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Prevalence of oral lesions and chronic non-communicable diseases in a sample of Chilean institutionalized *versus* non-institutionalized elderly.

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Abstract: Chile is experiencing a process of demographic aging with an increase in the number of elderly people, a percentage of which resides in Long-term Establishments for the Elderly (LEE). However, there is little information on the reality of the elderly in these long-term care facilities, so this study was conducted to compare the epidemiological profile of the prevalent oral pathologies as well as chronic non-communicable diseases (NCDs), of institutionalized versus non-institutionalized elderly subjects. Seventy-six institutionalized and forty-three non-institutionalized subjects were examined intraorally, and their clinical health record, gender and age were obtained, according to inclusion/exclusion criteria. The results indicate that female gender is the most common, with an average age of 78.5 year, with those 80 years old and above comprising the predominant group. The most prevalent oral lesions within the institutionalized group were denture stomatitis and irritative hyperplasia, while in the non-institutionalized these two lesions were found less frequently. As for the presence of xerostomia, there was no difference between the groups. The most common condition in both groups was total maxillary and mandibular edentulous, with the latter variable present more frequently in the institutionalized group ($p<0.05$). The predominant NCD for both groups were arterial hypertension, arthritis-osteoarthritis and diabetes mellitus ($p>0.05$), and depression was the most prevalent NCD in the non-institutionalized group ($p<0.05$). This study provides valuable information on the epidemiology of elderly´s oral lesions and NCDs to inform the decision-making process of public health policies.

Keywords: Oral lesions; Elderly people; Institutionalized; Chronic non-communicable diseases.

INTRODUCTION.

Human aging is a dynamic, irreversible and progressive process in which all the cells of the organism undergo changes and deteriorate, altering the structure and vital functioning of the organs and tissues.[1] Morphological and functional changes also occur in the oral cavity during the aging process affecting chewing, reducing the epithelium of the tongue, decreasing salivary flow and remodeling the alveolar bone, among others.[2]

Aging is organized by society in differing ways, by classifying the subjects according to their age. The current ratio of elderly population (EP) to those younger than 15 years old is 1:2. It is estimated that by the 2025 this ratio will be 103:100, translated into 22% of the population estimate of 20 million inhabitants.[3] To address this increasing aging population, public policies designed to improve life quality comprise the monitoring

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of a series of medical conditions that represent current and future high demands, such as the treatment and control of chronic non-communicable disease (NCDs), hospital readmissions and oral disease, among others.[4]

In addition to the poor status of general health, there are other relevant problems confronted by the EP, such as solitude and poverty.[5] In several countries, there is lack of services, structured assistance programs or training of specialized health personnel to correctly deal with the challenge of aging and mostly with the increase in the number of institutionalized elderly (Available at: http://www.paho.org). In the case of Chile, a large percentage of the elderly reside in Long-term Establishments for the Elderly (LEE).

The LEE accommodates those individuals 60 years old and above, who require a protected environment and differentiated care according to their vulnerability.[6] Thus, they should receive the appropriate support services and long-term and quality care, according to their level of dependence and social risk.[7] The Chilean census of 2002 revealed a total of 1,668 LEE in the country; however, the total number of EP living in these institutions was unknown. Moreover, there was no information about the health status (such as the most common NCDs) and about prevalence of oral disease, among others. A new proposal established in 2013 indicated that competitive funds were to be transferred from the National Service for the Elderly (SENAMA) to non-profit LEEs, specifically targeting oral disease (Available at: https://www.contraloria.cl). Thus, it is considered relevant to know the current oral health state of this age group under the care of third parties.

The aim of this study was to evaluate the prevalence of oral lesions and chronic NCDs in a sample of Chilean institutionalized *versus* non-institutionalized elderly.

MATERIALS AND METHODS.

Design and subjects

This investigation corresponds to a descriptive cross-sectional study executed between March and July 2014 that included 2 recruitment periods (the first for the institutionalized subjects and the second for the non-institutionalized subjects). The sample size was defined using SAMPSIZE software (Health Services Research Unit, University of Aberdeen, Scotland UK), which determined a size of 203 EP, with a 95% confidence interval (DE: 2.85), 20% oversampling and 80% power.

The total population was comprised of 119 EP subjects (Chileans), men and women, 76 from four branches of an LEE located in the northern area of Santiago de Chile (institutionalized) and 43 non-institutionalized patients of the Universidad de Chile School of Dentistry (FOUCH).

