

Correlation of Anemia, Xerostomia and its Association with Candidial Colonization among Postmenopausal Women of Different Socioeconomic Status in Patients Attending Dental School in South India

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ABSTRACT

Background and objectives: Menopause is a physiological state that gives rise to adaptive changes at both oral and systemic level. One of the major problems in these patients is burning mouth syndrome though no appreciable organic lesions are present. Xerostomia is another frequent symptom seen in menopause. The present study was undertaken to correlate between possible oral complications – xerostomia, anemia, and candidal colonization among postmenopausal women of different socioeconomic statuses. With this background the present study was undertaken to correlate between possible oral complications – xerostomia, anemia, and candidal colonization among postmenopausal women of different socioeconomic statuses.

Materials and methods: After obtaining explained and informed consent, 40 females subjects with age range from 40 to 80 years attending outpatient department of our dental school were included in the study. A specially designed proforma was used to record demographic details and annual percapita income. A structured questionnaire was used for assessing clinical subjective symptoms of xerostomia. Hemoglobin estimation was done by cyanomethemoglobin method. Saliva sampling for estimation of colony forming units was performed using oral rinse technique.

Results: Total sample of 40 subjects anemia was prevalent in 57.5%. Xerostomia was prevalent in 75% of total sample. Association between anemia and xerostomia status showed a significant positive correlation ($p = 0.04$) between anemia and xerostomia. Correlation between socioeconomic status with the variables (xerostomia score and candidal counts) showed no significant positive correlation.

Conclusion: Dental practitioners need to be aware about menopause and its oral manifestations as a possible risk factor for various oral health problems. Oral physicians should be vigilant and encourage postmenopausal women to seek appropriate oral healthcare which in turn improves systemic health.

Keywords: Anemia, Candidal carriage, Menopause, Postmenopausal women, Xerostomia.

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INTRODUCTION

Menopause in women is defined as time at which cyclic ovarian function as manifested by menstruation ceases.¹ Menopause is a physiological state that gives rise to adaptive changes at both oral and systemic level.² Menopause initiates physiological changes that include endocrinological alterations and atrophy of tissues lining vagina, urinary tract and other parts of body.³

Menopause is found to be associated with adverse changes in orofacial complex along with genital changes. One of the major problems in these patients is burning mouth syndrome though no appreciable organic lesions are present.^{3,4} Certain microorganisms, such as *Candida albicans*, staphylococci, streptococci and various anaerobes have also been suggested as etiological factors for burning mouth syndrome along with xerostomia, anemia, nutritional disorders, and diabetes mellitus, mechanical and idiopathic factors.¹

Xerostomia is another frequent symptom seen in menopause. Postmenopausal women have decreased unstimulated and stimulated saliva due to qualitative changes and changes in the mucosal sensory receptors.⁵ As saliva is critical fluid in maintaining health, impaired salivary secretion in these patients lead to impairment in oral tissues and thus affect the quality of life.

Nutritional status is also important during menopause as it has a direct effect on chemosensory function, which in turn would induce changes in dietary habits.¹

Persistence of conditions like xerostomia and oral manifestations caused by anemia can lead to significant and permanent oral and pharyngeal disorders like increased susceptibility to various infections which can further impair person's quality of life. Socioeconomic status of an individual plays a role indirectly in maintaining oral health.⁶

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Research community has paid limited attention in context to menopause and oral health. Reports to date emphasize on cytological studies on gingiva and mucosa in this regard.⁷⁻¹⁰ Research correlating menopause and saliva emphasized on flow rates and changes in pH.

With this background the present study was undertaken to correlate between possible oral complications – xerostomia, anemia, and candidal colonization among postmenopausal women of different socioeconomic statuses.

MATERIALS AND METHODS

Methodology

After obtaining explained and informed consent, 40 female subjects with age range from 40 to 80 years attending outpatient department of our dental school were included in the study. Subjects with natural history of menopause were included in study. Subjects with history of salivary gland pathologies, systemic diseases, under medication that affects salivary flow and who underwent hysterectomy were excluded from study.

