

Changing Trends in the Oral Mucosa of Geriatric Population - An Epidemiological Study

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Abstract

Objectives: To evaluate the prevalence of various oral mucosal lesions occurring in the geriatric population.

Study design: A cross-sectional study was conducted to assess the prevalence of various oral mucosal lesions occurring in the geriatric population from the outpatients attending to The Oxford Dental College and Hospital, Bangalore.

Material and Methods: The study sample included adults aged 50 years and above, who have come to the dental hospital for a routine dental check up (N=1000). Their oral cavity was screened, and the variations were recorded on a proforma.

Results: The study revealed that 89.4% had various changes in their oral cavity, of which 53.9% was found in 51-60 years; slight female predilection (58.4%) was observed. Among various oral mucosal changes, the statistically significant ones were the oral lichenoid reaction, median rhomboid glossitis, oral submucous fibrosis, mucous membrane pemphigoid, lingual varices, tobacco pouch keratosis and xerostomia.

Conclusion: The findings of the present study provide information on the prevalence of normal variations and oral changes among the elderly dental patients. The study findings also concluded that most of these patients had no awareness of the lesions seen in their oral cavity.

Keywords: elderly, oral mucosal lesions, prevalence

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INTRODUCTION

It was rightly said, "Mouth is referred to as a mirror of overall health"¹. Oral health is an integral part of general health. Statistics show about 7.7% of the Indian population is elderly. ² These individuals are more susceptible to oral cavity changes or diseases which eventually interfere with their daily

activities. Poor oral health poses several problems for their general health, causing a lot of discomfort and pain which in turn affects mastication, swallowing and speech. ³

Various changes over time, including mucosal trauma, mucosal diseases, oral habits, and salivary gland hypofunction can alter the clinical appearance and character of the oral tissues in older adults. However, there are several factors other than age which act as correlating factors influencing the oral mucosal conditions such as; trauma, medications, oral and denture hygiene affecting the changes in the oral cavity. ⁴ As the age advances, the oral mucosa becomes more permeable to harmful substances and vulnerable to external carcinogens.⁵

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Most of the reported oral mucosal conditions in the elderly are benign in nature; however, some may become malignant, especially if local or systemic predisposing factors coexist. Leukoplakia and squamous cell carcinoma are few lesions to mention which are the greatest concerns among the elderly. WHO has adopted several measures to improve the oral health worldwide in the older age group as the oral lesions and their treatment needs vary from nation to nation. ⁶

The present study was undertaken as there are very few studies reported in the literature on the oral conditions affecting the older age group from the Asian countries with the present sample size (N=1000).

MATERIALS AND METHODS

The study population consisted of 1000 patients, 552 were males, and 342 were females with subjects aged 50 years and above who attended the Department of Oral Medicine & Radiology; The Oxford Dental College and Hospital (Bangalore, India) for a routine dental check up. A written informed consent form was obtained from all the patients, before the inclusion in the study. Dental and general medical history of the patients was recorded on a proforma after a thorough oral examination. The following elements were included in the proforma: Age, OPD number, gender, the general status of the patient, any systemic diseases, medications used, alcohol and tobacco consumption, habits, and prosthetic or other appliances use. When clinical features were not diagnostic, a biopsy was undertaken. Clinical examination was performed according to the WHO guidelines. ⁴

During the clinical examination the following elements were analysed:

1. Patient's oral cavity: whether it was normal or had any variations,
2. Changes such as lesion's anatomical location,
3. Lesion's extension,
4. Etiological factors or any related factors like the use of prosthesis,
5. Any deleterious habits like alcohol, smokeless or smoking form of tobacco present.

A final diagnosis was rendered by correlating the etiological factor, associated with the lesion and then lesions were classified. A biopsy was performed to render a final diagnosis and to rule out any dysplasias present. All the changes were noted on a proforma and were tabulated.

Data obtained was analysed by the Pearson's chi-square test and Fischer's exact test, logistic regression was done by SPSS software.

