EFFECTS OF OCCUPATIONAL HAZARDS ON SALIVA

ALINA CRISTIAN¹, DORIN IOSIF BARDAC²

¹PhD candidate "Lucian Blaga" University of Sibiu, ²"Lucian Blaga" University of Sibiu

Keywords: saliva, occupational hazards *Abstract:* This paper presents the results of a clinical study of saliva tested with specific kits on a sample of 102 patients exposed to occupational pollutants such as cyanide and hydrochloric acid, compared to a control group of patients not exposed to such occupational hazards.

Cuvinte cheie: saliva, noxe profesionale *Rezumat:* Lucrarea prezintă rezultatele unui studiu clinic al mediului salivar, testat cu kituri specifice, efectuat pe un lot de cercetat de 102 subiecți expuși la noxe profesionale de tipul cianurilor și acidului clorhidric, comparativ cu un lot martor reprezentat de subiecți care nu sunt expuși la astfel de noxe profesionale.

WORKING HYPOTHESIS

In our current research, we started from the hypothesis of the need to perform a study of the effects of chemical pollutants such as cyanides of zinc, copper, nickel, hydrochloric acid on the human body, but mostly on oral health because the effects on this segment of the body are less known so far.(5) Oral health binder is the environment and the changes at this level influence oral cavity homeostasis.(2.4)

PURPOSE

The aim of the study is to assess the effects of occupational hazards such as cyanide and hydrochloric acid on saliva.

METHODS

The study material includes two batches of workers in a total number of 204 subjects, as follows:

- 1. The researched group is represented by 102 male subjects exposed to occupational hazards, such as cyanide, hydrochloric acid vapour, which can affect oral health. The subjects are galvanized workers in an electroplating department of a private company from Sibiu;
- 2. The control group also consists of 102 male subjects, who work as workers in a glass processing department of a private company from Sibiu and were not exposed to occupational hazards.

The study batches are homogenous in terms of age group, seniority, gender and professional training.

The working method consists of using an in vitro test called Saliva-Check BUFFER, to check the quality of saliva, salivary pH and the buffer capacity of saliva.(2,3,5)

This specific test is used only as directed by your dentist according to the recommended indications for verifying the properties of the stimulated and resting saliva and it was used in the present study for each patient as part of the clinical examination in a specialized outpatient dentistry.

Before testing, the patients were advised not to smoke, not to perform the oral hygiene procedures in the latest 24 hours,

not to eat or drink, not to use mouthwash at least one hour before salivary diagnostic procedure was performed.

The test has two distinct phases, namely: the first part of the test examines the resting saliva and the second part examines the stimulated saliva.

Resting saliva testing is done through three successive tests as follows:

- Test 1 requires the visual inspection by assessing salivary glands secretion levels, accessory found in the lower lip thickness. We assessed the time of forming saliva droplets, visible as indicated by the manufacturer of test, with the permission of Prof. L. Walsh of the Department of Cariology, Faculty of Odontology, University of Lund in Sweden in 2002.(5)
- 2. <u>Test 2</u> involves assessing the consistency of saliva. We evaluated visually according to the indications of the producing company, GC Saliva-Check Buffer, resting saliva consistency of the oral cavity.
- 3. <u>Test 3</u> involves measuring salivary pH. In this test, a specific paper is included to test the salivary pH and a specific marked container for collecting saliva. Normal salivary pH indicating a healthy saliva is between 6.8-7.8.(1,2)

Stimulated saliva testing is done by other two successive tests as follows:

- Test 4 requires the quantitative assessment of saliva after stimulation. The test includes a piece of paraffin. We instructed the patients to chew the piece of wax to stimulate salivary flow. After 30 seconds, we asked the patients to collect saliva in the special container and by not swallowing the saliva, to continue to gather it at regular intervals of 5 minutes. The amount of saliva can be measured by checking the gradations in millilitres from the glass. The normal flow of stimulated saliva may vary between 3m/minute and 1.6 ml min as indicated by the test.
 - <u>Test 5</u> involves evaluating the buffer capacity of saliva using the specific steps specified in the test

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¹Corresponding author: Alina Cristian, Str. Iuliu Maniu, Nr. 2, Sibiu, România, E-mail: alina_cristian24@yahoo.com, Tel: +40722 58002 Article received on 19.11.2012 and accepted for publication on 22.01.2013 ACTA MEDICA TRANSILVANICA March 2013;2(1):293-295

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instructions, and applying test strips of salivary buffer capacity.

RESULTS AND DISCUSSIONS

We examined the changes in salivary quantity and its determinants in the two groups (investigational and control). We applied the five salivary tests on the studied patients and the results obtained after the statistical processing of data are revealed in the tables and figures below:

Table no. 1. Visual inspection saliva test

Crosstab							
			test de inspe				
			scazuta	crescuta	Total		
lot	cercetare	Count	93	9	102		
		% within lot	91.2%	8.8%	100.0%		
		% within test de inspectie vizuala	98.9%	8.2%	50.0%		
		% of Total	45.6%	4.4%	50.0%		
	martor	Count	1	101	102		
		% within lot	1.0%	99.0%	100.0%		
		% within test de inspectie vizuala	1.1%	91.8%	50.0%		
		% of Total	.5%	49.5%	50.0%		
Total		Count	94	110	204		
		% within lot	46.1%	53.9%	100.0%		
		% within test de inspectie vizuala	100.0%	100.0%	100.0%		
		% of Total	46.1%	53.9%	100.0%		

Figure no. 1. Graphical representation of test results of the visual inspection of saliva



Table no. 1 and figure no. 1 show that:

- 91.2% (93 cases) in the investigated group have a low results and only 8.8% (9 cases) an increased one, while the control group there was 1% (1 case) with decreased values and 99% (101 cases) with increased values.
- The risk of having a low result is 93 times higher in the research batch than in the control group (OR = 93, CI95%: 13215-654497).

