

Prevalence of hyposalivation in patients of different adult age groups, with arterial hypertension, medicated with captopril, in Torreon, Mexico

Prevalencia de hiposaliación en pacientes adultos, con hipertensión arterial, medicados con captopril, en Torreón, México.

Resumen

Objetivo. Estimar la prevalencia de hiposaliación entre pacientes hipertensos tratados con captopril, masculinos y femeninos, dentro de los grupos etarios de 40-59 y 60-82 años. **Métodos.** Se incluyeron en el estudio 30 pacientes diagnosticados con hipertensión arterial y tratados con captopril: 19 adultos de entre 40-59 años (9 mujeres y 10 hombres) y 11 adultos mayores de entre 60-82 años (6 mujeres y 5 hombres). Para todos se determinaron las velocidades de flujo total de saliva no estimulada (VFTSNE) y estimulada con parafina (VFTSE). **Resultados.** La prevalencia de VFTSNE baja (0.10-0.19 mL/min) en el grupo de 40-59 años fue de 33% para mujeres y 20% para hombres, y en el grupo de 60-82 años permaneció en 33% entre mujeres pero se incrementó a 40% entre hombres. Sólo un paciente mostró VFTSNE muy baja (<0.1 mL/min), dando un 20% de prevalencia en el grupo de hombres de 60-82 años. La prevalencia de VFTSE baja (0.7-0.99 mL/min) en el grupo de 40-59 años fue de 11% para mujeres y 40% para hombres, mientras que en el grupo de 60-82 años se incrementó a 17% entre mujeres pero permaneció en 40% entre hombres. Por otra parte, la prevalencia de VFTSE muy baja (<0.7 mL/min) en el grupo de 40-59 años fue de 56% para mujeres y de 30% para hombres, y en el grupo de 60-82 años se redujo a 50% entre mujeres e incrementó a 40% entre hombres. **Conclusión.** La prevalencia de hiposaliación por el método de recolección de VFTSNE fue del 30% para todos los pacientes, mientras que por el método de VFTSE fue significativamente más alto: 73%.

in the 60-82 years group it decreased to 50% for females and increased to 40% for males. **Conclusion.** Prevalence of hyposalivation under the UWSFR collection method was of 30% of all patients, while under the SWSFR one it was significantly higher: 73%.

Descriptor: Hiposaliación, hipertensión, captopril, saliva total no estimulada, saliva total estimulada

Keyword: Hyposalivation, hypertension, captopril, unstimulated whole saliva, stimulated whole saliva

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Abstract

Objective. To estimate the prevalence of hyposalivation among male and female hypertensive patients treated with captopril, within the age groups of 40-59 and 60-82 yrs. **Methods.** 30 patients diagnosed with arterial hypertension and treated with captopril were included in the study. 19 adults between 40-59 yrs (9 females and 10 males) and 11 elderly between 60-82 yrs (6 females and 5 males). Unstimulated and paraffin-stimulated whole saliva flow rates (UWSFR and SWSFR) were determined for all. **Results.** Prevalence of low (0.10-0.19 mL/min) UWSFR in the 40-59 years group was 33% for females and 20% for males, and in the 60-82 years group it remained 33% for females but increased to 40% for males. Only one patient showed very low (<0.1 mL/min) UWSFR, a 20% prevalence in the male 60-82 years group. Prevalence of low (0.7-0.99 mL/min) SWSFR in the 40-59 years group was 11% for females and 40% for males, and in the 60-82 years group it increased to 17% for females and remained 40% for males. In the other hand, the prevalence of very low (<0.7 mL/min) SWSFR in the 40-59 years group was 56% for females and 30% for males, and

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Introduction

Saliva has many important functions including: moistening and lubrication of the oral cavity;¹ aiding in food's tasting, bolus formation and digestion;^{1,2} protection of oral mucosa and esophagus from food friction and acids from gastro-esophageal reflux;¹ tooth protection against demineralization^{1,2} and caries;^{1,3} and protection against bacterial, viral and fungal infections.^{1,2} A normal salivary flow rate is essential in order to maintain these functions.