RESULTS

In a sample of 1000 patients, there were 552 males and 342 females. Patients having significant variations in the oral mucosa were 894 (89.4%), and 106(10.60%) subjects did not have any such variations and were statistically significant ($p<0.001$), thus the prevalence of oral mucosal lesions observed were 89.4% shown in Table I.

The included sample size was categorized into 4 age groups, 51-60 years (53.90%) 61-70 years (22.90%) 71-80 years (8.70%) > 80 years (0.9%). The prevalence of oral mucosal conditions was 53.90% in the 51-60-year-old group, 22.90% among 61-70 years, 8.70% in 71-80 age groups and 0.9% above 80 years of age. In addition, the youngest age group (51-60 years) had a significantly higher number of oral mucosal conditions (53.90%) than the other groups (25.9% in the 61-70 years and 8.7% in the 71-80 years and the least above 80 years (0.3%) ($p<0.001$).

Two hundred and forty-six patients had deleterious habits like smoking, tobacco and areca nut chewing. Out of 246 patients, 231 had significant oral findings, and 15 did not reveal any changes. Smokers with oral changes were 49.8% compared with 60% of who did not show any significant findings.

Table II illustrates the distribution of various oral mucosal conditions in relation to age. There was a significant increase in the incidence of lichenoid reaction, median rhomboid glossitis, oral submucous fibrosis, mucous membrane pemphigoid, sublingual varices, tobacco pouch keratosis, xerostomia with age. Sublingual varices were observed to be 67% ($p=0.02$) in the 71-80 year-old group compared with 63.8% in the 61-70-year-old group. Lichenoid reaction and mucous membrane pemphigoid were 11.1% ($p<0.001$). Tobacco pouch keratosis and xerostomia were seen in 22.2% ($p<0.001$). Oral submucous fibrosis was detected in 4.5% of the 71-80-year-old group ($p=0.02$) followed by Median rhomboid glossitis which was 2.91% ($p=0.002$) in the 61-70-year-old group compared to 1.1% in the 71-80 year-old group.

Table III shows the distribution of various oral mucosal manifestations in relation to gender. Thirty-six various oral mucosal conditions were observed. The most common finding was sublingual varices (62.8%) in the males ($p=0.001$) followed by anemic stomatitis in the females (2.8%) with a p-

value of 0.01. Smoker's melanosis and smoker's palate were seen significantly in males, 2.5% and 1.5% respectively ($p=0.001$ and $p=0.01$).

In females, the other common oral mucosal conditions seen were atrophic tongue ($p=0.02$) and denture-induced stomatitis; ($p= 0.004$). Oral lichen planus, a premalignant lesion was seen significantly in 1.27% women ($p=0.04$) compared with 0.2% in the men. In the present study, 13 cases of squamous cell carcinoma were observed out of which 10 were noted significantly in the females; ($p=0.008$). Histopathological studies confirmed the diagnosis of carcinoma in these cases.

DISCUSSION

The number of individuals aging is steadily increasing around the globe due to better living conditions and several advances in medicine and therapeutics. Oral health determines the general

health and also well being of any individual. The incidence and prevalence of oral mucosal conditions is a very important parameter for the evaluation of the general health of an individual especially in the elderly.⁷

The prevalence of oral mucosal conditions in the elderly subjects (89.4%) is much higher than the results of other epidemiological studies done in the literature; this could be due to the various changes occurring in the oral mucosa due to ageing. Jainkittivong et al⁸ reported an overall prevalence of 83.6% similar to our study. Patil et al reported 64%⁹ of oral mucosal conditions which were lower than the reported results. Mujica et al¹⁰ observed the incidence of oral changes to be 15.5% in the elderly patients which was much lower than the present study results. Gonzalez et al¹¹ demonstrated a prevalence of 23.2% in the Mexican population which was in contrast with the present study.