Table no. 2. Test for consistency of saliva

Crosstab							
			test pen	test pentru consistenta salivei			
			scazuta	crescuta	normala	Total	
lot	cercetare	Count	4	96	2	102	
		% within lot	3.9%	94.1%	2.0%	100.0%	
		% within test pentru consistenta salivei	100.0%	99.0%	1.9%	50.0%	
		% of Total	2.0%	47.1%	1.0%	50.0%	
	martor	Count		1	101	102	
		% within lot		1.0%	99.0%	100.0%	
		% within test pentru consistenta salivei		1.0%	98.1%	50.0%	
		% of Total		.5%	49.5%	50.0%	
Total		Count	4	97	103	204	
		% within lot	2.0%	47.5%	50.5%	100.0%	
		% within test pentru consistenta salivei	100.0%	100.0%	100.0%	100.0%	
		% of Total	2.0%	47.5%	50.5%	100.0%	

Figure no. 2. The test for determining the consistency of saliva



Table no. 2 and figure no. 2 show that

People in the studied group show a high incidence of elevated values (94.1%), while the control group has a higher incidence (99%) of the normal values (p = 0.000).

Table no. 3. Test for measuring salivary pH

			Crosstab			
			test per	tru masurarea l		
			aciditate ridicata (5-6.8)	aciditate moderata (6-6.6)	saliva sanatoasa (6.8-7.8)	Total
lot	cercetare	Count	91	8	3	102
		% within lot	89.2%	7.8%	2.9%	100.0%
		% within test pentru masurarea PH-ului	100.0%	80.0%	2.9%	50.0%
		% of Total	44.6%	3.9%	1.5%	50.0%
	martor	Count		2	100	102
		% within lot		2.0%	98.0%	100.0%
		% within test pentru masurarea PH-ului		20.0%	97.1%	50.0%
		% of Total		1.0%	49.0%	50.0%
Total		Count	91	10	103	204
		% within lot	44.6%	4.9%	50.5%	100.0%
		% within test pentru masurarea PH-ului	100.0%	100.0%	100.0%	100.0%
		% of Total	44.6%	4.9%	50.5%	100.0%

Figure no. 3. Graphical representation of saliva pH test results



Table no. 3 and figure no. 3 show that:

People in the studied group show a high incidence of high acidity (89.2%), while the control group have a high incidence (99%) of healthy saliva (p = 0.000).

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Table no. 4. Test for measuring the amount of stimulated saliva

			Crosstab			
			test pentru cantitatea de saliva			
			foarte scazuta	scazuta	normala	Total
lot	cercetare	Count	37	62	3	102
		% within lot	36.3%	60.8%	2.9%	100.0%
		% within test pentru cantitatea de saliva	100.0%	96.9%	2.9%	50.0%
		% of Total	18.1%	30.4%	1.5%	50.0%
	martor	Count		2	100	102
		% within lot		2.0%	98.0%	100.0%
		% within test pentru cantitatea de saliva		3.1%	97.1%	50.0%
		% of Total		1.0%	49.0%	50.0%
Total		Count	37	64	103	204
		% within lot	18.1%	31.4%	50.5%	100.0%
		% within test pentru cantitatea de saliva	100.0%	100.0%	100.0%	100.0%
		% of Total	18.1%	31.4%	50.5%	100.0%

Figure no. 4. Test for measuring the amount of stimulated saliva



Table no. 4 and figure no. 4 show that:

People in the studied group show low or very low amount of saliva (36.3% + 60.8% = 97.1%), while the patients in the control group have predominantly normal amount of saliva (98%) (p = 0.000).

Table no. 5. Testing salivary buffer capacity

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			testarea capac	testarea capacitatii de tampon a salivei		
			foarte scazuta	scazuta	normala	Total
lot	cercetare	Count	47	53	2	102
		% within lot	46.1%	52.0%	2.0%	100.0%
		% within testarea capacitatii de tampon a salivei	100.0%	96.4%	2.0%	50.0%
		% of Total	23.0%	26.0%	1.0%	50.0%
	martor	Count		2	100	102
		% within lot		2.0%	98.0%	100.0%
		% within testarea capacitatii de tampon a salivei		3.6%	98.0%	50.0%
		% of Total		1.0%	49.0%	50.0%
Total		Count	47	55	102	204
		% within lot	23.0%	27.0%	50.0%	100.0%
		% within testarea capacitatii de tampon a salivei	100.0%	100.0%	100.0%	100.0%
		% of Total	23.0%	27.0%	50.0%	100.0%

Figure no. 5. Testing salivary buffer capacity



- Table no. 5 and figure no. 5 show that:
- The people in the investigated group have a low or very low buffering capacity of saliva (46.1% 52.0% = 98.1%), while the control group have predominantly normal amount of saliva (98%) (p = 0.000).

CONCLUSIONS

- 1. In the investigated group, the resting saliva is quantitatively significantly lower compared to the results obtained in the control group due to prolonged exposure to occupational hazards.
- 2. The growth of saliva consistency is also induced by the long-term exposure of the patients to occupational hazards such as cyanide and hydrochloric acid vapour.
- 3. Salivary pH changes may be due to the exposure to occupational hazards on long term.
- 4. Hydrochloric acid vapours and cyanide the patients are exposed to determined the decrease of the quantity of the stimulated saliva in the control group, in close correlation with increased salivary viscosity.
- 5. The majority of the patients in the study group, the exposure to occupational hazards on long term decreases salivary buffer capacity, respectively the saliva defence capacity.

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