The inclusion criteria were EP (60 years old or older), healthy or with living with mild disease managed by a medical doctor, categorized as class I and II according to the classification system of the American Society of Anesthesiologists (ASA), RP wearers, totally or partially edentulous and who accepted to participate in this study by means of a document of informed consent signed by the subject and/or an attorney. The exclusion criteria were not accepting to participate in the study and presenting mild or severe cognitive damage. At the end of the survey, a report was delivered to the Health Department responsible for the LEE, regarding the oral health of each subject, giving recommendations for the resolution of the identified oral health problems.

During the study, there were losses of institutionalized and non-institutionalized subjects due to illness, death (consequently, the information from these subjects was eliminated from the study) or the non-signing of the informed consent form (Figure 1).

This study was performed in accordance with the principles of the Declaration of Helsinki.

Data Collection

An intraoral examination (only one exposure EP, no follow-up) was performed to detect the presence of oral lesions, xerostomia and edentulism. The data collection instrument for these variables and to record the most common NCDs in the EP enrolled in this study was a previously validated clinical record.

The presence/absence of xerostomia was determined by the Fox test[8] and edentulism was defined by the Kennedy classification.[9]

An agreement between the examiners was determined for the diagnosis of the oral mucosa lesions, through an intra and inter-examiner calibration with a Kappa index 0.7 according to the criteria used by Espinoza *et al.*[10]

Statistics

The data obtained were processed using the Stata® SE v14 program. For the analysis of the variables, the Wilcoxon test was used to compare groups. For the categorical variables, frequencies and percentages were used. The statistical significance was set at $p<0.05$.

RESULTS.

Ninety-seven subjects were female (81.5%) and twenty-two male (18.5%). The average age of both groups was 78.5±9.2 years, with the following age ranges: 20 individuals (17.5%) between 60 and 69 years; 41 individuals (35.9%) between 70 and 79 years and 53 individuals (46.4%) 80 years old or above. Five subjects were eliminated from the study due to difficulties in obtaining information. When disaggregated by group, it was observed that 65 of the institutionalized subjects were female (86%) and 11 were male (14%). On the other hand, in the non-institutionalized group 32 subjects were female (74%) and 11 male (26%).

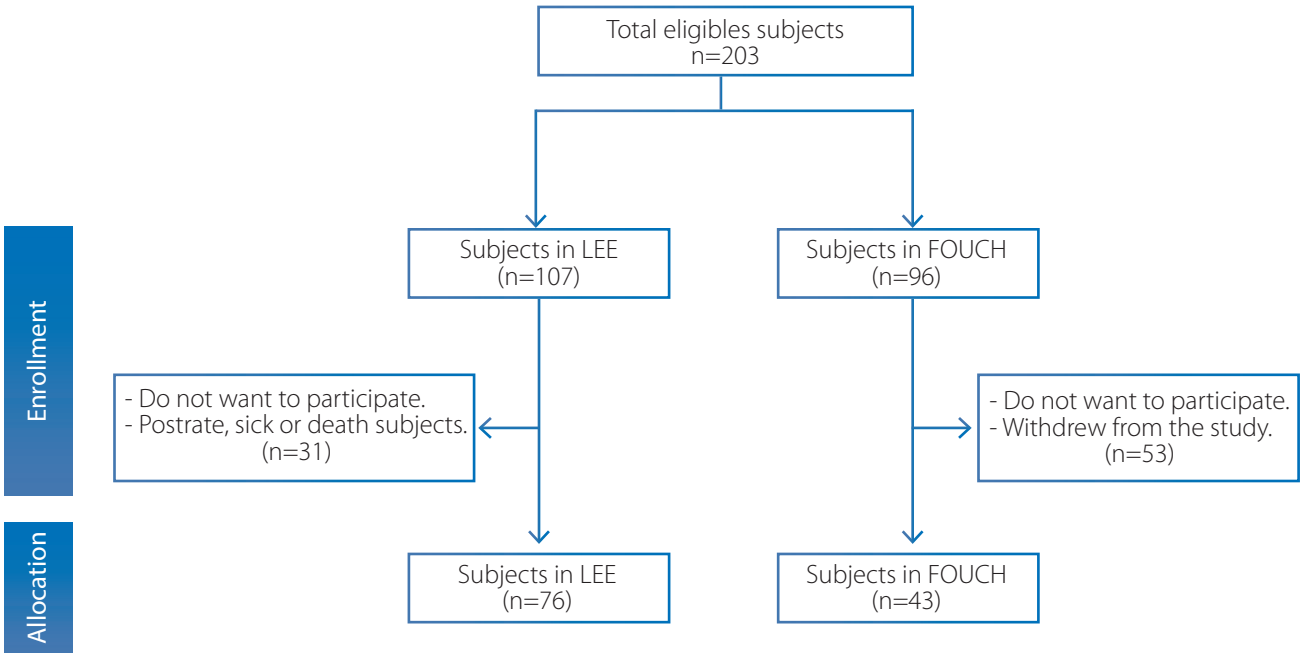
In the institutionalized EP group, the most prevalent oral lesions were denture stomatitis (45.5%, $p<0.05$), irritative hyperplasia (11%) and traumatic ulcer (10%). In the non-institutionalized EP group the most prevalent findings were irritative hyperplasia, traumatic ulcer and erythroplasia, each with a prevalence of 2%. The remaining 94% of the EP did not present oral lesions.

