LUCRĂRI ŞTIINŢIFICE SERIA HORTICULTURĂ, 60 (2) / 2017, USAMV IAŞI

THE ROLE OF FRUIT AND VEGETABLE CONSUMPTION IN MAINTAINING NORMAL ORAL PH

ROLUL CONSUMULUI DE FRUCTE ŞI LEGUME ÎN MENŢINEREA PH-ULUI ORAL NORMAL

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Abstract. *Salivar pH, an important indicator of a person's health, is measured in the morning, immediately after awakening, because throughout the day it may vary depending on the foods consumed. Average values should be 6.7 (with wide variations between 5, 6 - 8). Fruits and green vegetables have an alkaline effect once they get into the stomach. For the present study, we have comprised a group of 31 patients with general illness (HTA-associated diabetes), which we compared with a control group of 25 patiens, aged 50-85 years, to whom we measured the pH salivary. In the study group, low pH values were recorded due to the general diseases associated with the medication used, to restrict the consumption of fruits and vegetables, compared to the control group where the recorded pH has higher values.*
Key words: pH salivary, oral health, vegetables, fruits, vitamins

Rezumat. *pH-ul salivar, un indicator important asupra stării de sănătate a unei persoane, se măsoară dimineața, imediat după trezire pentru că pe parcursul zilei poate varia în funcție de alimentele consumate. Valorile medii ar trebui să fie de 6,7 (cu variații largi între5,6-8). Fructele şi legumele verzi (salata verde, urzici, stevie, loboda) au efect alcalinizant odată ajunse în stomac. Pentru studiul de față am constituit un lot 31 de pacienți cu boli generale (HTA-diabet asociate), care l-am comparat cu un lot martor de 25 pacienți, cu vărste cuprinse între 50 şi 85 ani, cărora le-am măsurat pH-ul salivar. La lotul de studiu s-au înregistrat valori scăzute al pH-ului, datorită bolilor generale asociate, medicației administrate, restricționării consumului de fructe şi legume, în comparație cu lotul martor unde pH-ul înregistrat are valori mai ridicate.*
Cuvinte cheie*:* pH salivar, sănătate orală, legume, fructe, vitamine

INTRODUCTION

Oral cavity is the environment in which oral fluids and odontal and prosthetic restorative materials coexist, even though they have a variety of chemical and physical compositions. This medium represents a complex ecosystem within which

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the oral fluid is one of the main compartments (adjacent to the oral mucosa and numerous bacteria), and any disturbance that occurs, disrupts the equilibrium that is installed, a balance that re-creates to create a new homeostasis, but to another level. Oral fluids, interstitial fluid and saliva, are saline solutions maintained at a constant temperature of approximately 36.5 ° C, which creates a very aggressive environment in the oral cavity where various biochemical reactions are initiated.

Saliva has a high capacity of phosphate and carbonate buffer, but also mucin composition, low pH values can cause chemical and electrochemical corrosion at the level of prosthetic restorations (Ursache *et al.,* 2006).

Saliva pH may be more acidic due to certain types of foods such as orange juice, candy sugar, pastry, smoking or general illnesses that could cause an acid saliva (Sjögren's Syndrome, chemotherapy) (Minich and Bland, 2007).

Saliva, often referred to as the body's health mirror, has been shown to reflect tissue levels of several biomolecules. Therefore, saliva analysis, like blood, gives us useful information for health assessment and monitoring, as well as disease states (Aguirre *et al.,* 1993).

MATERIAL AND METHOD

The study material comprises a group of 31 patients with general disease (HTA-associated diabetes) who compared it with a control group of 25 aged 50-85 years to whom we measured salivary pH. These patients presented themselves during the three years (2012-2015) in the Clinic of Dental Prosthetics, the Faculty of Dental Medicine of Apollonia University in Iasi, for the restoration of physiological, disturbed phonetic functions for prosthetic treatment.

The selected patients were informed and agreed on the conduct of the study. The patients underwent a clinical and paraclinical examination, following which a treatment plan was established for each subject. Also, all patients completed a general health questionnaire, as well as a food essayist.