Table I. Gives the Prevalence of Oral Mucosal Conditions in Relation to Age and Gender

| Age Group | Oral Mucosal Conditions | | | | | | No Oral Mucosal Conditions | | | | | | c ² Value | P-Value |
|-----------|-------------------------|--------|---------|--------|-------|--------|----------------------------|-------|---------|--------|-------|--------|----------------------|---------|
| | Males | | Females | | Total | | Males | | Females | | Total | | | |
| | n | % | n | % | n | % | n | % | n | % | n | % | | |
| 51-60 yrs | 308 | 51.08% | 231 | 58.78% | 539 | 53.90% | 42 | 6.92% | 46 | 11.70% | 88 | 8.80% | | |
| 61-70 yrs | 169 | 28.03% | 90 | 22.90% | 259 | 25.90% | 12 | 1.98% | 5 | 1.27% | 17 | 1.70% | | |
| 71-80 yrs | 69 | 11.44% | 18 | 4.58% | 87 | 8.70% | 1 | 0.16% | 0 | 0.00% | 1 | 0.10% | 22.246 | <0.001* |
| >80 yrs | 6 | 1.00% | 3 | 0.76% | 9 | 0.90% | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% | | |
| Total | 552 | 91.54% | 342 | 87.02% | 894 | 89.40% | 55 | 9.06% | 51 | 12.98% | 106 | 10.60% | | |

Table II. Gives the Distribution of Various Oral Mucosal Conditions in Relation to Age

| Conditions | 51-60 yrs [N=627] | | 61-70yrs [N=276] | | 71-80 yrs [N=88] | | >80 yrs [N=09] | | c ² Value | P-Value |
|--------------------------------|-------------------------------|------|---------------------|------|---------------------|------|-------------------|-------|----------------------|---------|
| | n | % | n | % | n | % | n | % | | |
| | Anemic glossitis + stomatitis | 12 | 1.9% | 2 | 0.7% | 1 | 1.1% | 0 | | |
| Angular cheilitis | 0 | 0.0% | 1 | 0.4% | 0 | 0.0% | 0 | 0.0% | 2.626 | 0.45 |
| Aphthous ulcers | 1 | 0.2% | 2 | 0.7% | 0 | 0.0% | 0 | 0.0% | 2.370 | 0.49 |
| Atrophic tongue/ depapillation | 7 | 1.1% | 2 | 0.7% | 1 | 1.1% | 0 | 0.0% | 0.405 | 0.93 |
| Burning mouth syndrome | 3 | 0.5% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1.790 | 0.61 |
| Candidiasis | 1 | 0.2% | 4 | 1.4% | 0 | 0.0% | 0 | 0.0% | 6.948 | 0.07 |
| Cheilitis granulomatosa | 0 | 0.0% | 1 | 0.4% | 0 | 0.0% | 0 | 0.0% | 2.626 | 0.45 |
| Chemical burn | 2 | 0.3% | 1 | 0.4% | 1 | 1.1% | 1 | 11.1% | 1.347 | 0.71 |
| Chronic Lingual Papillosis | 4 | 0.6% | 6 | 2.2% | 1 | 1.1% | 1 | 11.1% | 4.257 | 0.23 |
| Coated Tongue | 14 | 2.2% | 8 | 2.9% | 6 | 6.8% | 0 | 0.0% | 6.231 | 0.10 |