The condition of xerostomia was present in 35 EP (46%) in the institutionalized group and in 22 EP (51%) in the non-institutionalized group.

In relation to edentulism, it was observed that 89% of the total subjects were total maxillary edentulous and 11% partial maxillary edentulous. For the variable of maxillary edentulism, in the institutionalized EP, 86% were total edentulous while in the non-institutionalized 95% had this condition ($p>0.05$). On the other hand, 62% of the total subjects were total mandibular edentulous and 38% partial mandibular edentulous. For the variable mandibular edentulism, in the institutionalized EP, 68% were total edentulous versus 49% in non-institutionalized EP ($p<0.05$).

In relation to NCDs, it was observed that the most prevalent diseases in institutionalized and non-institutionalized EP were: arterial hypertension (38% *verus* 53%), arthritis-osteoarthritis (30% *verus* 21%) and diabetes mellitus (25% *verus* 28%), respectively ($p>0.05$). It should be noted that the percentages correspond to the total declared by the subjects, and one subject may have more than one pathology. Additionally, a statistical difference was found for the prevalence of depression between the groups ($p<0.05$), being one of the most prevalent diseases in the non-institutionalized group.

Figure 1. Flow chart of eligible and dropout of subjects in the study.



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DISCUSSION.

This study identified the prevalent oral lesions in the elderly living in LEE, in addition to xerostomia and edentulism. This information was currently unknown to this population and the health authorities. Moreover, information was collected on prevalent NCDs in the elderly living in long-term care facilities. A register of LEEs and the average numbers of housed EP and their dependency level was performed in Chile between 2007 and 2008.[6] However, this did not include any information about oral disease prevalence.

In relation to the epidemiological characterization, the results indicate that EP 80 years old and above were predominant. This is consistent with a report from CEPAL (Available at: https://www.cepal.org), which states that this age segment could increase from 1.3% in 2000 to 6.9% in 2050.

In this study females constituted the majority, coinciding with the national trend in Chile, since life expectancy is 6 years higher for females. It is important to note that the female population only predominates in the groups above 60 years of age (Available at: http://www.ine.cl). Worldwide, women not only live longer than men, but also tend to have less access to social protection, pensions and health insurance plans. These issues indicate the urgent need for revised social protection interventions with a particular focus on women (Available at: http://apps.who.int).

In relation to oral health, the pathologies identified in the oral cavity of EP are varied, but there are more frequent cases. It is essential to understand that in addition to the risk factors in oral health, there are many conditions that increase that risk. Several of the systemic diseases present in the EP can be pharmacologically managed, therefore the frequent use of cardiovascular drugs, (antiarrhythmics, among others), can induce different adverse or secondary effects in the mouth.[11] The real prevalence of these reactions is unknown, since many of them are asymptomatic or are not reported, but in general these reactions affect the mucous membranes, the production of saliva and the sense of taste.

