

Clinical and Radiographic Findings in Older and Non-older Patients Applying to the Faculty of Dentistry

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Abstract

Objective: This study aimed to evaluate intraoral, extraoral, and radiographic findings in the jaws of older adults and compare these findings with those of a control group of non-elderly individuals.

Materials and Methods: Seven hundred randomly selected patients above 18 (350 older adults, 350 non-older) comprised the study population. A questionnaire consisting of 21 questions was used. Intraoral, extraoral, and radiographic examinations were conducted.

Results: Most older adults (85.1%) patients had at least one systemic disease. This proportion was 31.4% in non-older patients ($p < 0.001$). The majority of elderly (90.3%) patients and the control group (77.1%) reported that they did not regularly go to the dentist ($p < 0.001$). The most common intraoral finding in both the older adults and the control group was inflamed gums and periodontal problems. The most common extraoral finding in older adults (42.4%) was pain and sound in the temporomandibular joint and lymphadenopathy (71.7%) ($p = 0.001$) in the control group. The radiographic findings showed that the number of impacted teeth and caries was significantly higher in the non-older group ($p < 0.05$).

Conclusion: It is important to perform a more careful dental examination on older patients than is required for non-older individuals because these patients have more systemic diseases, a history of drug use, and inadequate oral hygiene.

Keywords: Dental caries, elderly, general health, oral mucosal lesion

Introduction

The average life span is increasing in industrialized and developed countries because of advances in medicine and the reduction in fertility. Hence, the geriatric population will increasingly attend dental offices in the future. Old age is a process of changes that leads to decreased functional capacity in tissues and organs. Both systemic and oral health deteriorate with age. For this reason, the decrease in functional abilities and the frequent occurrence of health problems among older adults have revealed the necessity for more consciously approaching older individuals and their problems. It is important for oral epidemiological investigations related to oral health in the older adults. Although there are studies in the literature related to the oral health status of older adults, no studies have compared the

clinical and radiographic findings of oral health in the older and non-older populations (1).

Interactions always affect each other' oral/dental and medical health. Systemic conditions such as atherosclerotic disease, pulmonary disease, and diabetes mellitus that oral health status can either coincidentally or causally impact (2).

Many studies worldwide have documented poor oral health due to the high prevalence of coronal and root caries, tooth loss and edentulousness, periodontal diseases, and oral mucosal lesions, and an unacceptable level of oral hygiene in older dental patients (1,3-7). Poor oral health may be due to a lack of awareness regarding oral hygiene and its importance as well as an inability to access oral health services for restorative care in addition to systemic diseases and medications (7). Regular

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patient contact is required to detect oral diseases as early as possible (1).

Treatment planning for older dental patients must include an understanding of the chronic diseases that the patient lives with, as this plays a critical role in the acceptance and success of dental treatment plans. Radiographic examination is important for detecting pathologic findings that may affect the patient's general health or dental treatment plan. Panoramic radiography is an imaging modality that is extremely important in the diagnosis and treatment of many oral and maxillofacial diseases and is routinely used in dental clinics for treatment planning (8). The panoramic radiographs (PR) of older adults have been used to evaluate changes in the gonial angle and height of the mandibular bone with aging and indexes such as the mandibular index (9-13). Other studies have been conducted on specific subjects, such as maxillary sinus findings (14), the anatomy of the mid-palatal suture (15), and the elongated styloid process (16). In addition to oral manifestations such as caries and mucosal lesions in elderly individuals, findings such as cysts, tumors, and impacted teeth in their jaws have not received adequate attention in previous studies. There are only a few studies related to this issue (17,18).

This study aimed to evaluate oral manifestations and radiographic findings in older patients and compare them with those in a control group of non-older individuals. In this way, there will be an increase in epidemiological knowledge about oral health in the older population, which can be used for related future planning in this group.

Materials and Methods

Süleyman Demirel University Faculty of Medicine Clinical Research Ethics Committee approved this study (decision number: 69, date: 21.03.2018). Seven hundred random patients above the age of 18 who applied to the department of dentomaxillofacial radiology were included in this study. The informed consent form was read and signed by the participants to inform them about the study purpose and methodology.