| | | | | | | | | | | |
|---|-----|-------|-----|--------|----|-------|----|-------|---------|---------|
| Cysts & Tumours | 4 | 0.6% | 2 | 0.7% | 0 | 0.0% | 0 | 0.0% | 0.673 | 0.88 |
| Denture induced stomatitis | 4 | 0.6% | 0 | 0.0% | 2 | 2.3% | 0 | 0.0% | 5.864 | 0.11 |
| Denture-related ulcer | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fibrous hyperplasias | 6 | 1.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 3.591 | 0.3 |
| Fissured Tongue/Mid Line Fissures | 139 | 22.2% | 74 | 26.81% | 18 | 20.5% | 4 | 44.4% | 4.952 | 0.17 |
| Fordyce Granules | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Frictional keratosis | 0 | 0.0% | 1 | 0.4% | 0 | 0.0% | 0 | 0.0% | 2.626 | 0.45 |
| Geographic Tongue | 6 | 1.0% | 5 | 1.81% | 1 | 1.1% | 0 | 0.0% | 1.296 | 0.73 |
| Hairy Tongue | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hemangioma + AV malformation | 0 | 0.0% | 2 | 0.72% | 0 | 0.0% | 0 | 0.0% | 5.257 | 0.15 |
| Herpetic stomatitis/herpes labialis | 4 | 0.6% | 1 | 0.36% | 0 | 0.0% | 0 | 0.0% | 0.832 | 0.84 |
| Leukoedema | 7 | 1.1% | 4 | 1.45% | 2 | 2.3% | 0 | 0.0% | 0.980 | 0.80 |
| Leukoplakia + Erythroplakia | 36 | 5.7% | 10 | 3.62% | 6 | 6.8% | 0 | 0.0% | 2.726 | 0.43 |
| Lichen planus | 4 | 0.6% | 2 | 0.72% | 0 | 0.0% | 0 | 0.0% | 0.673 | 0.88 |
| Lichenoid reaction* | 2 | 0.3% | 0 | 0.00% | 0 | 0.0% | 1 | 11.1% | 36.272 | <0.001* |
| Median rhomboid glossitis* | 1 | 0.2% | 8 | 2.90% | 1 | 1.1% | 0 | 0.0% | 14.631 | 0.002* |
| Mucocele | 1 | 0.2% | 1 | 0.36% | 1 | 1.1% | 0 | 0.0% | 2.535 | 0.46 |
| Oral submucous fibrosis(OSMF) * | 14 | 2.2% | 0 | 0.0% | 4 | 4.5% | 0 | 0.0% | 9.641 | 0.02* |
| Paan chewer's mucosa | 3 | 0.5% | 2 | 0.7% | 0 | 0.0% | 0 | 0.0% | 0.773 | 0.85 |
| Mucous membrane pemphigoid * | 0 | 0.0% | 0 | 0.0% | 1 | 1.1% | 1 | 11.1% | 59.356 | <0.001* |
| Smoker's melanosis | 10 | 1.6% | 4 | 1.5% | 1 | 1.1% | 0 | 0.0% | 0.259 | 0.96 |
| Smoker's palate | 3 | 0.5% | 6 | 2.2% | 0 | 0.0% | 0 | 0.0% | 7.152 | 0.06 |
| Squamous cell carcinoma | 10 | 1.6% | 2 | 0.7% | 1 | 1.1% | 0 | 0.0% | 1.274 | 0.73 |
| Sublingual Varicosity/Varices* | 347 | 55.3% | 176 | 63.8% | 59 | 67.0% | 4 | 44.4% | 9.111 | 0.02* |
| Tobacco pouch keratosis +tob induced keratosis* | 10 | 1.6% | 0 | 0.0% | 0 | 0.0% | 2 | 22.2% | 38.793 | <0.001* |
| Traumatic fibroma | 11 | 1.8% | 4 | 1.4% | 1 | 1.1% | 0 | 0.0% | 0.401 | 0.94 |
| Traumatic ulcer | 1 | 0.2% | 2 | 0.7% | 0 | 0.0% | 0 | 0.0% | 2.370 | 0.49 |
| Xerostomia* | 3 | 0.5% | 1 | 0.4% | 0 | 0.0% | 2 | 22.2% | 131.358 | <0.001* |
| Dysguesia | 1 | 0.2% | 0 | 0.0% | 1 | 1.1% | 0 | 0.0% | 4.488 | 0.21 |

Table III. Gives the Distribution of Various Oral Mucosal Conditions in Relation to Gender

| Conditions | Total [N=1000] | | Males [N=607] | | Females [N=393] | | c ² Value | P- Value |
|---------------------------------|----------------|-------|---------------|------|-----------------|-------|----------------------|----------|
| | n | % | n | % | n | % | | |
| Anemic glossitis + stomatitis* | 15 | 1.50% | 4 | 0.7% | 11 | 2.80% | 7.394 | 0.01* |
| Angular cheilitis | 1 | 0.10% | 0 | 0.0% | 1 | 0.25% | 1.546 | 0.39 |
| Aphthous ulcers | 3 | 0.30% | 1 | 0.2% | 2 | 0.51% | 0.945 | 0.56 |
| Atrophic tongue/ depapillation* | 10 | 1.00% | 2 | 0.3% | 8 | 2.04% | 7.014 | 0.02* |
| Burning mouth syndrome | 3 | 0.30% | 0 | 0.0% | 3 | 0.76% | 4.648 | 0.06 |

