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Intra-oral findings and general health conditions among institutionalized and non-institutionalized elderly in Greece

Dimitris Triantos

Stomatologist, Private Practice Limited to Oral Medicine, Athens, Greece

BACKGROUND: The aim of the study was to record the findings from intra-oral examination and the general health conditions encountered in a group of Greek individuals 65 years of age or older.

PATIENTS AND METHODS: The study subjects were derived from the elderly attending 12 randomly selected community centres located in Athens and neighbouring municipalities, consisting the non-institutionalized study group and from the elderly living in three ecclesiastical nursing homes, consisting the institutionalized study group. The research data comprised information from the subjects' interviews, self-defined health status, medical records and intra-oral examination on the following variables: sex, age, general health condition, dentate or not, use of dentures and oral conditions. Fisher's exact two-sided test was used for statistical analysis.

RESULTS: Overall, 316 patients were examined; 120 male (38%), 196 female (62%), mean age 78 years (range: 65–99). Of those, 150 were non-institutionalized (59 male, 91 female) and 166 institutionalized (61 male and 105 female). The vast majority (90%) of the patients had at least one general health problem, for which they were taking daily medication. Twenty-three different medical conditions were recorded. The most frequent medical problems were hypertension (56%), cardiovascular problems (41%), depression/anxiety (39%), arthritis (18.5%) and visual problems (16%). The vast majority of the study patients (79%) were edentulous, while 33% were not wearing or using their dentures. Almost half of them (47%) had at least one oral condition. Twenty-seven different oral conditions were recorded. The most frequent oral findings were denture-induced stomatitis (17.2%), dry mouth (14.6%), atrophy of tongue papillae (10.5%), fissured tongue (9.8%) and haemangioma (6.8%). No cases of malignant lesions were observed.

CONCLUSIONS: The present study confirms that in this particular age group, general health problems are frequent, variable, coexistent, necessitating the daily administration of multiple medications, while oral examination by a specialist is an essential part of the multidisciplinary medical care in this group of individuals.
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Introduction

The number of individuals over 65 years old is steadily increasing in almost all the countries, as a result of the improvement in living conditions and the medical advances in therapeutics (1, 2). According to the United Nations estimates, globally, the number of older persons will nearly triple, increasing from 606 million in 2000 to nearly 1.9 billion by 2050 (1). The elderly population in more developed regions has already surpassed the child population and by 2050, there will be two elderly persons for every child (1). The increase in the percentage of aged people who live longer has proportionally increase the need for continuous medical care for this age group.

During the past decades, multiple epidemiological studies have attempted to evaluate the oral health, mainly in aged people living in protected environments and having limited access to dental services, but also in elderly living independently in the society, in various countries such as Sweden (3), Denmark (4), Finland (5), Brazil (6), the USA (7), the UK (8), Israel (9), Hong Kong (10), Malaysia (11), Canada (12), Slovenia (13), Germany (14), China (15) or Chile (16).

The current research data suggest that oral lesions among elderly people are frequent and commonly related to the use of dentures (6, 17). The coexistence of multiple medical conditions might further complicate oral health (18–20). In a recent study (21), the majority of requested elderly believe that, oral health status is important to their quality of life, through a variety of physical, social and psychological ways.

Correspondence: Dr Dimitris Triantos, Kartali 6, Mavili Sq, 11528 Athens, Greece. Tel.: 0030-210-77-09-339. Fax: 0030-210-52-22-144. E-mail: dtriantos@hotmail.com
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With a focus on early detection and prevention of oral lesions, dental practitioners as oral health care providers can improve the quality of life of this population and aid in the attainment of successful ageing (20), especially when, general doctors might not feel confident in examining the oral cavity or consider, they had not sufficient training in this examination (22).

As in other countries, the proportion of the older population in Greece has dramatically increased the last three decades, with the percentage of individuals over 65 years old rising from 10.92% in 1971 to 17.08% in 2001 (2).

