

ASSESSMENT OF SALIVARY FLOW RATE IN PATIENTS ON ANTIHYPERTENSIVE DRUGS

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ABSTRACT

Background

Hypertension is one of the serious systemic diseases that may cause general systemic changes, which is often reflected in the oral cavity. It has conflicting results in salivary changes among patient with hypertension; an increase, decrease or no alteration in salivary pH, flow rate can be identified.

Aim

The purpose of the present study was to examine the association of hypertension with salivary flow rate and ph. level. Hence this study was to investigate flow rate in stimulated saliva in hypertensive patients.

Reason

Hypertension is one of the serious systemic diseases affecting all populations in the world. Hence this study investigates salivary changes in hypertensive patient.

Conclusion

Hence in this study the salivary flow rate is increased in hypertensive patient between the age groups 60-70. The overall range of ph is 25, systolic and diastolic are same 25.

INTRODUCTION

Saliva is secreted by three pairs of major and numerous minor salivary glands, which are exocrine glands.^[1] It is a very dilute fluid, composed of waters, variety of electrolytes including sodium, potassium, calcium, magnesium, bicarbonate, and phosphates.^[2] It also contains immunoglobulins, proteins, enzymes, mucins, and nitrogenous products. Salivary function includes lubrication and protection, buffering action and clearance, maintenance of tooth integrity, antibacterial activity, and taste and digestion.^[3] The normal pH of saliva is 6 to 7 which is slightly acidic and pH can range from 5.3 (low flow) to 7.8 (peak flow).^[4] Bicarbonate, phosphate, urea, amphoteric proteins and enzyme acts as buffering system in which bicarbonate is most important buffering system, it diffuses into plaque and acts as a buffer by neutralizing acids.^[5] Moreover, it generates ammonia to form amines, which also serve as a buffer by neutralizing acids.^[6] On average, unstimulated flow rate is 0.3 mL/min and stimulated flow rate is, at maximum, 7 mL/min, any unstimulated flow rate below 0.1 mL/min is considered hypofunction.^[7] Hypofunction of stimulated salivary flow is not a normal age-related change.^[7] Reduced flow may result from a number of different conditions, such as dehydration, Sjogren's syndrome, diabetes mellitus. Saliva plays a significant role in the maintenance of oral health.⁸ It is the complex mixture of fluids that surrounds the oral tissues, and it originates from major and minor salivary glands. Saliva consistency can be watery, thick, sticky or frothy depending on its composition^[1]. These components enhance taste, speech, and swallowing and facilitate irrigation, lubrication, and protection of the mucous membranes in the upper digestive tract salivary flow rate ranges from 0.25 to 0.35 milliliter per minute^[2].

Hypertension is a highly prevalent cardiovascular disease, which affects over 1 billion people worldwide.^[9] Although more than 70% of hypertensive patients are aware of the disease, only 23.49% are treated, and fewer (20%) achieve control.^[9] Hypertension is defined as systolic and diastolic blood pressures with values >140mmHg and >90mmHg respectively, the prevalence of which varies by age, race, and education.^[8] Hypertension exerts a substantial public health burden on cardiovascular health status and healthcare systems in India.^[10] The rates for hypertension in percentage are projected to go up to 22.9 and 23.6 for Indian men and women, respectively by 2025.5 Hypertension and use of anti-hypertensive medications has definitive effect on pH of stimulated saliva which can be attributed to many oral detrimental changes.¹¹ Hence, there is a necessity to monitor blood pressure for reconstruction and maintenance of oral health. Saliva is gaining popularity as a diagnostic tool for evaluating physiologic and pathologic conditions by virtue of its ease of collection method, non-invasiveness and low cost.^[9] Thus, the aim of the present study is to evaluate the influence of hypertension on pH of saliva, saliva flow rate and buffering capacity in individuals.^[12]

Hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated.^[13] Hypertension may be diagnosed by a health professional who measures blood pressure with a device called a sphygmomanometer - the device with the arm cuff, dial, pump, and valve.^[14] Blood pressure is expressed by two measurements, the systolic and diastolic pressures, which are the maximum and minimum pressures, respectively, in the arterial system.^[14] Normal blood pressure at rest is within the range of 100–140 mmHg systolic and 60–90 mmHg diastolic^[3]. High blood pressure may be treated medically, by changing lifestyle factors, or a combination of the two. Important lifestyle changes include losing weight, quitting smoking, eating a healthful diet, reducing sodium intake, exercising regularly, and limiting alcohol consumption^[15]. Buffering capacity and pH are particularly important functions of saliva. The PH level varies for different hypertensive patient according to their age group^[2]. PH may not be as important a measure for buffering action on caries as the pH of plaque, which modifies the saliva.^[16] The buffering capacity of saliva affects plaque pH, unless the pH of plaque is too low for enzymatic action of bacteria.¹⁶ The lowest level of pH plaque might be 6.1 or even lower, approximately 15 minutes after food consumption¹⁶. The purpose of the present study was to examine the association of hypertension with salivary flow rate and pH level^[14].

