cannot be generalized without further studies. In addition, we did not analyze other important salivary components such as IgA and lysozyme, which may have an association with this dermatological disease.

In conclusion, psoriasis patients had higher levels of salivary K⁺ ions and sAA when compared to the control group without significant differences in other studied salivary variables. However, these salivary changes in the psoriasis group had no correlation with the severity of the disease. Having established a connection between salivary changes and psoriasis, we believe further studies are needed to determine whether these changes had already occurred before the appearance of psoriasis lesions, as this would act as a significant indicator of a person's susceptibility to this disease. More research is warranted to study the associations and the correlations between salivary components' changes, and common systemic diseases that may help in early diagnosis, monitoring, and progression of the diseases.

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