A questionnaire consisting of 21 questions about the patient's sociodemographic characteristics, the reason for applying, general health status, history of drug use, oral hygiene practices, dental prosthesis use, and smoking or alcohol habits was used. Intraoral, extraoral, and radiographic examinations were performed. The number of natural teeth, caries, tooth loss, filled teeth, implants, tooth abrasions, mucosal lesions, and tongue lesions, as well as periodontal health, infection, and the presence of abscesses and fistula, were evaluated during the intraoral examination. The mucosal lesions, red-blue lesions, white lesions, vesiculobullous lesions, ulcerated lesions, pigmentation, and variants of normality were examined. In the extraoral examination, the presence of temporomandibular joint

(TMJ) disease, lymphadenopathy, and swelling were evaluated. PR of the participants taken for various reasons were examined. All PR images were acquired using the same digital panoramic machine: the Promax (Planmeca, Helsinki, Finland) operated at 66 kV, 8 mA, and 16 s exposure time. On the PR, caries, periapical lesions, bone loss, sclerosis, impacted teeth, persistent root, bone components of the TMJ, stylohyoid ligament, soft tissue calcification, and the presence of cysts and tumors were recorded.

To eliminate individual differences, a questionnaire and physical examinations (intraoral, extraoral and radiological) were performed by one researcher (SSY is three years of experience). Patients were divided into two groups (350 geriatric patients aged 65 and over and 350 adult patients aged 18-65). The decayed, missing, and filled teeth (DMFT) index was used to assess oral health. Index calculations were performed with 32 teeth, including the third molars.

Statistics

SPSS software (SPSS 17.0 for Windows; SPSS Inc., Chicago, IL, USA) was used for statistical analyses, and $p < 0.05$ was considered statistically significant. Descriptive statistics and the Pearson's chi-square test were used to evaluate the data.

Results

The study sample consisted of 350 (47.4% women, 52.6% men) older patients and 350 (47.1% women, 52.9% men) non-older patients. The mean age was 70.91 ± 5.5 years (min 65, max 95) in the older patients and 33.7 ± 12.5 years (min 18, max 63) in the non-older patients. The majority of elderly participants (55.4%) were primary school graduates. Non-elderly participants were mostly (42.9%) university graduates. The majority of elderly (85.1%) patients had at least one systemic disease, whereas only 31.4% of non-older patients ($p < 0.001$) had at least one systemic disease. It was determined that cardiovascular system disease was the most common illness in both older (60.6%) and non-older (39.4%) patients ($p < 0.001$) (Table 1).

Approximately 79.1% of older patients and 20.9% of the control group stated that they used drugs ($p < 0.001$). The percentage of older adults using anticoagulants was 32.3%, whereas the percentage of those using anticoagulants in the control group was 2.6%. While the rate of smoking was 8% in older adults, it was 34.3% in non-older patients. Rates of oral hygiene and other habits according to groups are presented in Table 2. It was determined that the frequency of toothbrushing and the mean number of teeth increased with education level in the study population ($p < 0.001$). While 19.7% of the older patients did not have any fixed or removable prosthesis, the presence of a fixed prosthesis was in the majority (33.7%). Most of the control group (76.9%) did not have any fixed or removable prosthesis

($p < 0.001$). While 62.6% of older patients reported having dry mouth, only 32.9% of the patients in the control group had dry mouth ($p < 0.001$). The number of patients with complaints of bad breath was higher in the control group (44.3%) than in the older group (34.3%). The frequency of dry mouth complaints was higher in older patients with endocrine system diseases and who received chemotherapy and radiotherapy for cancer ($p < 0.001$).

Extraoral findings were present in 13.7% of older patients and 23.1% of the control group ($p = 0.001$). The most common extraoral finding in older patients (42.4%) was pain and sound related to TMJ. In the control group, the most common extraoral examination finding was lymphadenopathy (71.7%) ($p = 0.001$) (Table 3). The most common intraoral finding in both the

older patients and the control group was inflamed gums and periodontal problems. The prevalence of oral mucosal lesions was 82.6% in the older group. Intraoral findings according to groups are presented in Table 3.