MATERIALS AND METHODS

Method

A total of 25 hypertensive patients of these female 13 and male 12 with different age groups were taken a survey. In that 25 subjects 4 were between 30-40, 6 were between 40- 50, 8 were between 50-60, 3 were between 60-70, 3 were between 70-80. The proforma containing relevant information regarding oral problems was questioned by the researcher to different patients according to their age groups and it is filled by the researcher. It was conducted in Saveetha dental college and hospitals.

Materials

BP was checked to the patient with automatic sphygmomanometer and the systolic, diastolic and pulse rate was noted. Then the subject was asked to spit his/her saliva after 1min of interval, it was collected using eppendorf tubes which is indicating mm. The saliva secreted after 1min of interval was noted down. The salivary pH rate of the subjects was measured using pH strips, indication of the specific colours represents the pH rate of the patient.

RESULT

From the data recorded it was evident that majority of the hypertensive patients examined during the course of study belonged to the age group of 30-80 years. The overall mean and standard deviation for pH rate is 6.84, 0.688. The overall mean and standard deviation for systolic pressure is 125.04, 22.152

The overall mean and standard deviation for diastolic pressure is 83.40, 13.829.

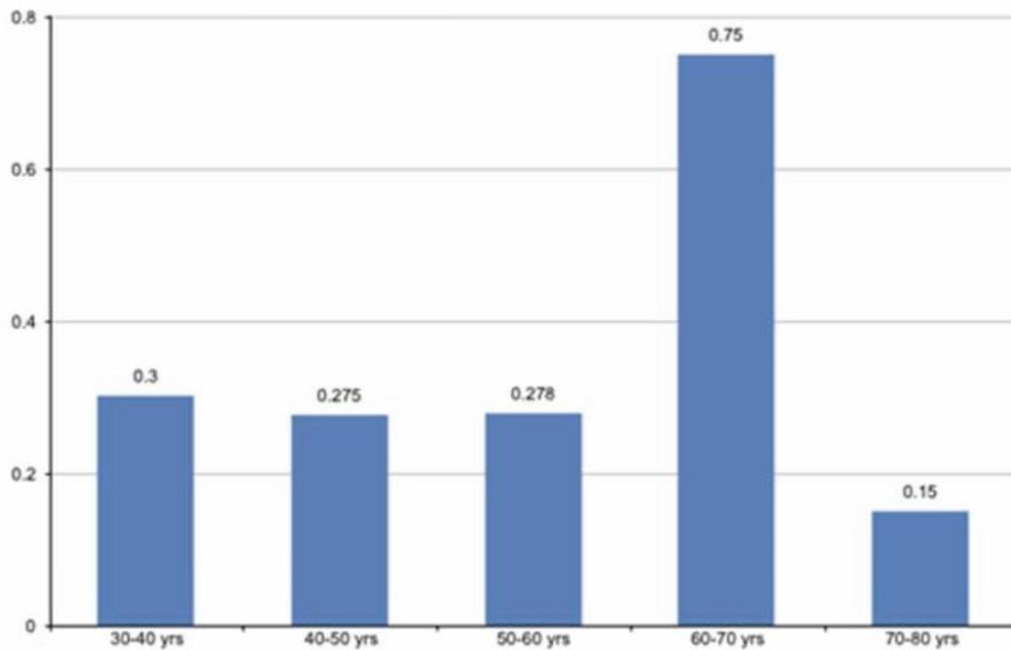
The over all mean and standard deviation for salivary flow rate is 0.322, 0.2521.