Saliva testing aims to identify saliva as the causal factor of the changes that occurred and later to motivate the patient to improve their oro-dental status.

As a working method, we used the Saliva-Check BUFFER (fig.1) in vitro test to check the salivary quality, saliva pH and saliva buffer capacity (Coulter and Walsh, 2006; Oner Ozdas *et al.,* 2010).

Patients in the study group were advised not to smoke, to perform dental brushing for the last 24 hours, not to consume food or beverages, not to use mouthwash at least one hour before the salivary diagnostic procedure is performed. Testing has two distinct stages, namely: the first step consists in examining the saliva of rest, and in the second stage the stimulated saliva is examined.

Fig. 1 Saliva Check BUFFER Kit

Saliva testing involves visually inspecting the salivary level by assessing salivary gland secretion, saliva consistency, as indicated by the test company, and salivary pH measurement. This test includes specific paper for salivary pH testing and a graduated specific saliva collection tray. The normal salivary phage indicating a healthy saliva is between 6.8-7.8 (Aleksejuniene *et al.,* 2007; Coulter and Walsh, 2006).

RESULTS AND DISCUSSIONS

Accumulating clinical data with paraclinical data and using descriptive and correlational statistical studies, significant outcomes have been outlined for the proposed study. The study lot (group A) consists of 19 women and 12 men and the control group (group B) of 15 women and 10 men. Their origin is 65% of urban areas in both study groups. Both the age of the patients in the study group and that of the control group were ranked the same; in lot A ranges between 55-64 years in a proportion of 22.58%, the interval 65-74 years being 35.49%, the batch segment aged 75-84 years reaching a 25.8%, the age category over 85 years holds 16.13%.

Table 1

Distribution of the batch by age group

Age groups	Nr. cases A		Nr. cases B	
	Nr.	%	Nr.	%
55-64 years	7	22.58 %	11	44 %
65-74 years	11	35.49 %	7	28 %
75-84 years	8	25.80 %	5	20 %
< 85 years	5	16.13 %	2	8 %
TOTAL	31	100%	25	100%

To assess the stimulated salivary flow rate, the steps are:

• The patient chews and soaks a 1 gram paraffin cube for 30-60 sec. (fig. 2), after which the secreted saliva will be swallowed. Stimulating salivary secretion can also be done chemically by applying a 2% citric acid solution to the tongue.

• Start the stopwatch and for 5 minutes. the patient still chews paraffin and removes saliva in the graduated container (fig. 2) of the Saliva-Check BUFFER Kit. To remove the foam add a drop of octanol.

• The amount of saliva harvested is divided by the number of minutes and RFS is obtained.

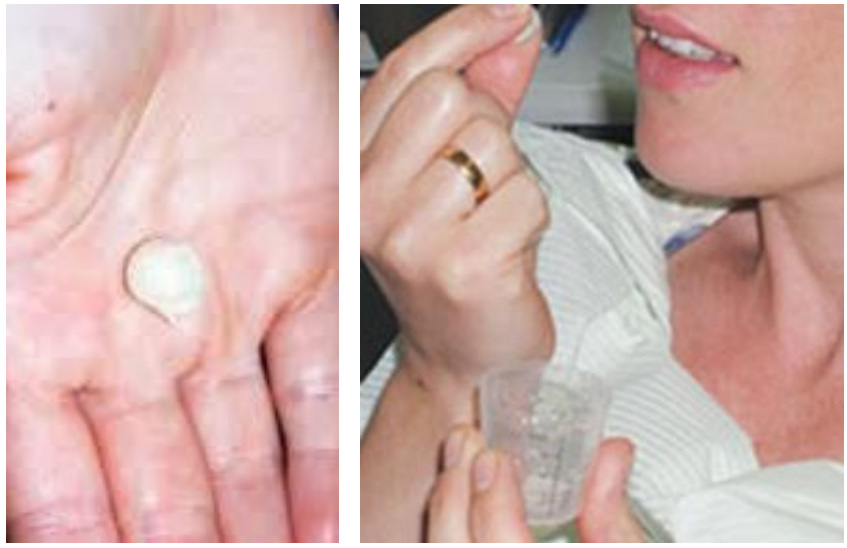


Fig. 2 The paraffin cube and the graduated container

Salivary flow is the result of the salivary secretion rate that we can distinguish in:

• Rare salivary flow rate (RFR), which averages 0.30 mL / min with a caution threshold when it falls below 0.10 mL / min;

• Stimulated salivary flow rate (RFS) that averages 2 mL / min with a caution threshold when the value falls below 0.70 mL / min; more than 50% of this secretion is provided by the parotid gland.