Although the average number of teeth was 14.6 ± 9.1 in the elderly group, 27.1 ± 5 teeth in the non-older group. Forty-four older (14.6%) and five control (1.4%) patients were edentulous. The mean number of teeth, mean number of decayed teeth, and mean number of filled teeth were higher in the control group than in the older adults ($p < 0.001$). The DMFT value was 20.2 in the older group, which was higher than that in the non-older group (9.9). The mean number of implants and crown-bridged teeth was higher in the older group ($p < 0.05$). In radiographic

Table 1. The distribution of systemic diseases according to groups

	Older adults n (%)	Non-older n (%)	p
Cardiovascular disease	212 (60.6)	138 (39.4)	0.00**
Respiratory disorders	46 (13.1)	7 (2)	0.00**
Endocrine disorders	118 (33.7)	35 (10)	0.00**
Hematologic disorders	6 (1.7)	17 (4.9)	0.01*
Genitourinary disorders	27 (7.7)	3 (0.9)	0.00**
Neuropsychiatric disorders	39 (11.1)	17 (4.9)	0.002*
Musculoskeletal disorders	24 (6.9)	9 (2.6)	0.006*
Alergia	12 (3.4)	18 (5.1)	0.17
Gastrointestinal disorders	23 (6.6)	9 (2.6)	0.009*
Dermatological disorders	4 (1.1)	3 (0.9)	0.5
Cancer, radiotherapy, chemotherapy	25 (7.1)	2 (0.6)	0.00**
Eye disorders	7 (2)	3 (0.9)	0.17
Ear disorders	8 (2.3)	0	0.004*

* $p < 0.05$, ** $p < 0.001$

Table 2. Habits of oral hgyiene and the other habits according to groups

	Older adults n (%)	Non-older n (%)	p
Tooth brushing habit			
Once a day	87 (24.9)	107 (30.6)	0.00**
Twice a day	69 (19.7)	115 (32.9)	
Three times a day	8 (2.3)	16 (4.6)	
After every meal	3 (0.9)	3 (0.9)	
1-2-3 per week	21 (6)	17 (4.9)	
If you remember	67 (19.1)	65 (18.6)	
Doesn't brush at all	51 (14.6)	22 (6.3)	
Dental floss use	17 (5.5)	41 (11.7)	0.00**
Reasons for applying to our clinic (the most common answer)	To make a dental prosthesis 106 (36)	Dental pain 126 (30.3)	0.00**
Regularly dentist visit	316 (90.3)	270 (77.1)	0.00**
When was the last time you went to the dentist? (the most common answer)	2-5 years ago 110 (31.4)	0-1 month ago 76 (24.9)	0.01*
Bruxism	42 (12)	99 (28.4)	0.27

* $p < 0.05$, ** $p < 0.001$

findings, the number of impacted teeth and caries in the non-older group, were statistically significantly higher than those in the older group ($p < 0.05$). The radiographic findings are presented in Table 4.

Discussion

According to the results of the study, a more careful dental examination should be performed on older patients than is required on non-older individuals because these patients have more systemic diseases, a history of drug use, and inadequate oral hygiene.

One of the criteria of optimal aging is to maintain a natural, functional dentition throughout life. Poor oral health has already been determined in older patients due to conditions such as a high incidence of missing teeth, caries, periodontal diseases, tooth wear, and inadequate connection with the dentist. Although there are many studies regarding the oral health status of the elderly (2,5,7,8), no study has compared older adults with non-older patients. This study compared extraoral and intraoral findings, dental habits, demographic data, general health status, and radiographic findings of elderly and non-older patients.

Table 3. Extraoral and intraoral findings according to groups

	Older adults n (%)	Non-older n (%)	p
Extraoral findings			
Lymphadenopathy	17 (28.3)	43 (71.7)	0.00**
Pain and sound in TMJ	28 (42.4)	38 (57.6)	0.14
Swelling	3 (0.4)	0	0.12
Intraoral findings			
Periodontal problem	304 (86.9)	346 (98.9)	0.00**
Caries	190 (54.3)	251 (71.7)	0.00**
Tooth wear	198 (56.6)	50 (14.3)	0.00**
Red-blue lesions	144 (41.1)	41 (11.7)	0.00**
White lesions	24 (6.9)	30 (8.6)	0.24
Vesiculo-bullous lesions	5 (1.4)	11 (3.1)	0.10
Ulcerated lesions	18 (5.1)	13 (3.7)	0.23
Pigmentation	38 (10.9)	34 (9.7)	0.35
Variant of normal	75 (21.4)	123 (35.1)	0.00**
Abscess-fistula	15 (4.3)	15 (4.3)	0.57
Tongue lesions	192 (54.9)	131 (37.4)	0.00**
Lesions related to prosthesis	40 (11.4)	2 (0.6)	0.00**
Infection-related lesions (such as alveolitis, pericoronitis, osteomyelitis)	6 (1.7)	38 (10.9)	0.00**