Because of the scarcity of pertinent to oral health research data from Greece, the aim of the study was to record the oral and general health conditions encountered in a group of Greek individuals 65 years of age or older, either living independently in the society (non-institutionalized) or living in nursing homes (institutionalized) in the broader region of Athens, capital of Greece and in three provincial large cities of Greece.

Patients and methods

The study subjects of the non-institutionalized group were derived from the elderly attending 12 randomly selected Community Open Care Centres (K.A.P.H), located in Athens and neighbouring municipalities; these are centres where aged people gather for social and entertainment purposes. Access to the premises was requested from the social workers in charge.

On the day of the examination, the author explained to the individuals the aim of the study, the importance of oral examination and the kind of oral health problems which usually arise with ageing. Written instructions on oral and denture hygiene measures were also provided. Any attending person over the age of 65 was asked to volunteer in the study. Prior to the clinical examination, medical data were collected through interviews between the participant elderly and the social worker.

Subsequently, the author, a clinician with special training in recognizing oral disorders, using a wooden spatula, a portable light and a mouth mirror, carried out an oral examination using previously established diagnostic criteria (3, 23).

Denture-induced stomatitis was diagnosed as proposed by Newton (24), namely, as localized or diffuse erythema involving a part of or the entire denture-covered mucosa or as granular or papillary inflammation involving the central part of the hard palate and alveolar ridge.

Dry mouth was assessed by the findings of the clinical examination of the mucosa as well as the symptoms of the patient such as: small or absent saliva pool in the floor of the mouth, frothy saliva, stickiness upon removal of dental mirror on the oral mucosa; shiny, smooth or atrophic oral mucosa; persistent daily feeling of dryness, drinking liquids overnight or as an aid in swallowing any food, etc.

Furthermore, under the general term exostoses were described non-pathological, localized bony protuberances, while dysgeusia was defined as a distortion of normal taste. Sublingual varicosities because of their high frequency with ageing were not included. Only clinically manifest lesions were recorded and as biopsies or other diagnostic tests were not performed, some of the diagnoses must be considered presumptive.

The study subjects of the institutionalized group were derived from three ecclesiastical Nursing Homes, located in three large provincial Greek cities: Chalkida, Tripolis and Kalamata. Permission was obtained from the Homes' Board Directors for conducting the survey. The information on the overall health and the administration of medications was provided by the residents' medical notes and nursing staff. The oral examination was carried out by the author as described earlier.

The research data derived from the subjects' interviews, self-defined health status, medical records and oral examination were on the following variables: sex, age, general health conditions, dentate or not, use of dentures and oral lesions. Fisher's exact two-sided test was used to assess, if between the two study groups, there were any statistically significant differences in the type and frequency of oral and general health conditions; the differences were considered at a 0.05 significant level.

Results

Individuals in the non-institutionalized group who were not interested to participate in the study either because they claimed they were busy with other activities on the day of the examination or they considered their oral health to be fine, were excluded from the study (60 of 210 attending individuals or 29%). Similarly, individuals in the institutionalized group, who were imbed and too ill or unable to communicate were excluded from the study (six of 172 individuals or 3%).

Overall, 316 patients were examined; 120 male (38%), 196 female (62%), mean age 78 years (range: 65–99). Of those, 150 (47.5%) were non-institutionalized [59 male, 91 female, mean age 74 years (range: 65–94)] and 166 (52.5%) institutionalized [61 male and 105 female, mean age 81 years (range: 65–99)]. The distribution of study patients by age group, sex, oral, dental and general health status is summarized in Tables 1 and 2.

The majority of the study patients (79%) were edentulous, while 33% did not have or use complete or partial dentures. Almost half of them (47%) have oral conditions (78% one, 17% two and 5% three). Twenty-seven different oral conditions were recorded. The most

Table 1 Distribution of the patients by sex and age group

	Male		*Female*		
Age group	*In*	*Non-in*	*In*	*Non-in*	*Total*
65–75	11	22	17	61	111 (35%)
76–85	21	31	49	25	126 (40%)
>86	29	6	39	5	79 (25%)
Total	120 (38%)		196 (62%)		316

In, institutionalized; non-in, non-institutionalized.