Saliva of rest is permanently present in the form of a thin layer of 1-10 micron thickness on all oral surfaces, mainly having a protective role. Through its action, stimulated salivary flow plays an important role in self-cleansing and provides adequate clearance time. Thus, food debris and microbial flora are dispersed throughout the oral cavity, preventing the bacterial plaque from forming on only some sites, thereby providing cleansing (oral stagnation) of oral bacteria, glucose from diet, fluoride and anti-plaque and antibacterial chemical agents.

By comparing the sex distribution of salivary buffer capacity (tab. 2, fig. 3a, b), we can observe almost identical percentages of the three categories (low, medium and increased pH) in both genders.

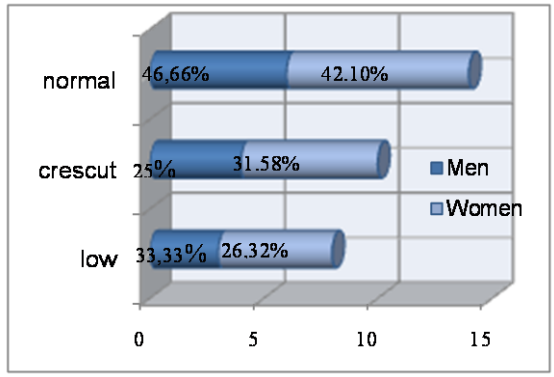
We meet lower salivary pH (M pH = 5.20) in patients with general illness because some drugs (corticoids, antihypertensives) may decrease ph salivary. In other

situations like diabetes, acid pH is the result of high glucose concentration in the saliva, and thus can be correlated with decreased salivary flow in these patients.

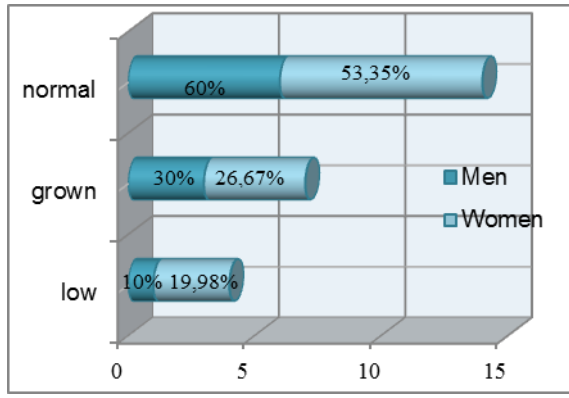
Table2

Gender distribution of salivary pH

		Lot A (study)		Lot B (witness)	
		Men		Men	
		Frequency	Percent	Frequency	Percent
pH	low	4	33.33 %	1	10 %
	increased	3	25 %	3	30 %
	normal	5	41.66 %	6	60 %
	TOTAL	12	100%	10	100%
Women				Women	
		Frequency	Percent	Frequency	Percent
pH	low	5	26.32 %	3	19.98 %
	increased	6	31.58 %	4	26.67 %
	normal	8	42.10 %	8	53.35 %
	TOTAL	19	100%	15	100%