A specially designed proforma was used to record demographic details and annual per-capita income. Accordingly patients were divided in to Upper high class, high class, upper middle class, lower middle class, poor class, very poor class based on classification system developed by AK Agarwal.⁶

Assessment of oral dryness: A structured questionnaire developed by S Pai et al was used for assessing clinical subjective symptoms of xerostomia.¹⁰

Percentage of hemoglobin estimation: 0.5 ml of blood sample was collected from cubical vein of each subject using 24 gauge needles in a 3 cc syringe. Hemoglobin estimation was done by cyanomethemoglobin method using spectrophotometric (elico) analysis at 550 nm and were categorized to nonanemic, mild, moderate and severely anemic.¹¹

Saliva sampling and assessment of salivary candidal colonization: Saliva sampling for estimation of colony forming units was performed using oral rinse technique (Fig. 1). All the subjects were asked to thoroughly rinse their mouth with 10 ml sterile phosphate buffer saline for 1 minute and return back the rinse to sterile container. The rinse was immediately concentrated by centrifuging at 1,700 rpm for 10 minutes. The supernatant was discarded and 0.001 µl inoculating loop was used to spread the sample on to Sabouraud's dextrose agar plates supplemented with chloramphenicol (10 mg/ml) (Fig. 2). These agar plates were incubated for 48 hours in an incubator and CFUs were counted manually using digital colony counter and number was multiplied by 1,000 and expressed as CFU/ml.¹² To confirm candidal colonization, the colony forming units from random plates were stained with PAS stain and Candidal growth was identified as positive (Fig. 3).

The obtained data was entered in to proforma and subjected to statistical analysis using chi-square test and student t test to test significance of parameters.

RESULTS

The prevalence of anemia is shown in (Table 1), of total sample of 40 subjects anemia was prevalent in 57.5% (n = 23) of individuals. Anemic status was further categorized to mild, moderate, severe based on hemoglobin percentage. Of the total sample one third of the subjects (n = 13) 32.5% were moderately anemic.

Assessment of xerostomia status showed xerostomia (Table 2) was prevalent in 75% (n = 30) of total sample. Association between anemia and xerostomia status showed significant positive correlation (p = 0.04) between anemia and xerostomia (*see* Table 1).

Though a significant correlation is seen between anemia and log of candidal units (*see* Table 2) there is no statistical significance (p = 0.091). Correlation between socioeconomic



Fig. 1: Saliva sampling using oral rinse technique

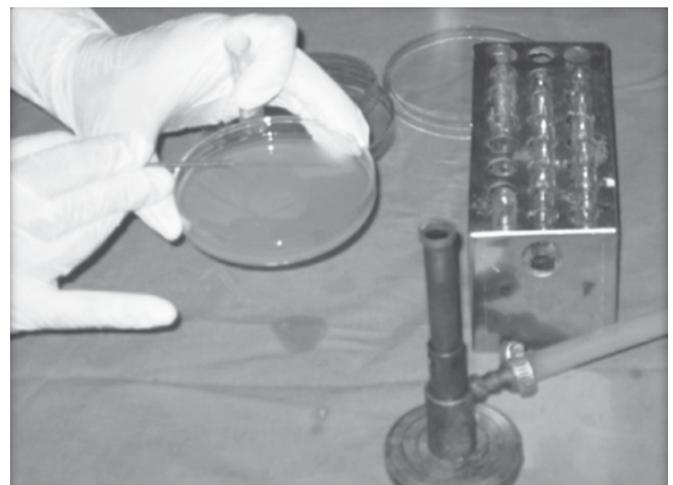


Fig. 2: Streaking the sample on to the agar plates

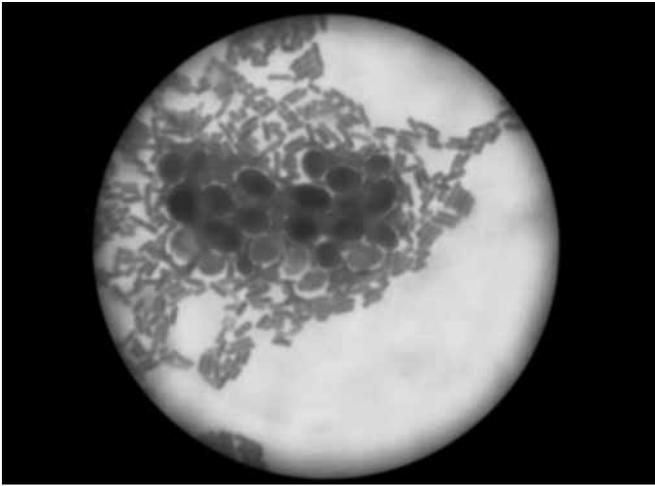


Fig. 3: Candidal colonization identified with PAS stain

status with the variables (xerostomia score and candidal counts) showed no significant positive correlation (Table 3).

DISCUSSION

Natural menopause is defined as spontaneous cessation of menstruation for 12 consecutive months at 45 to 55 years of age.¹³ The female hormone estrogen influences many physiological and psychological functions. Oral discomfort such as burning sensations has long been reported to be strongly associated with menopause. Xerostomia is a common clinical complaint in these individuals.¹⁴ This is said to predispose to oral infections like candidal infections.

