Frequency of Oral Anatomic Variations and Mucosal Lesions Among a Defined Group of Elderly Dental Patients in Iran

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Background: Aging and its consequences has been a major population problem around the globe.
Objectives: This study aimed to determine the prevalence of anatomical variations and pathological lesions of oral mucosa among elderly dental patients.
Patients and Methods: We conducted this study on elderly patients who had attended Oral Medicine Department of Shahid Beheshti University of Medical Sciences, Dental School, Tehran, Iran. In total, 129 consecutive patients of 60 years of age or older were interviewed and clinically investigated for the presence of oral mucosal alterations. Lesions without definite clinical diagnoses were examined histopathologically. Data were analyzed by the Chi-square test and logistic regression by means of the SPSS software version 18.
Results: Out of the 129 elderly participants, aged between 60-87 years (mean: 66.71 ± 6.21), males constituted 58.1% (n = 75) of patients and female were 41.9% (n = 54). Normal variations of oral mucosa were observed in 62% (n = 80) of patients, while 44.2% (n = 57) had oral mucosal lesions. Normal variations were significantly associated with smoking (OR = 1.2), while denture wearers were at higher risk of oral pathological lesions (OR = 1.5). Meanwhile, the frequency of normal variations in men was 1.3 folds higher than that of women (P = 0.04).
Conclusions: The frequency of normal variations and oral lesions among elderly dental patients is high, and this is significantly associated with smoking, denture wearing and male sex.

Keywords: Aged; Anatomic Variation; Mouth; Frequency

1. Background

Aging and its consequences is a major population problem around the globe. According to the World Health Organization (WHO) predictions, the proportion of older adults is increasing around the world from 10.5% in 2007 to 21.8% in 2050. During the recent two decades, Iran has also been facing population aging (1). The immunity of oral mucosa, tissue healing and regeneration is compromised in older people (2).

The prevalence of oral mucosal changes has been reported as 50 - 98% in the elderly (3-7), and 15 - 30% in the general population (8-10). The most frequent senile pathology and physiological changes in the oral mucosa are denture stomatitis (3-5, 11), and sublingual varicosity (3-5), respectively. In the general population, Fordyce granules are considered as the most frequent normal variation (12). More often, prevalent oral diseases take place over the age of 40, so that 90% of leukoplakias, many cases of oral cancer, and pemphigus appear in older people (13, 14).

Dealing with aging has imposed many challenges on governments and communities all around the world. Lack of financial support and appropriate health planning programs make it difficult to manage the problem of oldness in the current century (1). Despite several studies in different countries, scarce concise information is available regarding the health status of senior citizens, which is partly due to their inability to participate in epidemiological studies (15). Moreover, most previous studies have been conducted on statistically atypical populations such as those residing at sanitariums, which might affect the results and lead studies to report higher frequency of changes erroneously (16). On the other hand, in many researches, dental, periodontal or oral mucosal lesions were addressed alone, and the prevalence of normal variations as well as systemic diseases and medications were out of focus.

Only limited information about oral mucosal alterations or conditions among the elderly Iranian population is available (1, 6, 7).

2. Objectives

The purpose of this study was to determine the frequency of normal anatomic variations and pathologic changes in oral mucosa of elderly patients attending a dental school.

3. Patients and Methods

The target population in this cross-sectional study was patients of 60 years of age and over seeking dental and oral treatment at the Department of Oral and Maxillofacial Medicine, Shahid Beheshti University of Medical Sciences Dental School (Tehran, Iran) in 2011. Considering a power of 90% and significance level of less than 5% and the probability of 40% for the study consequences, the sample size was measured as 129 using the Power and Sample Size Software. With regards to the high number of different referrals to our center from various districts of Tehran (the capital city of Iran) and even from other cities of Iran, sample selection was carried out using the convenient and consecutive method. Patients unable to communicate, such as handicapped individuals, and those not willing to cooperate were excluded from the study. Variables of age, sex, marital status, occupation, level of education, history of systemic diseases, medications, and smoking habits were recorded via interviews. Patients were grouped into three categories in terms of smoking habits: nonsmoker, light smoker (5 - 15 pack/year), and heavy smoker ($\geq$ 20 pack/year). Thereafter, a pre-trained senior dental student examined the patients under the supervision of a professor. Oral examination was undertaken using two plain mouth mirrors and gauze compresses under artificial light with the elderly patients sitting on the dental seat. The dentition system was evaluated, and the edentulous patients were asked to remove their denture(s) (if any) to examine the underlying tissues more accurately. Oral mucosal changes were divided into two main categories: normal variations (conditions even with a well-established pathogenesis that presented no health impairment, required no treatment, and were very common and not hazardous to total health) (3) and pathological lesions (originating from pathological processes with a specific etiology, treatment modality or prognosis) (3). The lesions were in turn categorized to five subgroups of white and mixed red-white, red and vesiculo ulcerative, exophytic, pigmented, and denture-related lesions. The diagnosis of oral mucosal alterations were made based on history, clinical features according to the WHO definitions (17) and histopathological investigations when the final diagnosis could not be achieved through clinical examination. Lesions were regarded as denture-related if they were localized on the oral mucosa covered by removable prostheses, and if there was no other obvious explanation (3). The results of interviews and oral examinations were recorded in anonymous data forms, accordingly. A comprehensive explanation regarding the necessity and the process of the study was made for each patient before entering the study, and all participating patients signed an informed written consent form. In addition, the committee of medical ethics of Shahid Beheshti University of Medical Sciences approved the study procedure, which was consistent with the World Medical Association Declaration of Helsinki. Data was analyzed by the chi-square test, and logistic regression by means of the SPSS software (SPSS, Inc. Chicago, IL) version 18. P values of less than 5% were considered significant.