a

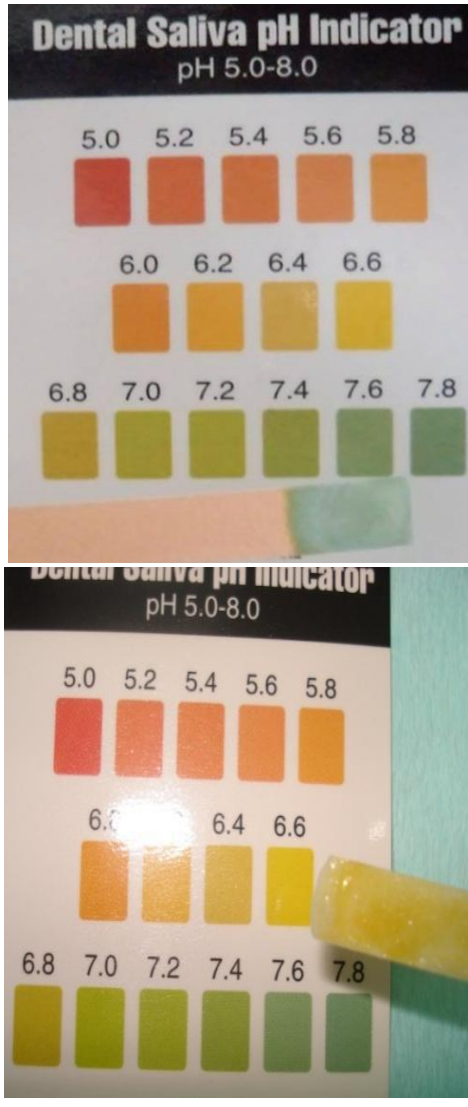


b

Fig. 3 Graphical representation of gender distribution of salivary pH

Saliva's buffering capacity is the ability to reduce acidity. There are two salivary buffered systems of phosphates in unstimulated saliva and bicarbonates in stimulated saliva. A salivary ph lower or equal to 4 denotes a reduced saliva buffering capacity.

The extent to which the pH will decrease is influenced by the amount and location of the bacterial plaque, prevailing flora, salivary production, and the type and concentration of the substrate (fermentable carbohydrate) introduced into the oral environment.



a.

b.

Fig. 4 Values of salivary pH in the patients of the group: a. Lot A; b. Lot B

Acid in food most often produces dental erosions. Acid beverages that can cause erosion include carbonated beverages, some fruit juices (especially citrus); a diet rich in hydrocarbon may also favor dental erosion. It is important to note that the frequency of consumption of acidic foods plays a more important role in the occurrence of dental erosion than the ingested amount.

Acid erosion is irreversible and only the dentist can identify the early signs of it on the teeth: vulnerable enamel, thin, translucent or transparent appearance, color change (yellowing) and lack of brilliance. In case of acid ph, the color changes of the acrylic mobile dentures present in the oral cavity, as well as higher deposits of tartar, are also found.

An important role of the saliva is to neutralize acid pH and thus contributes to enamel protection against demineralisation (enamel demineralization occurs after repeated acid attacks on the tooth). If these acidic attacks are very common on enamel, it does not have time to recover, and over time, teeth will lose their surface enamel.

The food questionnaire revealed that patients whose pH is increased regularly consume acidic foods (meat and meat products, industrially processed dairy products, eggs, nuts, dried beans, soy beans). Therefore, in patients whose pH is acidic, it would be advisable to consume alkaline fruits and vegetables to protect, not just odonto-periodontal units, but also the rest of the oral cavity structures. Among the recommended vegetables are cucumbers, cabbage, broccoli, celery, parsley, pasta, asparagus, red beet, spinach, pumpkin, onions,but and nettles, stevia, loboda,apples, apricots, apples, apricots, peaches, cherries, avocados, grapes, ripe bananas, strawberries, grapefruit, mango, melon / red , nectarines, black olives, papaya, pear.

CONCLUSIONS

The salivary PH in normal range was recorded in people with a good general health status and with a frequent consumption of fruits and vegetables.

Increased consumption of citrus and carbonated beverages explains the higher frequency of erosion in adult teeth as well as color changes of acrylic dentures.

Salivary determinations indicate a change in salivary pH to acid in patients with gastric disease and diabetes, sometimes reaching very low values of about 3.1, which greatly influences the demineralisation process of the dental structures with the formation caries, tartar deposition.

In diabetic patients, saliva buffering capacity is significantly lower, falling within the saliva buffer capacity category, and the salivary pH recorded is significantly lower compared to the pH of non-diabetic patients. The mean salivary ph was 6.55 for patients with diabetes representing an acid saliva while the rest of the patients had a saliva with an average of 7.

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