Hyposalivation is a salivary flow rate below normal.⁴ Patients suffer hyposalivation when their unstimulated whole salivary flow rate (UWSFR) is either low (0.1-0.19 mL/min) or very low (<0.1 mL/min),^{5,6} or when their stimulated whole salivary flow rate (SWSFR) is either low (0.7-0.99 mL/min) or very low (<0.7 mL/min).⁶

Hyposalivation has been linked to a series of oral problems including rampant caries and candidosis,⁷ tooth demineralization,⁸ altered taste and difficulty in eating, chewing and swallowing food,⁹ and halitosis.¹⁰ Hyposalivation has a number of etiologic factors, including radiotherapy in head and neck,^{7,11-13} systemic disorders (Sjögren syndrome; endocrine, neurologic, genetic, metabolic and infectious disorders)¹²⁻¹⁵ and the medical use of drugs.^{12,13,16,17} In particular, hyposalivation has been observed in patients using antihypertensive drugs.¹⁸⁻²²

Hypertension is a very important public health challenge in Mexico. In 2012, the prevalence of hypertension in the country was of 30.8% among females and 31.1% among males.²³ Captopril is an angiotensin converting enzyme inhibitor used as antihypertensive drug, which has shown to increase stimulated and unstimulated whole salivary rate in healthy adults,²⁴ but it has also been reported that hypertensive patients taking captopril along with other drugs had hyposalivation when measuring the UWSFR.¹⁸ Given that most of the hypertensive patients that visit the School of Dentistry at Torreon of the Autonomous University of Coahuila, Mexico, are being treated with captopril, we decided to estimate the prevalence of hyposalivation among them.

Methods

For this study 30 patients from the School of Dentistry at Torreon of the Autonomous University of Coahuila were chosen, 15 males and 15 females, within the ages of 40 and 82, with a mean age of 55.3 years. By age, 19 patients were adults between the ages of 40 to 59 years (9 females and 10 males, mean age of 47.5 years) and 11 elderly between the ages of 60 to 82 years (6 females and 5 males, mean age of 69.4 years). All of them had been diagnosed with arterial hypertension and were being treated with captopril. Patients treated with other drugs for hypertension or with other systemic diseases were excluded. Patients included in this study read and signed an informed consent form explaining

the scope or this study.

Whole saliva collection, general

We measured the UWSFR and paraffin-chewing SWSFR using previously reported methods.^{25,26} Saliva was collected at least 2 hours after the last food ingestion. Before the collections patients abstained from any actions which would stimulate saliva flow such as eating, chewing gum or having candy. The collections were made in a calm environment. Since salivary flux varies according to a circadian rhythm, saliva was collected at a similar time of the day for each patient. On a first visit, the patients provided saliva under an unstimulated method. On a second visit in the following days, the patients provided saliva under a stimulated method. Saliva was collected in 15ml graduated tubes.

First visit, UWSFR collection method.^{25,26}

The patient sat down and was told not to move the head or the tongue during the test. The patient was instructed to swallow, then to accumulate saliva in the mouth for two minutes without swallowing, and finally to spit all the saliva inside the collection tube. The procedure was repeated another two times for a total of three collections in a single collection tube per patient. The tube was capped and placed in a rack for 5 min, after which the amount of saliva was measured and divided by six in order to calculate the patient's salivary flux per minute.

Second visit, paraffin-chewing SWSFR collection method.^{25,26}

The patient sat down and was told to swallow the saliva in his mouth, then to place in his mouth a piece of paraffin wax (Cera de parafina transparente Cristal, Parafinas y mezclas, S.A. de C.V., Toluca, Mexico) until it became soft (30 seconds), and finally to swallow the saliva produced during this time. The patient was then instructed to chew the wax for 6 min, spitting the accumulated saliva in the collection tube as needed. Finally the tube was capped and placed in a rack for 5 min, after which the amount of saliva was measured and divided by six in order to calculate the patient's salivary flux per minute.

Statistical Analysis.

Statistical analysis was performed with the Statistical Analysis System software (SAS, Version 9.0, SAS Institute, Cary, NC, USA). Measures of central tendency and dispersion were calculated. For continuous variables Student's t-test was used; Chi-square test was used for categorical variables. The statistical significance was defined as $P < 0.05$.