4. Results

Out of the 129 elderly participants with age ranging between 60-87 years (mean: 66.71 ± 6.21), male constituted 58.1% (n = 75) of patients were and women 41.9% (n = 54). Furthermore, 64.3% of patients (n = 83) had at least one systemic disease, whereas 35.7% (n = 46) were disease-free. Cardiac disease, hypertension, and diabetes mellitus were found as common systemic diseases among our patients (Table 1).

Of the total sample, 81.4% (n = 105) were nonsmokers, 10.9% (n = 14) light smokers, and 7.8% (n = 10) heavy smokers. None of the patients used smoke-less tobacco. Moreover, consumption of alcohol was not mentioned by our patients.

Table 1. Frequency of Systemic Diseases Among Elderly Dental Patients [a]

Systemic Disease	Frequency
Cardiac disease and hypertension	66 (51.2)
Diabetes mellitus	25 (19.4)
Gastrointestinal disease	8 (6.2)
Orthopedic disease	8 (6.2)
Renal disease	6 (4.7)
Thyroid disorders	5 (3.9)
Respiratory disease	5 (3.9)
Neurologic disease	2 (1.6)
Rheumatologic disease	2 (1.6)
Psychological disease	1 (0.8)
Blood dyscrasia	1 (0.8)
Others	1 (0.8)

[a] Data are presented as No. (%).

Table 2. Frequency of Oral Normal Variations Among Elderly Dental Patients [a]

Normal Variation	Frequency
Sublingual varicosity	36 (27.9)
Fordyce granules	36 (24.8)
Coated tongue	26 (20.2)
Torus palatinus	12 (9.3)
Fissured tongue	4 (3.1)
Torus mandibularis	3 (2.3)
Hairy tongue	3 (2.3)
Geographic tongue	1 (0.8)
Total	80 (62.0)

[a] Data are presented as No. (%).

Oral examination revealed that 62% of patients (n = 80) had at least one normal variation with sublingual varicosity being the most prevalent entity (27.9%), followed by Fordyce granules (24.8%), and coated tongue (20.2%) (Table 2). In addition, patients with systemic diseases showed more frequency of normal variations (P = 0.3) and pathologic lesions (P = 0.9) than healthy contributors.

Pathological lesions were noticed in 44.2% of patients (n = 57) (Table 3). Red and vesiculo ulcerative lesions were seen in 13.2% of patients followed by angular cheilitis (5.4%), aphthous ulcers (3.1%) and herpetic stomatitis (3.1%).

White and red-white lesions were observed in 12.4% of patients, with lichen planus (4.7%) and frictional keratosis (3.9%) being the most frequent entities. Leukoplakia was seen in one patient (0.8%).

Fifteen patients had at least one denture-related lesion, of which the most frequent lesion was denture stomatitis (9.3%).

Table 3. Frequency of Oral Pathological Changes Among Elderly Dental Patients [a]

Pathologic Lesions	Frequency
Red and vesiculo ulcerative lesions	
Angular cheilitis	7 (5.4)
Aphthous ulcers	4 (3.1)
Herpetic stomatitis	4 (3.1)
Pemphigoid	1 (0.8)
Traumatic ulcer	1 (0.8)
Atrophic tongue	1 (0.8)
Total	17 (13.2)
White and red-white lesions	
Lichen planus	6 (4.7)
Frictional keratosis	5 (3.9)
Lichenoid reaction	2 (1.6)
Leukoplakia	1 (0.8)
Morsicatio	1 (0.8)
Nicotinic stomatitis	1 (0.8)
Total	16 (12.4)
Denture-related lesions	
Denture stomatitis	12 (9.3)
Frictional keratosis	2 (1.6)
Denture-related ulcer	1 (0.8)
Total	15 (11.6)
Pigmented lesions	
Smokers' melanosis	7 (5.4)
Petechiae	3 (2.3)
Hematoma	2 (1.6)
Melanotic macule	1 (0.8)
Total	14 (10.9)
Exophytic lesions	
Squamous cell carcinoma	3 (2.3)
Mucocele	3 (2.3)
Peripheral giant cell granuloma	2 (1.6)
Total	8 (6.2)

[a] Data are presented as No. (%).