** $p < 0.001$
TMJ: Temporomandibular joint

Table 4. Radiographic findings according to groups

Radiographic Findings	Older adults n (%)	Non-older n (%)	p
Caries	211 (60.3)	257 (73.4)	0.001*
Periapical lesion	139 (39.7)	113 (32.3)	0.02*
Bone loss (horizontal or vertical)	339 (96.9)	187 (53.4)	0.00**
Impacted tooth	21 (6)	129 (36.9)	0.00**
Embedded residual root	44 (12.6)	19 (5.4)	0.001*
Internal-external root resorption	2 (0.6)	8 (2.3)	0.05
Changes in TMJ bone structures (such as sclerosis, flattening)	139 (39.7)	110 (31.4)	0.01*
Soft tissue calcifications	85 (24.3)	51 (14.6)	0.001*
Stylohyoid ligament calcification	264 (75.4)	274 (78.3)	0.21
Cyst-tumor	9 (2.6)	8 (2.3)	0.50

* $p < 0.05$, ** $p < 0.001$
TMJ: Temporomandibular joint

Treatment requirements are high due to the increasing older population and their poor oral health. Oral health is part of a patient's general health, and it has been reported that poor oral-dental status is associated with general health in older patients (19,20). It is important to understand the relationship between oral health and systemic disease to prevent the onset or worsening of chronic systemic disease. The prevalence of systemic chronic diseases was quite high among older adults, and they consume more medications than individuals in other age groups. The prevalence of chronic diseases ranges from 54.6% to 90% in older dental patients in Turkey (7,21,22). In this study, this rate was 85.1% in older adults and 31.4% in non-older patients. The literature reported that the highest incidence of disease in older adults is in the cardiovascular system; this study finds the same. Cardiovascular system diseases were more prevalent than other diseases in both older adults and non-older patients in this study. Excessive smoking (34.3%) in non-older patients may be the cause of their cardiovascular system diseases.

Polypharmacy, which causes important problems such as increased healthcare costs, adverse drug reactions, and drug-drug interactions, is an expanding concern among older adults (23). The incidence of Turkey's population aged 65 years and over receiving at least one prescription medication was quite high (65-85%); this is similar to other countries in the world (7,24-26). The prevalence of drug use was determined as 79.1% in older adults and 20.9% in non-older patients.

In this study, the use of anticoagulants was specifically questioned because it is important for dental practices due to bleeding complications (27). Since the prevalence of thromboembolic events increases with age, anticoagulant use has been more prevalent in older patients than in non-elderly patients. The prevalence of anticoagulant use in older adults (32.3%) was much higher than in non-elderly patients (2.6%). Previous studies have reported that the incidence of tooth loss is high in older adults, and this has a significant effect on oral health and quality of life (28,29). Factors associated with tooth loss in older adults included systemic diseases that caused inadequacy in providing oral hygiene and affected oral tissues with chronic systemic inflammation, periodontitis, unrestorable teeth (either from fractures or deep root caries), and various medications and treatments that caused dry mouth and education level (30). Approximately 30% of the population aged 65-74 years is edentulous, as the World Health Organization reported in 2015 (31).

Edentulism causes aesthetic problems and affects functional abilities such as speaking and chewing (32). The prevalence of edentulism in the older population has shown a decreasing tendency in recent years. Although the rate of edentulousness in the older population was 75% in 1990 in Turkey, this rate has

been reported as being between 11.6% and 67.4% in studies conducted since then (7,8,33-36). The different rates between studies may be due to the use of different study populations in the studies (7,8,33-36). In this study, the edentulous rate was 14.6% in older adult patients and 1.4% in the control group.

In older adult people, the inadequacy of oral hygiene habits can result from low education levels and conditions such as systemic diseases (musculoskeletal diseases, ophthalmologic problems, etc.) that negatively affect the patient's manipulation ability (37). The reasons for poor oral health can include not visiting the dentist regularly, in addition to inadequate oral hygiene habits (38). The majority of both study groups reported not visiting the dentist regularly. The majority of the older adult reported brushing their teeth once a day, whereas the control group mostly brushed their teeth twice a day. Studies in the literature (39,40) have reported that the proportion of partially dentate or edentate elderly is more than non-older people, similar to our study. Therefore, the use of removable dental prostheses in older adults is also increasing. We are more likely to encounter poor oral health due to gingivitis, periodontitis, and root caries resulting from plaque accumulation and lack of oral hygiene practices in older adults who use removable dental prostheses. In this study, most of the older adult patients using removable prostheses were using partial dentures, whereas most of the control group did not have any fixed or removable prostheses (41).