Results

Hyposalivation under the UWSFR collection method was observed in 9 of the 30 patients (30%): 5 of the 15 females (33%) and 4 of the 15 males (27%). Of them, 8 (27%) had low UWSFR:

5 of the 15 females (33%) and 3 of the 15 males (20%). Only a patient (3%) had very low UWSFR: one of the 15 males (7%) (Table 1).

By age, in the 40-59 years old group, hyposalivation under the UWSFR collection method was observed in 5 of the 19 patients (27%): 3 of the 9 females (33%) and 2 of the 10 males (20%). All of them had low UWSFR (Table 1).

In the 60-82 years old group, hyposalivation under the UWSFR collection method was observed in 4 of the 11 patients (36%): 2 of the 6 females (33%) and 2 of the 5 males (40%). Of them, 3 (27%) had low UWSFR: 2 of the 6 females (33%) and 1 of the 5 males (20%). Only one (9%) had very low UWSFR: one of the 5 males (20%) (Table 1).

Hyposalivation under the SWSFR collection method was observed in 21 of the 30 patients (70%): 10 of the 15 females (67%) and 11 of the 15 males (73%). Of them, 8 (27%) had low SWSFR: 2 of the 15 females (13%) and 6 of the 15 males (40%). Furthermore, 13 (43%) had very low SWSFR: 8 of the 15 females (53%) and 5 of the 15 males (33%) (Table 1).

By age, in the 40-59 years old group, hyposalivation under the SWSFR collection method was observed in 13 of the 19 patients (68%): 6 of the 9 females (67%) and 7 of the 10 males (70%). Of them, 5 (26%) had low SWSFR: 1 of the 9 females (11%) and 4 of the 10 males (40%). Furthermore, 8 (42%) had very low SWSFR: 5 of the 9 females (56%) and 3 of the 10 males (30%) (Table 1).

In the 60-82 years old group, hyposalivation under the SWSFR collection method was observed in 8 of the 11 patients (73%): 4 of the 6 females (67%) and 4 of the 5 males (80%). Of them, 3 (27%) had low SWSFR: 1 of the 6 females (17%) and 2 of the 5 males (40%). Furthermore, 5 (45%) had very low SWSFR: 3 of the 6 females (50%) and 2 of the 5 males (40%) (Table 1).

UWSFR and SWSFR results for each patient.

Gender	Age in years	UWSFR mL/min	SWSFR mL/min	Gender	Age in years	UWSFR mL/min	SWSFR mL/min
F	45	0.16 - L	0.66 - VL	M	40	0.35 - N	1.16 - N
F	47	0.41 - N	1.00 - N	M	40	0.25 - N	0.75 - L
F	47	0.11 - L	0.33 - VL	M	40	0.33 - N	0.83 - L
F	48	0.16 - L	0.41 - VL	M	40	0.16 - L	0.58 - VL
F	48	0.25 - N	0.66 - VL	M	41	0.25 - N	0.83 - L
F	48	0.30 - N	0.75 - L	M	43	0.25 - N	0.58 - VL
F	49	0.25 - N	0.66 - VL	M	54	0.13 - L	0.50 - VL
F	51	0.33 - N	1.16 - N	M	55	0.25 - N	0.75 - L
F	52	0.41 - N	1.08 - N	M	55	0.41 - N	1.16 - N
F	60*	0.28 - N	0.75 - L	M	59	0.33 - N	1.00 - N
F	63*	0.18 - L	0.41 - VL	M	60*	0.08 - VL	0.41 - VL
F	69*	0.16 - L	0.66 - VL	M	61*	0.16 - L	0.58 - VL
F	69*	0.33 - N	1.00 - N	M	70*	0.33 - N	1.33 - N
F	70*	0.33 - N	1.00 - N	M	74*	0.25 - N	0.75 - L
F	78*	0.28 - N	0.66 - VL	M	82*	0.33 - N	0.91 - L

Notes: Female (F) or male (M), indicating whether salivary flow was normal (N), low (L) or very low (VL). *Patients in the 60-82 years old group.

Table 1.

