



EVALUATION OF HYPOSALIVATION IN POSTMENOPAUSAL FEMALES USING MODIFIED SCHIRMER TEST

Rakhee Modak*¹, Amit Mhapuskar² and Mayur Chaudhary³

¹Assistant Professor, Department of Oral Medicine and Radiology, Bharati Vidyapeeth Deemed University Dental College and Hospital, Pune, India.

²Head of the Department, of Oral Medicine and Radiology, Bharati Vidyapeeth Deemed University Dental College and Hospital, Pune, India.

³Associate Professor, Department of Oral and Maxillofacial Pathology, Bharati Vidyapeeth Deemed University Dental College and Hospital, Pune, India.

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ABSTRACT

Saliva plays important role in maintaining homeostasis of oral cavity. Saliva is being studied extensively & used for risk assessment, diagnosis & monitoring high risk behavior & disease progression. A variety of medical conditions & medications are associated with salivary gland hypofunction. The reduction of partial or total production of oestrogen during menopause causes significant decrease of salivary flow resulting in hyposalivation & symptoms of xerostomia. The objective of study was chair side evaluation of hyposalivation by “Modified Schirmer Test” in postmenopausal female & to discriminate between salivary flow of healthy & postmenopausal subjects, which might help them to seek required hormone replacement therapy.

*Corresponding Author

Dr. Rakhee Modak

Assistant Professor,
Department of Oral
Medicine and Radiology,
Bharati Vidyapeeth Deemed
University Dental College
and Hospital, Pune, India.

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INTRODUCTION

Saliva is an integral factor for maintaining oral & systemic health. Menopause is a physiologic process which occurs in the fifth decade of life in women, involves permanent cessation of menstruation. Many physiologic changes most of which are due to decreased ovarian oestrogen production take place in women approaching menopause. Women appear to experience increase in oral symptoms that may result from endocrine disturbances. They

may complain of dry mouth because of decreased salivary secretion as well as burning sensation of mouth & tongue. Taste sensation may change causing frequent complaint of metallic taste. Because oral mucosa contain estrogen receptors variations in hormone levels directly affect oral cavity. Oral health in postmenopausal women thus gets affected & needs attention along with important issues.

When salivary flow rate is reduced susceptibility to various oral diseases is enhanced. The diminished salivary buffering capacity is of clinical importance for caries development. The caries controlling effect of salivary flow rate can be ascribed to rinsing and clearing effect of saliva in oral cavity.

The topic of effect of menopause on salivary secretion was studied by only few studies. The high frequency of oral symptoms in menopausal females and paucity of studies co-relating xerostomia with hyposalivation were factors that motivated present study, which aimed to assess xerostomia & salivary flow in menopausal females.

Salivary flow can be measured by saliva collecting devices, wafer test, segregators & swab method.^[1,2] These qualitative & quantitative methods which were previously used to measure salivary flow were time consuming technique, required trained personnel, longer time interval, The Schirmer Test is used routinely by ophthalmologists to measure tear film wetness. Studies have been carried out to detect salivary flow using Modified Schirmer Test in patients suffering from Graft Versus Host disease & patients who received head and neck radiation.^[2]

MATERIALS AND METHODS

Patient Selection

The study population consisted of out patients visiting department of Oral Medicine & Radiology, Bharati Vidyapeeth Dental College & Hospital, Pune over a period of three months. A study sample consisted of 82 female subjects, including 41 postmenopausal females & 41 menstruating healthy females without known medical history; were selected randomly from patients reporting Oral Medicine & Radiology department.

Inclusion Criteria

Study group A consisted of 41 postmenopausal females in age group of 50-70 years with no systemic history.

Control group B consisted of 41 normal healthy menstruating female patients in age group of 25-40 years without systemic disease.

Exclusion Criteria included patients on medication like antihypertensives, antiinflammatory, diuretics, antihistaminics, muscle relaxants, analgesics, antidepressants & antipsychotic drugs. Patients who are having Sjogren's Syndrome multiple systemic diseases such as diabetes, psychological disorders and those undergoing radiation therapy and any other disorders affecting quantity & quality of saliva.

Assessment of Xerostomia

The chairside assessment of xerostomia was done using questionnaire, modified from Fox et al., & Pai et al.; questionnaires to assess the patients feeling of mouth dryness.^{3,4} Based on severity of symptoms, patients are classified as mildly, moderately and severely xerostomic.

[Table -1] shows six questions, modified from Fox et al., and Pai et al., questionnaires which were used to assess the patients' feelings of mouth dryness. Based on the severity of symptoms, patients were classified as mildly, moderately and severely xerostomic.