| | | | | | | | | |
|---|-----|--------|-----|-------|-----|--------|--------|--------|
| Candidiasis | 5 | 0.50% | 2 | 0.3% | 3 | 0.76% | 0.903 | 0.38 |
| Cheilitis granulomatosa | 1 | 0.10% | 1 | 0.2% | 0 | 0.00% | 0.648 | 1.00 |
| Chemical burn | 4 | 0.40% | 1 | 0.2% | 3 | 0.76% | 2.146 | 0.30 |
| Chronic Lingual Papillosis | 11 | 1.10% | 8 | 1.3% | 3 | 0.76% | 0.674 | 0.54 |
| Coated Tongue | 28 | 2.80% | 22 | 3.6% | 6 | 1.53% | 3.857 | 0.05 |
| Odontogenic Cysts & Tumours | 6 | 0.60% | 2 | 0.3% | 4 | 1.02% | 1.895 | 0.21 |
| Denture-induced stomatitis* | 6 | 0.60% | 0 | 0.0% | 6 | 1.53% | 9.323 | 0.004* |
| Denture-related ulcer | 0 | 0.00% | -- | -- | -- | -- | -- | -- |
| Fibrous hyperplasias | 6 | 0.60% | 4 | 0.7% | 2 | 0.51% | 0.090 | 1.00 |
| Fissured Tongue/Mid Line Fissures | 235 | 23.50% | 146 | 24.1% | 89 | 22.65% | 0.262 | 0.64 |
| Fordyce Granules | 0 | 0.00% | -- | -- | -- | -- | -- | -- |
| Frictional keratosis | 1 | 0.10% | 1 | 0.2% | 0 | 0.00% | 0.648 | 1.00 |
| Geographic Tongue | 12 | 1.20% | 7 | 1.2% | 5 | 1.27% | 0.029 | 1.00 |
| Hairy Tongue | 0 | 0.00% | -- | -- | -- | -- | -- | -- |
| Hemangioma + AV malformation | 2 | 0.20% | 1 | 0.2% | 1 | 0.25% | 0.096 | 1.00 |
| Herpetic stomatitis/herpes labialis | 5 | 0.50% | 2 | 0.3% | 3 | 0.76% | 0.903 | 0.38 |
| Leukoedema | 13 | 1.30% | 7 | 1.2% | 6 | 1.53% | 0.259 | 0.77 |
| Leukoplakia + Erythroplakia | 52 | 5.20% | 36 | 5.9% | 16 | 4.07% | 1.673 | 0.24 |
| Lichen planus* | 6 | 0.60% | 1 | 0.2% | 5 | 1.27% | 4.906 | 0.04* |
| Lichenoid reaction | 3 | 0.30% | 1 | 0.2% | 2 | 0.51% | 0.945 | 0.56 |
| Median rhomboid glossitis | 10 | 1.00% | 7 | 1.2% | 3 | 0.76% | 0.366 | 0.74 |
| Mucocele | 3 | 0.30% | 1 | 0.2% | 2 | 0.51% | 0.945 | 0.56 |
| Oral submucous fibrosis(OSMF) | 18 | 1.80% | 12 | 2.0% | 6 | 1.53% | 0.274 | 0.80 |
| Paan chewer's mucosa | 5 | 0.50% | 1 | 0.2% | 4 | 1.02% | 3.489 | 0.08 |
| mucous membrane Pemphigoid | 2 | 0.20% | 1 | 0.2% | 1 | 0.25% | 0.096 | 1.00 |
| Smoker's melanosis* | 15 | 1.50% | 15 | 2.5% | 0 | 0.00% | 9.860 | 0.001* |
| Smoker's palate* | 9 | 0.90% | 9 | 1.5% | 0 | 0.00% | 5.880 | 0.01* |
| Squamous cell carcinoma * | 13 | 1.30% | 3 | 0.5% | 10 | 2.54% | 7.815 | 0.008* |
| Sublingual Varicosity/Varices* | 586 | 58.60% | 381 | 62.8% | 205 | 52.16% | 11.058 | 0.001* |
| Tobacco pouch keratosis+tob induced keratosis | 12 | 1.20% | 7 | 1.2% | 5 | 1.27% | 0.029 | 1.00 |
| Traumatic fibroma | 16 | 1.60% | 11 | 1.8% | 5 | 1.27% | 0.442 | 0.61 |
| Traumatic ulcer | 3 | 0.30% | 3 | 0.5% | 0 | 0.00% | 1.948 | 0.28 |
| Xerostomia | 6 | 0.60% | 2 | 0.3% | 4 | 1.02% | 2.454 | 0.29 |
| Dysgeusia | 2 | 0.20% | 2 | 0.3% | 0 | 0.00% | 1.297 | 0.52 |