All the patients who presented hyposalivation under the UWSFR collection method also presented it under the SWSFR one and 12 patients (5 females, 7 males) only under the SWSFR collection method.

After statistical analysis, no significant difference ($P > 0.05$) was found in the age of the patients by gender (56.26 ± 10.34 y 54.26 ± 13.09 for females and males respectively), which denotes homogeneity among the patients included in the study as desired. In the other hand, highly significant differences were found among the female patients when comparing the salivary flow rates before and after stimulation, with a UWSFR mean of 0.269 ± 0.093 mL and a SWSFR mean of 0.746 ± 0.255 mL ($P < 0.0001$). The same effect was observed among male patients in whom the UWSFR mean was of 0.217 ± 0.09 while the SWSFR one was of 0.808 ± 0.265 mL. We found a high positive correlation between UWSFR and SWSFR in both females and males ($r = 0.881$; $P < 0.0001$ and $r = 0.883$; $P < 0.0001$; respectively) (Figures 1 and 2). After ANOVA of UWSFR and SWSFR values between females and males, no significant differences were found ($P > 0.05$), which indicates that there is no difference in the procedure between both genders.

Correlation between SWSFR and UWSFR in females.

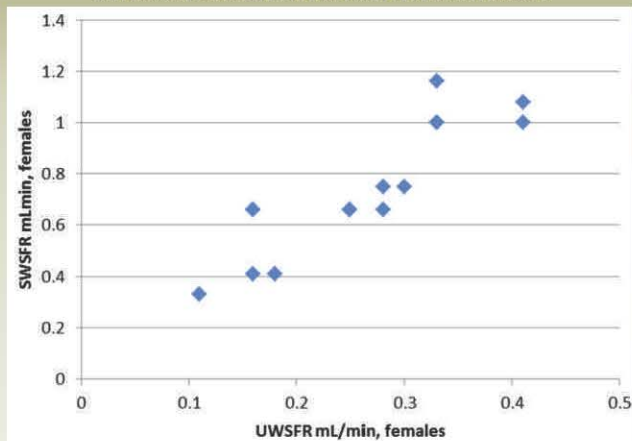


Figure 1.

Correlation between SWSFR and UWSFR in males.

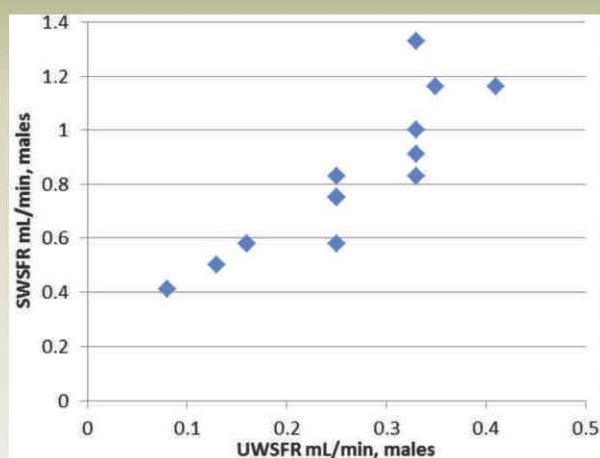


Figure 2.

Discussion

The positive correlation between UWSFR and SWSFR that we found is in accordance with other studies.^{6, 27-30} While one study showed that captopril increased stimulated and unstimulated whole salivary rate in healthy adults,²⁴ and other reported that hypertensive patients taking captopril along with other drugs had hyposalivation when measuring the UWSFR,¹⁸ we found reduced unstimulated and stimulated flow rates in our hypertensive patients treated with captopril: the prevalence of hyposalivation under the UWSFR collection method was of 30% among our patients, while under the SWSFR one it was significantly higher, 73%. It is noteworthy that this is not in agreement with other studies which found that reduced flow rates for unstimulated whole saliva were more common than those for stimulated one.^{6, 30}

Given the importance of saliva for oral health, we suggest that dentists measure USWFR and SWSFR for their patients, especially those with hypertension and treated with captopril, in order to determine if they suffer from hyposalivation throughout the day (when saliva production is unstimulated) or when eating and chewing (when saliva production is stimulated), allowing the practitioners to establish a better treatment plan which may improve the quality of life of their patients.

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