Table. 1.

1.	Do you feel your mouth is dry?	Mild xerostomia
2.	Do you sip liquids to aid in swallowing dry food?	
3.	Do you feel thirsty very frequently?	Moderate xerostomia
4.	Do you have difficulties swallowing any food?	
5.	Does your mouth feel dry throughout the day?	Severe xerostomia
6.	Do you chew gum/hard candies/minutest daily to relieve oral dryness?	

METHODOLOGY

The method was explained to all patients & informed consent was obtained. Patient's case history was taken including history of reduced salivary secretion, burning sensation, altered taste sensation.

All participants were asked to refrain from eating, drinking, smoking & chewing or oral hygiene procedures one hour before test. All patients were examined in conducive climatic conditions between 8 am to 12 noon to avoid temperature and diurnal variations.

An unstimulated salivary flow was measured using Modified Schirmer Test (MST), which is developed from Schirmer test routinely used by ophthalmologist to measure tear film wetness. A commercially available 5x35 mm Schirmer test strip has a millimeter scale (2-35mm) delineating the amount of fluid flow. In present study MST was performed with Schirmer paper strip (Bell Pharma, Andheri -Mumbai, India).

During performing the test, subjects sat upright in dental chair. Each subject was asked to swallow once to clear secretions in the mouth and not to swallow anymore during test. The patient was asked to rest tongue on hard palate so that strip would not touch the tongue during test. The MST strip will be held vertically with a cotton plier & when round end of the strip contacts moisture, level of moisture travels up the strip and distance was read at 1, 2 and 3 minutes of interval and reorded immediately. [Picture 1].

Data was subjected to statistical analysis using chi-square test. Statistical significance was achieved as p value was less than 0.001.

RESULTS

In study group 31.71% of females had mild xerostomia and 7.32% subjects had moderate xerostomia. [Table 2].

In study group out of 41 patients 34 subjects (82%) were found with hyposalivation using MST & in control group out of 41 patients 10 subjects (24%) were found with hyposalivation. [Table 3].

The mean flow of saliva in study group at end of first minute, second minute, third minute was 14.22 mm, 21.73 mm, 29.66 mm respectively. [Table 4, Table 5A, 5B].

When comparison were made between striking different values for mean flow of saliva among control group & test group were found with help of Chi-square test. The difference obtained was significant as $p < 0.001$. [Graph 1]. On observation it was noticed that individuals who showed third minute reading below 25 mm had subjective complaint of mouth dryness.

Table. 2. percentage count of xerostomic subjects. $P < 0.001$.

	MILD XEROSTOMIA	MODERATE XEROSTOMIA	NO XEROSTOMIA
PERCENTAGE %			
STUDYGROUP	31.71 %	7.32 %	60.98 %
CONTROL GROUP	2.44 %	2.44 %	95.12 %

Table. 4. Mean flow of saliva at the end of 3 minutes. $P < 0.001$.

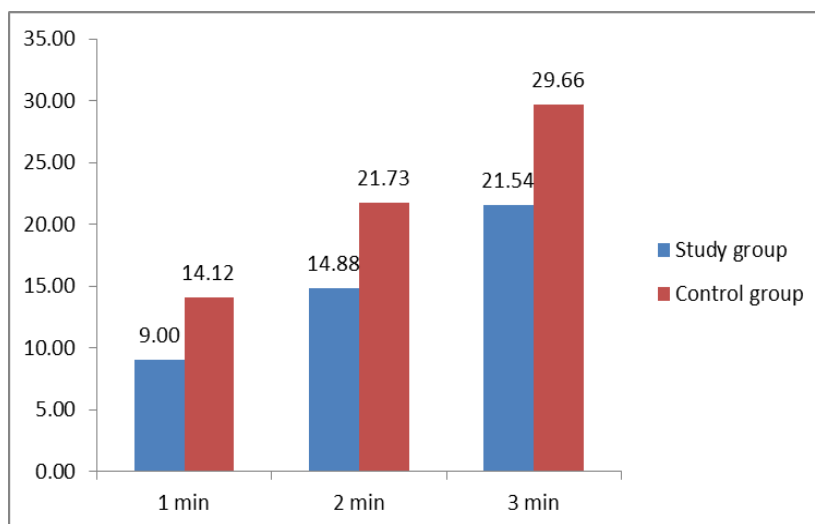
	STUDYGROUP	CONTROLGROUP
1 min	9.00 mm	14.22 mm
2 min	14.88 mm	21.73 mm
3 min	21.54 mm	29.66 mm

Table 3- Results using Modified Schirmer Test.