Table 2 Distribution of the study variables by study group

Groups	*Edentulous (%)*	*Use of dentures (%)*	*Oral lesions (%)*	*Medical problems (%)*
Institutionalized	88.5	46.5	46.2	93
Non-institutionalized	68	97	47.2	87
Total	79	67	47	90

Table 3 Type and frequency of oral conditions in the study patients

Oral condition	*Total, N (%)*	*In*	*Non-in*	*P-value*
1. Denture-induced stomatitis	33 (17.2)	16	17	0.713
2. Dry mouth	28 (14.6)	17	11	0.430
3. Atrophy of tongue papillae	20 (10.5)	14	6	0.164
4. Fissured tongue	19 (9.8)	10	9	>0.999
5. Haemangioma	13 (6.8)	9	4	0.265
6. Denture-induced hyperplasia	8 (4.2)	6	2	0.288
7. Denture-related mucosal petechiae	8 (4.2)	2	6	0.156
8. Oral melanotic macules	8 (4.2)	4	4	>0.999
9. Fordyce's condition	7 (3.7)	2	5	0.263
10. Traumatic ulcers	7 (3.7)	2	5	0.263
11. Geographic tongue	7 (3.7)	5	2	0.452
12. Fibroepithelial polyp	5 (2.6)	1	4	0.194
13. Erythematous candidosis	4 (2)	4	0	0.125
14. Median rhomboid glossitis	4 (2)	3	1	0.625
15. Exostoses	4 (2)	3	1	0.625
16. Lichen planus	3 (1.6)	1	2	0.606
17. Amalgam tattoo	2 (1)	0	2	0.225
18. Pyogenic granuloma	2 (1)	0	2	0.225
19. Burning mouth	2 (1)	0	2	0.225
20. Other*				
Total	192			

*From one lesion: frictional white lesion, mucocele, herpes labialis, smoker's keratosis of the palate, dysgeusia, exfoliative cheilitis, phenytoin-induced gingival hyperplasia, paralysis of hypoglossal nerve and atrophy of lingual muscles.
No statistically significant differences were observed between study groups ($P < 0.05$, Fisher's exact two-sided test).
In, institutionalized; Non-in, non-institutionalized.

frequent oral findings were denture-induced stomatitis (17.2%), dry mouth (14.6%), atrophy of tongue papillae (10.5%), fissured tongue (9.8%) and haemangioma (6.8%). No cases of malignant lesions were observed (Table 3).

The vast majority (90%) of the subjects had at least one general health problem for which they were taking daily medication. Twenty-three different medical conditions were recorded. The most frequent medical problems were hypertension (56%), heart problems (41%), depression/anxiety (39%), arthritis (18.5%) and vision problems (16%; Table 4).

Comparing the two groups, the institutionalized elderly were more medically complicated and, on average, they presented with four coexistent medical problems (comparing with two in the non-institutionalized group), more frequently were edentulous (88.5% when compared with 68% in the second group), while, less than half of them were using dentures (46.5% when compared with 97% in the second group). Regarding the frequency and the type of oral lesions recorded, no statistically significant differences were observed between the two study groups (Table 3), but they were observed in the type and frequency of general medical conditions, e.g. institutionalized patients were 15 times more likely to have depression and/or anxiety comparing with non-institutionalized patients (Table 4).