The \pm value for ph is +8,-6

The \pm value for systolic is +190,-92, Diastolic is +105,- 60,salivary flow rate is +0.8,-0.1

AGE GROUP		PH	SYSTOLIC	Diastolic	Salivary flow rate
30-40	Mean	7.00	110.25	79.50	.300
	Std. Deviation	.000	16.317	10.344	.2309
	Minimum	7	95	74	.1
	Maximum	7	132	95	.5
	Range	0	37	21	.4
	N	4	4	4	4
40-50	Mean	7.17	115.50	82.50	.275
	Std. Deviation	.753	19.817	16.022	.2824
	Minimum	6	92	62	.1
	Maximum	8	148	101	.8
	Range	2	56	39	.7
	N	6	6	6	6
50-60	Mean	6.56	129.89	84.78	.278
	Std. Deviation	.527	18.388	13.664	.1873
	Minimum	6	95	66	.1
	Maximum	7	158	105	.5
	Range	1	63	39	.4
	N	9	9	9	9
60-70	Mean	7.33	140.67	76.00	.750
	Std. Deviation	1.155	43.016	15.100	.0000
	Minimum	6	111	60	.8
	Maximum	8	190	90	.8
	Range	2	79	30	.0
	N	3	3	3	3
70-80	Mean	6.33	133.67	93.67	.150
	Std. Deviation	.577	3.215	15.373	.0866
	Minimum	6	130	76	.1
	Maximum	7	136	104	.3
	Range	1	6	28	.2
	N	3	3	3	3
Total	Mean	6.84	125.04	83.40	.322
	Std. Deviation	.688	22.152	13.829	.2521
	Minimum	6	92	60	.1
	Maximum	8	190	105	.8
	Range	2	98	45	.7
	N	25	25	25	25

Salivary Flow Rate



CORRELATIONS

Pearson Correlation

	PH	SYSTOLIC	Diastolic	salivary flow rate
PH	1	.285	.064	.297
SYSTOLIC	.285	1	.603(**)	.323
Diastolic	.064	.603(**)	1	-.024
salivary flow rate	.297	.323	-.024	1
pocket depth	.027	-.030	-.186	.109

** Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Salivary characteristics were associated inconsistently between 30-40, 40-50, 50-60, 60-70, 70-80 age groups. Salivary pH for those age groups were not statistically significant. It varies for different age groups. There is also variation in salivary flow rate after 1 min of interval for each subject was observed.(1)

Robinson Sabino-Silva et al in 2013 did a study on Increased SGLT1 expression in salivary gland ductal cells correlates with hyposalivation in diabetic and hypertensive rats. This study highlights the water transporter role of SGLT1 in salivary glands, which, by increasing ductal water reabsorption, may explain the hyposalivation of diabetic and hypertensive subjects.(2)

Monique Tremblay et al in 2012 did a cross sectional study on Association between salivary pH and metabolic syndrome in women .In this study, the salivary pH appeared as a possible correlate of MetS componen expression^{[6](3)}

C.R. PiccoLilian et al in2012 did a study on Spontaneously hypertensive rat as experimental model of salivary hypofunction^[7]

In a study was done by Wong et al^[17] where he concluded that the blood pressure influences the general condition in several ways. Saliva is composed of electrolytes, including sodium, potassium, calcium, magnesium, bicarbonate, and phosphates. The most important buffering system of saliva is bicarbonate which maintains the neutrality of the salivary ph. The demineralization and remineralization of enamel and dentin is affected by the buffering capacity of the saliva. Dawes et al^[18] concluded that bicarbonate concentration and the salivary pH has a direct relationship, as the bicarbonate concentration decreases due to decrease in flow, the pH of saliva is also lowered. There was no significant difference in salivary flow rate among each group in this study. The cleansing action of saliva on tooth surface prevents caries. Bassoukou et al^[19] concluded that unstimulated saliva pH is closely related to the oral buffer capacity to the caries risk, further these are in agreement with a study conducted by Browne et al and Scully et al.^[20] Prashanthi B et al^[21] concluded that patients on diuretic medication which is antihypertensive have a higher prevalence of xerostomia, periodontitis, dental caries and mucosal lesions when compared with that in the control group individuals. An important risk factor for dental/oral health is decrease in ph. Johansson I et al and Saelbröm A-K et al^[22] concluded that the decreased buffering capacity due to more acidic pH resulted increased incidence of dental caries which supports the present study which is similar to our study. Our team has extensive knowledge and research experience that has translate into high quality publications⁽²⁴⁻³⁵⁾

CONCLUSION

Hence in this study the salivary flow rate is increased in hypertensive patient between the age groups 60-70 .The overall range of ph is 25, systolic and diastolic are same 25.

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