Denture stomatitis and irritative hyperplasia were the most predominant oral mucosal lesions in the institutionalized EP group. These results are in agreement with those reported by Espinoza *et al.*,[10] although in that study the participants were sourced from public and private health systems in Santiago, Chile. Noticeably, during the past 10 years, the same oral lesions have been documented to prevail in the general EP. Among the most common risk factors detected in the group that presented denture stomatitis were the ill-fitting, nocturnal use or lack of hygiene of an oral prosthetic device (by the EP or the LEE caregiver). At the level of the palate, the lesion of interest to the WHO is candidiasis.[12] When this injury is associated with the use of removable prostheses (RP), it is clinically referenced as denture stomatitis, a lesion that together with angular cheilitis and irritative hyperplasia, does not have a diagnosis published by the WHO, but are classified by the criterion of Axéll.[13] Its prevalence varies between 15% and 70% among RP patients. This disease occurs more frequently after the age of 55, the most affected patients being those 65 years of age or older, with increasing frequency as age advances.[10] Nevertheless, diabetes mellitus is another risk factor for the development of this lesion. This together with prolonged use of drugs is very frequent in this group of EP.[14] Quantitative or qualitative alterations of salivary secretion and the role of the *Candida* fungal species in the pathogenesis of denture stomatitis, are also factors to consider.[14,15]

It is known that some complications of xerostomia can lead to the development of candidiasis or result in difficulties in the use of dental prostheses. Glazar *et al.*,[16] analyzed the presence of xerostomia in institutionalized and non-institutionalized EP, finding that the prevalence in both groups was similar, which is in agreement with our results. At the oral level a qualitative and quantitative decrease of saliva (known as xerostomia and hyposalivation, respectively) occurs naturally or pathologically, resulting in a loss of oral humidification, and from a nutritional point of view, causing problems in chewing, swallowing, tasting and talking.[17]

The study developed by Espinoza *et al.*,[10] revealed that 25% of the EP are edentulous. In this characterization, no differences were found when comparing the two groups, so that the edentulism can be classified as a sequella and not as a condition worsened by the institutionalization process. This can be explained by the fact that EP are the most affected group, in terms of oral health status, either because they have not received sufficient or

adequate preventive measures or they lacked timely treatment to recover their health status throughout their lives.[2] According to the 2009-2010 National Health Survey, 22.9% of respondents reported the use of dental prostheses and 25.3% declared the need to wear them, increasing to 55.3% in the age group 65 years old and older.[18] This last percentage indicates a trend towards the increase of edentulism with age and the need for dental prosthesis to recover the ability to efficiently chew food of varying textures, through a correct occlusion of the remaining or prosthetic teeth. On the contrary, the use of non-functional prostheses negatively affects the masticatory efficiency, inducing the selection and intake of foods low in fiber and protein, which are difficult to chew and therefore to swallow. This poor nutrition leads to development of conditions in the elderly characterized by the loss of muscle mass, acute diseases and NCDs.[18]

Our study revealed that the most prevalent NCDs were hypertension, arthritis-osteoarthritis, diabetes mellitus and depression. Thus, for both EP groups these diseases followed the national and global trend. NCDs play an increasingly important role within the framework of the general burden of diseases in Latin America and the world. Cardiovascular disease accounts for 45.4% of deaths of total deaths attributable to NCDs per year, and diabetes mellitus for 4.9% deaths. On the other hand, in the United States more than 90% of EP carry at least one NCD while 73% have two or more (Available at: http://apps.who.int).

Surprisingly, depression was higher in non-institutionalized EP. In the study by Estrada *et al.*,[19] it is mentioned that factors such as state of dependence and diminished quality of life would increase the depressive symptomatology and therefore would be higher in institutionalized EP. However, in our study, the reason may be that the institutionalization, independent of the motive, has been carried out with the purpose of solving the problems developed due to from scarce economic resources, lack of support, abandonment, and social marginalization, among other factors, thus improving aspects of their life that do not make them feel sick (Available at: http://observatorio.ministeriodesarrollosocial.gob.cl). Another aspect can be attributed to the phenomenon of living in the company of peers, which makes the elderly feel less depressed; however, there are few studies that thoroughly investigate this psychiatric disorder in EP.

The limitations of the study were the impossibility to include the entire EP of LEE because a small percentage had some degree of deterioration in their general health making communication difficult, for example, bedridden subjects with some mild to moderate cognitive impairment, among others. On the other hand, the results of this study are not comparable because the socio-economic realities of each LEE are unique and not disclosed, even though SENAMA has established minimum criteria for the accreditation of these institutions.

For future studies, we should consider increasing the percentage of oversampling in EP due to the high loss of subjects because of their aging condition.

CONCLUSION.

This study provides valuable information on the epidemiology of prevalent oral lesions and NCDs unknown to date in EP residing institutionalized.

Denture stomatitis, irritative hyperplasia and edentulism were the most common oral findings in an EP, and arterial hypertension, arthritis-osteoarthritis and diabetes mellitus were the most frequent NCDs.

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