COUNT					
		HYPOSALIVATION			Chi-square test used
		YES	NO	TOTAL	P-VALUE
GROUP	STUDY	34	7	41	< 0.001
	CONTROL	10	31	41	
TOTAL		44	38	82	

Table. 6. Percentage sensitivity and specificity of present study.

SENSITIVITY	SPECIFICITY	PPV	NPV
77.27	81.58	82.93	75.81



Graph. 1. showing mean flow of saliva.

Table. 5A.

Study Group A	Schirmer 1 min	Schirmer 2 min	Schirmer 3 min
Average	9.00	14.88	21.54
SD	3.19	4.34	5.07
Median	8	15	22

Table. 5B.

Control Group B	Schirmer 1 min	Schirmer 2 min	Schirmer 3 min
Average	14.12	21.73	29.66
Median	3.91	4.23	4.45
SD	15	21	30



Pic. 1. Assesment of Hyposalivation using MST.

DISCUSSION

Saliva is the complex biologic fluid and principle defence factor of oral cavity which maintains homeostasis and keeps mucosa healthy. It has other properties like antimicrobial

and antifungal activities. It transports digestive enzymes, helps in remineralisation of teeth & assists in speech, mastication & deglutition by lubricating oral cavity^[9,10] The salivary flow and composition greatly vary under different conditions. Per day approximately 0.5 litres of saliva is secreted. The unstimulated salivary flow rate is 0.3 ml per minute & when it is stimulated, it increases to 1.5 – 2 ml per minute & whereas during night time, salivary flow is negligible.

Xerostomia is subjective feeling of having dry mouth whereas hyposalivation is reduced salivary flow rate. The terms 'Xerostomia' and 'Hyposalivation' are independently used as salivary flow and xerostomia symptoms have poor co-relation.^[9] Xerostomia is set of symptoms and highly individual. Direct questioning is relatively accurate method to assess xerostomia whereas hyposalivation can be objectively evaluated by using sialometry. Therefore present study used questionnaires to assess mouth dryness and hyposalivation was evaluated by Modified Schirmer Test. (MST) Fontana et al evaluated the association between the MST and other traditional methods like volumetric & gravimetric methods. In all tests MST was found to be simple, practical, inexpensive, standardised & easy to perform method.^[5]

Studies have shown that MST < 25 mm at 3 minutes suggestive of hyposalivation, provided high sensitivity & specificity. Another study showed that MST value > 28 mm at 3 minutes was normal.

Austin Chen et al performed MST on patients who received head & neck radiation & patients who had oral chronic graft versus host disease where Chen et al reported significance of MST as saliva flow measuring test.^[2]

Kumar N N et al studied salivary flow rate in subjects who were on antidepressant medications & its comparison with healthy control & assessment of unstimulated salivary flow rate by Modified Schirmer Test (MST) & volumetric method (spitting method) for evaluation of xerostomia & whether any correlation exists between two methods, where specificity and sensitivity was found to be 90.9% and 31.5% respectively.^[6]

Tapasya et al used MST in evaluation of postmenopausal hyposalivation. Pia Lopez et al used MST to assess salivary gland hypofunction.^[7]

In present study sensitivity was found to be 77.27% and specificity was 81.58%. [Table 6] In routine clinical practice only subjects with definite symptoms of xerostomia or burning mouth syndrome are investigated. The immediate implication obtained from present study is to treat postmenopausal females by assessing xerostomia symptoms & hyposalivation and help them to seek required hormone replacement therapy. Also hyposalivation detected in menstruating females could be clue to unknown underlying systemic disease. However present study has demerits like; complaint of mouth dryness is highly individual; and some subjects didn't show reduced flow rate and vice versa.

CONCLUSION

Xerostomia & hyposalivation remain a debilitating condition for many individuals and cause significant reduction in patient's perception of life. The result of our study showed that study is effective to discriminate between subjects with normal and decreased salivary flow. The MST can be used as chairside screening tool which is reliable, easy to perform, inexpensive, reproducible, time saving, sensitive and specific to check salivary secretion also it is well tolerated by patient, as it is non-invasive. The limitation of this study is; small sample size and test gives quantitative analysis of saliva, & it can demonstrate structural and functional defects of salivary flow. So more studies with large sample size need to be carried out.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

FINANCIAL DISCLOSURE

The study presented in this article was conducted at the educational institution of the authors and was not supported by any financial assistance

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