CHANGES OBSERVED IN THE ORAL CAVITY



1. SMOKER'S MELANOSIS



2. ANEMIC GLOSSITIS



3. TRAUMATIC ULCER



4. LINGUAL VARICES

These variations could be due to different methodology strategies used by different countries and regions. Very few authors have recorded normal oral mucosal changes and also the variations seen, hence the study was under taken.

The present study reports a higher incidence of oral mucosal conditions in the younger age group 51-60 years followed by 61-70 year old group and the old age group, this could be due to the changing environmental conditions, nutrition intake, physical activity and various dental materials used these days. Jainkittivong et al.⁸ reported a higher incidence in the older age group, which is in contrast with our study.

In the present study we found an increasing evidence of sublingual varices in the 71-80 years-old age group followed by 61-70 years, similar to Jainkittivong et al.⁸ and Kaplan et al.¹² This could be due to the physiological age-related degeneration, which occurs due to the loss of connective tissue tone that supports the blood vessels which is more prevalent in the older age groups.

According to gender distribution, studies have not demonstrated any differences in the oral conditions.¹³⁻¹⁵ Mosqueda et al.¹⁶ reported a female preponderance similar to the present study. Gonzalez et al.¹¹ and Mujica et al.¹⁰ in 2008 also observed a slight female preponderance (58.78%) in their study similar to our study. The reason could be, poor water and food intake, post menopause and also psychological stress which can make them more vulnerable to all these changes.

About denture stomatitis and atrophic tongue, our findings were consistent with Thomson et al.¹⁷ and Bohmer et al.¹⁸.

We found that tobacco-related lesions like smoker's melanosis, smoker's palate, tobacco pouch keratosis were associated with males, probably because of the higher use of tobacco among the males which was consistent with the studies done by Bhatnagar et al.¹⁹ Saraswathi et al.²⁰ and Sujatha et al.²¹. We also observed oral lichen planus more in women than men, probably due to the stress and hormonal imbalances which were

consistent with the findings seen by Luciana Correa et al.²² and J Scott et al.²³.

In the present study, thirteen patients were diagnosed with squamous cell carcinoma (SCC) as these patients were totally unaware of the changes which were occurring in their oral cavity, similar to the study of Espinoza et al¹⁴ yet this frequency was higher than the reports by Jainkittivong et al⁸.

Although most of the oral mucosal changes observed, were benign in nature there were few premalignant and malignant lesions and conditions; they will indeed pose several difficulties to this select group of the population. Oral mucosal changes cause a change in their lifestyle affecting the quality of life of these patients. Hence a periodic and a thorough oral screening and an examination are highly required for the geriatric population.

CONCLUSION

To conclude, the present study has provided data about the epidemiologic aspects of oral mucosal conditions in the geriatric population and also the changing trends in the oral mucosal changes as the individuals' age. This data helps in the appropriate planning of the future health studies in this select group of the population. As the people are ageing, proper oral health care services have to be provided adequately to improve their oral health status. Several community-based studies and programs are the need of the hour to prevent diseases associated with the oral cavity. As most of the elderly patients are unaware of the changes taking place in their oral cavity, proper awareness and screening must be done to prevent any premalignant or malignant lesions and conditions. This can prevent the process of malignant transformation and improves the general well-being of these individuals.

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