Table 4 Type and frequency of general conditions in the study patients

Medical condition	*Total, N (%)*	*In*	*Non-in*	*P-value*
1. Hypertension	159 (56)	76	83	0.093
2. Heart problems	117 (41)	73	44	0.008*
3. Depression/anxiety	112 (39)	99	13	<0.001*
4. Arthritis	54 (18.5)	36	18	0.025*
5. Vision problems	46 (16)	34	12	0.001*
6. Gastrointestinal problems	45 (15.7)	33	12	0.002*
7. Dyskinesia	44 (15.4)	43	1	0.003*
8. Diabetes	39 (13.8)	16	23	0.170
9. Neurological disease	35 (12.2)	27	8	0.002*
10. Respiratory problems	29 (10)	17	12	0.561
11. Hearing problems	28 (9.8)	20	8	0.047*
12. Cholesteraemia	20 (7.0)	2	18	<0.001*
13. Parkinsonism	18 (6.3)	17	1	<0.001*
14. Osteoporosis	16 (5.6)	3	13	0.008*
15. Thyroid disease	16 (5.6)	5	11	0.121
16. Haematinic deficiencies	11 (3.8)	6	5	>0.999
17. Dementia	10 (3.5)	10	–	0.002*
18. Prostate	9 (3.1)	2	7	0.091
19. Epilepsy	5 (1.15)	3	2	>0.999
20. Gout	4 (1.4)	4	–	0.125
21. Insomnia	4 (1.4)	4	–	>0.999
22. Cervical syndrome	3 (1.05)	–	3	0.106
23. Constipation	3 (1.05)	3	–	>0.999

In, institutionalized; Non-in, Non-institutionalized.
*Statistically significant differences were observed between study groups ($P < 0.05$, Fisher's exact two-sided test).

Discussion

Oral health is an important part of the quality of life of any individual. Oral lesions can cause discomfort or pain interfering with mastication, swallowing and speech, while symptoms such as halitosis, xerostomia or oral dysaesthesia can interfere with the daily social activities.

It is well known that ageing causes changes to oral mucosal epithelium, such as thinning and reduction of collagenesis, decreasing the ability to epithelial regeneration and subsequently, the resistance of the organism to any disease of microbial or traumatic in nature (25). So, it is not surprising that the majority of the elderly subjects of the present study experienced oral health problems. Indeed, the prevalence of oral mucosal lesions was high, because almost half (47%) of the patients exhibited one or more oral lesions, a prevalence within the range (22–61%) reported in previous studies in institutionalized as well as, non-institutionalized elderly (4, 5, 10–14, 16). Nevertheless, any comparison between epidemiological surveys is difficult, as they vary in the methodology, sample size and diagnostic criteria, while the inter-examiner variability causes further confusion.

A significant proportion of oral lesions encountered in the present study was related to the use of dentures, as expected, because the majority of the patients (79%) were edentulous. The prevalence of denture-induced lesions has been previously investigated in denture wearers of the general population (3), among elderly people in general (10, 12, 16), or those elderly living in institutions (4, 6) or attending for care specialized centres (8, 26).

Denture-induced stomatitis was the most frequent lesion (17%), an expected finding as suggested by other investigators (4, 6, 12, 16, 17, 26), although there are marked differences in the quoted prevalences.

Current thinking suggests an interplay of various factors in the pathogenesis of the disease, but the extent of interplay is still a controversy (27). *Candida albicans* has been implicated as the causative organism, however, in the light of recent research it is debatable whether or not, it is the only causative organism (27), as *Candida* is a common oral commensal, but only a proportion of denture wearers get the infection. Poor hygiene and continuous use of dentures are considered to be additional predisposing factors in the manifestation of the condition (28). Thus, it is important that, instructions related to denture hygiene measures are given to the elderly, and in those living in protected environments, the institutional staff must be instructed and trained in the necessary procedures (4). As recently shown (29), oral health care education programmes can improve caregivers' knowledge, attitudes and oral health care performance for functionally dependent elderly.

Furthermore, overextended denture flanges may cause mucosal ulceration and eventual hyperplasia, with proliferative fibrous tissue typically seen in the labial vestibule. In the present study, traumatic ulcers (3.7%), fibrous hyperplasia (4.2%), mucosal petechiae (4.2%) and frictional white lesion of the alveolar mucosa (0.52%) associated with denture wearing were also recorded. Of note, denture-induced stomatitis was not associated with angular cheilitis in any of the patient.

Overall, denture-induced oral lesions accounted for 29.8% of the total number of oral lesions. The institutionalized elderly were more frequently edentulous (88.5% when compared with 68% in the non-institutionalized group), while, less than half of them were using dentures (46.5% when compared with 97% in the non-institutionalized group) as a result of the general negligence for their oral health, which in turn, might represent a sign of resignation to physical deterioration (18).