Oral dryness attributed to undetermined qualitative changes in salivary composition or changes in mucosal sensory manifestations supported correlation between estrogen deficiency and oral changes seen during menopause.¹⁵⁻¹⁷

First case with oral symptom of dry mouth in postmenopausal women was reported in literature by Ziskin and Moulton et al in year 1946.¹³ Literary review shows very few studies identifying the effect of menopause on oral health. Yelsan et al reported higher DMFT values in postmenopausal women.¹⁸ Sema dural et al found decreased salivary pH and oral hygiene as risk factors for poor oral health in postmenopausal women.¹⁹

Owing to limited number of studies signifying effect of menopause on oral health, this study intended to assess oral health among postmenopausal women of different socioeconomic statuses as low socioeconomic status is thought to be one of the contributing factor for deprived oral health.²⁰

Massler et al¹³ in year 1951 demonstrated that 93% of subjects with oral complaint of dry mouth were of postmenopausal age group signifying the prevalence of xerostomia in postmenopausal women. Our study showed 75% of sample had oral dryness which is significantly higher compared to 43% subjects showing dry mouth in study conducted by Wardrop²¹ et al in 1989.

Postmenopausal women are frequently more anemic.²² WHO defines anemia as a condition in which hemoglobin content of blood is lower than normal as a result of deficiency of one or more essential nutrients, regardless of the cause of such deficiencies.²⁰ Prevalence of anemia is best determined by a reliable method of measuring hemoglobin percentage. In earlier studies tallquist method and sahli's method have been used for hemoglobin estimation but these methods were not highly sensitive²² hence cyanomethemoglobin method of estimation was used in our study.

Table 1: Categorization of subjects as nonanemic and anemic subjects with status of oral dryness

		Log no. : candidal units		p-value
		Mean	SD	
Anemia	Nonanemic	4.17	0.57	0.091
	Anemic	4.49	0.57	

Table 2: Correlation between anemia and log of candidal units

		Xerostomia status				p-value
		Present		Absent		
		N	%	N	%	
Anemia	Nonanemic	10	33.3	7	70.0	0.049 (S)
	Anemic	20	66.7	3	30.0	

S: Significant

Table 3: Correlation between socioeconomic status with xerostomia score and candidal counts

SES		Log no. of candidal units		p-value	Xerostomia score		p-value
		Mean	SD		Mean	SD	
	Upper high class (3)	4.93	0.59	0.188	43.00	1.73	0.231
	High class (8)	4.07	0.48		25.63	11.78	
	Upper middle class (7)	4.36	0.64		32.86	18.42	
	Lower middle class (13)	4.52	0.54		33.85	11.14	
	Poor class (6)	4.06	0.50		31.83	7.73	
	Very poor class (3)	4.42	0.81		22.00	2.65	

In a study conducted in English speaking Caribbean women it was found, anemia was more prevalent in post-menopausal women with one of the contributory factor being socioeconomic status and poor literacy.²² Socioeconomic Status (SES) is an important determinant of standard of living and health status as it influences incidence and prevalence of various health conditions.²³ Socioeconomic status also influences social security in terms of accessibility, affordability, acceptability and actual utilization of various health facilities. According to Shezadi Sabah et al anemia was more commonly associated with low socioeconomic status.²⁴ Similarly in present study of total anemic subjects 56.5% belong to low socioeconomic group. The higher prevalence of anemia in these individuals can be attributed to lower standard of living, nutritional deprivation in these individuals.

66.7% of individuals with oral dryness were anemic which was significantly higher than nonxerostomic group with p-value = 0.049, demonstrating positive association between anemia and xerostomia which can be attributed to socioeconomic status of individuals and effect of menopause.

The mean of log score of *Candida* counts were higher among anemic than nonanemic individuals with no statistically significant difference noted.

The observations made from the study indicate that anemia and xerostomia were prevalent in the post-menopausal women. Association between anemia and xerostomia status showed a significant positive correlation (p = 0.04) in the present study. An association is identified between socioeconomic status, xerostomia score and Candidal counts) signifying the role of nutritional status in maintenance of oral health in this population.

This study emphasises that dental practitioners need to be aware about menopause and its oral manifestations to maintain appropriate oral health in these patients which in turn improves their systemic health.

CONCLUSION

Dental practitioners need to be aware about menopause and its oral manifestations as a possible risk factor for various oral health problems. Oral physicians should be vigilant and encourage postmenopausal women to seek appropriate oral healthcare which in turn improves systemic health. Further research is indicated to corroborate findings of this study, determine causes and investigate to improve oral health of postmenopausal women.

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