Dry mouth or xerostomia, a subjective feeling, may be caused by medications, systemic diseases such as Sjögren's syndrome, diabetes mellitus, psychological factors, dehydration, and head and neck radiotherapy. It is a frequent complaint in the older population; however, it can occur at any age. Dry mouth was higher in the elderly who had endocrine system diseases who received chemotherapy and radiotherapy for cancer. However, a comparison of epidemiological estimates from studies on older populations concluded that approximately 1 in 5 older people suffer from dry mouth (42,43). In this study, dry mouth complained in the majority of older patients, similar to previous studies, but not in the control group. Dry mouth prevalence was found higher (62.6%) than in the studies in the literature (10% to 38%) in the older adult population. The cause of this condition may be the level of medication use and disease in elderly individuals. The other reason may be the number of removable dentures used in the majority of older adults. Arslan et al. (43) reported a significant association between problems associated with dentures and dry mouth among older adults with dentures.

Aging oral mucosa is more permeable to detrimental factors and more inclined to a mechanical hazard. Oral mucosal lesion risk increases the presence of removable dentures and dry mouth (22). The literature has stated that there is a wide variation in the

prevalence of oral mucosal lesions in older adults, ranging from 2.4% to 98%. A universally accepted classification system for oral mucosal lesions is not available, which may be the reason for this difference among the studies (44). In the present study, this prevalence was 82.6%, which was more than non-elderly. Similar to several previous studies, the present study found that tongue lesions were the most prevalent lesions among oral mucosal lesions. The literature has shown that tongue lesions constitute the majority of oral mucosal lesions, and their prevalence varies in different parts of the world (45-47).

It has been reported that the TMJ degenerates with age, similar to other joints. The prevalence of temporomandibular disorders in older adults is relatively high, but the clinical symptoms are minimal. However, it was reported that approximately 45-70% of older adults had degenerative changes in the TMJ, as perceived by radiological examination (48). In the present study, 39.7% of older adults had degenerative changes in the TMJ on radiological examination, and this rate was higher than that of non-older patients (31.4%).

Previous studies have stated that temporomandibular disorder symptoms tend to decrease with age; nevertheless, pain and sound in the TMJ were the most common findings in extraoral examination in elderly patients compared with non-older patients; this is similar to several previous studies (49,50). Because panoramic radiography imaging is quick and simple, it is a well-suited diagnostic tool for evaluating dental and jawbone changes in older adults. Recent studies have reported that dental diseases, especially ones such as apical periodontitis, are risk factors for some systemic diseases commonly found in the elderly, like coronary artery disease and diabetes mellitus. In the present study, the prevalence of periapical radiolucencies was 39.7% in older adults and 32.3% in non-older adults. Cardiovascular system disease was the most common, both in older adults and non-older individuals. However, edentulous was more common in the elderly. The prevalence of periapical radiolucencies ranging from 18% to 41% in older adults has been reported (18,51).

The prevalence of residual roots in older adults ranges from 4% to 18% (18,47). It was 12.6 % in older adults, similar to studies in the literature, and 5.4 % in non-older in the present study. The rates of impacted teeth in studies ranged from 6.4% to 15%, which is more than in the present study (18,51). In the present study found 6% in the elderly patients and 36.9% in the non-older patients. The different rates in the studies may be due to the difference in the number of elderly patients studied. However, the high rate of edentulism in older adults and the extraction of impacted teeth before the construction of removable dentures may explain the high rate of impacted teeth in non-older people.

Study Limitations

The number of the study population was a little low. Studies with a larger patient population should be conducted to represent the older population.

Conclusion

It is important to perform a more careful dental examination in older adults than in non-older individuals because these patients have more systemic diseases, drug use, and do not have adequate oral hygiene. This is particularly true because the risk of oral cancer increases with age, making it essential to not miss an examination of the oral mucosa and to perform a complete radiological evaluation. Therefore, the development of geriatric dentistry can be achieved by taking license lessons and increasing dentists' awareness during training.

Ethics

Ethics Committee Approval: Süleyman Demirel University Faculty of Medicine Clinical Research Ethics Committee approved this study (decision number: 69, date: 21.03.2018).

Informed Consent: The informed consent form was read and signed by the participants to inform them about the study purpose and methodology.

Authorship Contributions

Concept: E.B., Design: Ö.G., Data Collection or Processing: S.S.Y., Analysis or Interpretation: E.B., Literature Search: E.B., Ö.G., Writing: E.B.

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