Erythematous candidosis was present in 2% of the patients in the form of red asymptomatic patches of the buccal, lingual or palatal mucosa. Denture wearing, antibiotics, diabetes and xerostomia might represent the underlying predisposing factors for the manifestation of the condition in the study patients (28).

Xerostomia was the second commonest complaint (14.6) in the study population, a finding explained by the number of medical conditions encountered in the patients, necessitating the daily administration of multiple medications. Drugs with anticholinergic/parasympathetic activity are the main culprits, such as tricyclic antidepressants and antihypertensive drugs (30). Hypertension, depression and/or anxiety were indeed among the most frequent (56% and 39% respectively) medical problems encountered in the study population. Xerostomia can give rise to problems with mastication, swallowing and denture retention, while rendering oral mucosa more sensitive to any stimuli, adversely affecting oral health and the quality of life (31).

As previously mentioned, age-induced mucosal atrophy makes oral mucosa more vulnerable to the actions of external stimuli including carcinogens; thus, previous studies in elderly population has focused on precancerous and cancerous lesions (32). In the present study, no cases of malignant or pre-malignant lesions such as leukoplakia or actinic cheilitis were recorded; indeed, most oral lesions observed, as shown in Table 3, were relatively innocuous inflammatory, reactive or developmental processes, which do not necessitate immediate therapeutic intervention.

The present study additionally shows that although, the lifespan of the general population is increasing, the successful ageing is jeopardized by multiple systemic conditions which become more prevalent with age, causing impaired systemic health and adversely influencing the quality of life (19, 20). Indeed, the vast majority (90%) of the subjects had at least one general health problem for which they were taking daily medication, while 23 different medical conditions were recorded (Table 4). As, multiple medical conditions necessitate the simultaneous administration of multiple medications, it is becoming increasingly likely that the oral cavity would be the target organ for a number of diverse abnormalities that develop as side-effects (33).

Hypertension (56%) and heart problems (41%) were the most frequent medical problems in both groups of the elderly. Heart problems can complicate dental procedures as patients may be of risk of infective endocarditis, bleeding or myocardial infarction, while antihypertensive drugs can cause side-effects such as oral ulcers, salivary gland swelling or pain, angio-oedema, gingival hyperplasia, xerostomia, burning mouth or paraesthesiae (34).

Depression and/or anxiety were the third commonest medical conditions recorded in 39% of the study patients. Depression is already a major public health problem, as elderly people, who are at high risk for the disease, constitute an ever-expanding segment of the population (35). Depression is a mental illness in which mood, thought content and behavioural patterns are impaired, causing individual distress, compromising social function and impairing self-maintenance skills (e.g. oral hygiene), increasing the incidence of dental disease; thus, individuals with depressive symptoms report worse quality of life and self-reported oral health (35, 36). In addition, many medications used to treat the disease magnify the xerostomia while, depressed patients can manifest a range of orofacial symptoms such as atypical facial pain, oral dysaesthesia, temporomandi-

bular dysfunction syndrome, halitosis, taste disturbances, etc. (37).

Arthritis (18.5%), vision problems (16%) and moving difficulties (15.4%) were also frequent among study patients; such problems can affect elderly persons' abilities to maintain oral health, or may render them unable to have access to immediate dental treatment (38). Also frequent among study patients was diabetes, recorded in 13.8% of the patients, a condition which predisposes to oral complaints such as dry mouth, altered taste, burning sensation, salivary gland swelling, oral candidosis, while antidiabetic agents can give rise to oral ulcerations (39).

Conclusions

The present study demonstrated that among elderly people, either living in long-term care facilities or independently in the society, general health problems with possible oral complications are common, variable and coexistent, necessitating the daily administration of multiple medications. The prevalence of oral lesions is also high and although most of them are of minor clinical importance and require no treatment, they do require clinical attention and follow up. Regular oral examination by a specialist should be part of the continuous multidisciplinary medical care provided to this expanding age group of patients.

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