Pigmented lesions were found in 10.9% of patients with smokers' melanosis (5.4%) being the most common lesion.

Eight patients (6.2%) had exophytic lesions, with mucocele being the most prevalent entity (2.3%) followed by peripheral giant cell granuloma (PGCG) (1.6%) (Table 3).

Of the total sample, 105 (81.4%) were nonsmokers, 14 (10.9%) were light smokers, and 10 (7.8%) were heavy smokers. According to the logistic regression, there was a significant association between frequency of oral normal variations and smoking (P = 0.04) (OR = 1.2).

Men had a 1.3 fold higher frequency of oral normal variations than women (P = 0.04), however no significant association was found between frequency of normal variations and marital status, level of education, job, systemic disease, medications and age (P > 0.05).

Sixty-three patients (48.8%) were denture-wearers, and 66 (51.2%) had no dentures. According to the logistic regression, a significant association was found between the frequency of pathological changes and denture wearing (P = 0.02), so that denture users showed a 1.5 fold higher occurrence of oral lesions than the other cases.

5. Discussion

One trained examiner under the close supervision of an experienced professor did all the diagnostic processes in order to decrease systematic errors. Clinical diagnosis was based on a universally approved criteria established by WHO (17). Meanwhile, we used investigations such as biopsy to confirm clinical diagnoses, where applicable.

The overall frequency of oral mucosal changes including normal variations and pathological lesions was measured as 81.4%, which was similar to studies by Rabiei et al. (6), Jainkittivong et al. (5), and Ferreira et al. (3), while in contrast with studies by Pentenero et al. (11), Cebeci et al. (8) and Al-Mobeeriek (9). In the latter studies, oral changes were assessed for all age groups, whereas in our study only elderly dental patients were examined in whom oral mucosal changes are expected to be more common.

The frequency of normal variations was 62%, similar to the study of Ferreira et al. (3), yet Cebeci et al. (8) reported far less prevalence of such changes, which may be due to their population being of different age groups.

Consistent with studies by Jainkittivong et al. (5), Ferreira et al. (3) and Mozafari et al. (7), oral mucosal pathological lesions were noticed in 44.2% of patients, which was comparable to that reported by Mujica te al. (57%) (10), and very different from reports by Al-Mobeeriek (15%) (9) and Shulman et al. (28.24%) (16). The latter studies were done on different age groups including young adults and middle-aged people, while our patients were mainly older patients in whom oral mucosal changes were more anticipated.

Denture-related lesions were found in 11.6% of our patients, of which the most prevalent lesion was denture stomatitis. The results were in accordance with studies by Jainkittivong et al. (5), Espinoza et al. (4), Mujica et al. (10),

Ferreira et al. (3), Rabiei et al. (6) and Mozafari et al. (7). Meanwhile, a significant relationship existed between frequency of oral pathological changes and denture wearing as shown by Jainkittivong et al. (5), Espinoza et al. (4), Pentenero et al. (11) and Ferreira et al. (3).

Leukoplakia was seen in 0.8% of our patients similar to the study by Cebeci et al. (8). However, Jainkittivong et al. (5), Mujica et al. (10) and Ferreira et al. (3) reported higher frequencies of this lesion. The differences were attributable to variations in smoking habits, consumption of smoke-less tobacco preparations, and alcohol drinking between the studied populations.

In our study, three patients (2.3%) were diagnosed with squamous cell carcinoma (SCC) similar to the study of Espinoza et al. (4), yet this frequency was higher than reports by Jainkittivong et al. (5), Ferreira et al. (3) and Cebeci et al. (8). As the present study was performed on patients who had referred to our dental school to treat their oral lesions, the higher frequency of SCC in our patients is justified. According to the results of the present study, smoking and male sex are associated with increased risk of having oral normal variations, while wearing dentures increases the risk of oral mucosal lesions.

This study was conducted on patients that had visited our dental school to seek treatment services; hence the study sample was not fully representative of the general population. Therefore, more comprehensive research with random sampling and greater sample size should be done to elucidate the prevalence rate of senile oral changes in the Iranian population. Moreover, since the study was cross-sectional, it can be used to explore only associations, not casual relationships.

In conclusion, the frequency of oral mucosal variations and pathological changes are high among elderly dental patients, which are related significantly to smoking, male sex, and wearing dentures. More comprehensive studies in this regard and health programming for elderly people seem mandatory.

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Authors' Contributions

Study concept and data analysis: Mahin Bakhshi. Data collection: Zahra Hassani. Data interpretation: Maryam Tofangchiha. Drafting and critical revision of the manuscript: Maryam Baharvand.

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