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Number of teeth and chewing satisfaction related to cardiometabolic, vascular diseases and self-perception of health in older adults

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ABSTRACT

Aims: To determine the association of chewing satisfaction and number of teeth with cardiometabolic and vascular diseases and self-perception of health (SPH) in the elderly.

Methods: An observational and population-based cross-sectional study was conducted with the participating elderly of the Multidimensional Study of Elderly of Porto Alegre (EMIPOA) who responded to a questionnaire about their oral health, which was applied by telephone. The following variables were analyzed: sex, age, age range, chewing satisfaction, number of teeth, SPH, coronary artery disease (CAD), cerebrovascular accident (CVA), diabetes mellitus (DM), Hypertension (SAH) and obesity.

Results: There were 251 elderly evaluated averaging on age 72.5 ± 7.6 years. The mean number of teeth was 8.80 ± 8.91 while chewing satisfaction was reported by 52.2%. A significant association ($P < 0.05$) was observed between satisfaction with chewing ability and mean number of teeth, DM and SPH (dissatisfied elderly had a lower mean number of teeth, poor/awful SPH and greater prevalence of DM). A significant association was also observed between mean number of teeth and age range, SPH, CVA, CAD, SAH (lower mean number of teeth in elderly ≥ 80 years and with fair/poor perception of health and the morbidities described).

Conclusions: In the elderly of EMIPAO, oral health was found to be associated with age range, cardiometabolic and vascular diseases and self-perception of health.



INTRODUCTION

The oral health of the elderly has been described as precarious in different populations,¹ showing negative effects on overall health, where it has been associated with chronic inflammation and increased risk of cardiovascular events.²

Additionally, tooth loss leads to changes in occlusion, considered the most common cause of compromised chewing, which can affect the choice of foods by the elderly³ and result in a poor diet.⁴ Such a situation creates conditions where these individuals seek an alternative diet that is more suitable to their limitations.^{5,6} Another study in an elderly population reported that individuals with more missing teeth ate more pastas and cream sauces and less vegetables and fruits than did those with a more preserved oral condition.⁷

According to the World Health Organization (WHO), a combination of risk factors, such as smoking, excessive alcohol consumption, obesity, dyslipidemia, insufficient intake of fruits, legumes and greens and physical inactivity, are responsible for the high morbidity and mortality of cardiometabolic diseases.⁸

Self-perception of health is one of the most utilized indicators in gerontology research, because it is strongly associated with the true state of health of persons and predicts mortality and functional decline.⁹ Within this context, the aim of this study was to determine the association between chewing satisfaction, the mean of number of teeth, and self-perception of health with cardiometabolic and vascular diseases, in the elderly participating in a multidimensional study in Porto Alegre, in South Brazil.

METHODOLOGY

Study design

The study was characterized as quantitative, cross-sectional and population based.

Population and sample

The population was composed of 1076 elderly individuals in the Multidimensional Study of Elderly of Porto Alegre (EMIPOA) conducted by investigators of Institute of Geriatrics and Gerontology of Pontifical Catholic University do Rio Grande do Sul (PUCRS). Of these, 304 elderly were contacted by telephone and responded to a questionnaire on oral health. A total of 251 elderly whose information was complete were included in the study.

Variables

The variables demographic data (age, age range, sex), anthropometric measurements (weight, height and body mass index (BMI; individuals considered obese if $BMI \geq 25 \text{ kg/m}^2$)), report of cardiometabolic and vascular diseases (systemic arterial hypertension, SAH; coronary artery disease, CAD; diabetes mellitus, DM; and cerebrovascular accident, CVA) and self-perception of health (SPH) were obtained from the databanks of EMIPOA. The variables related to oral health (report of number of teeth present and chewing satisfaction) were obtained by telephone contact. The data on oral health were validated by two procedures carried out by a trained oral surgeon: (A) application of a questionnaire on the appearance and number of teeth, utilization of a dental prosthesis, and chewing satisfaction; (B) an oral clinical examination of 15% of the sample to check the number of teeth in which agreement was 86.6%. In relation to satisfaction with chewing, agreement was 78%.¹⁰

Statistical analysis

The data were evaluated by descriptive and inferential statistics, utilizing SPSS (*Statistical Package for the Social Sciences*) for Windows, version 11.5. Distribution tables were tested by chi-squared analysis and comparisons between means were performed by the Student t-test. $P < 0.05$ was considered statistically significant, and $0.05 \geq P \geq 0.10$ was considered indicative of a trend.¹¹

Ethical aspects

The research project was evaluated and approved by the Scientific Commission of the Institute of Geriatrics and Gerontology and Committee on Research Ethics of PUCRS (Protocol No. 0992/07). All elderly signed an informed consent form at the time of data collection from EMIPOA.

RESULTS

Of the 251 elderly evaluated, 174 (69.3%) were women and 77 (30.7%) were men. The mean age was 72.5 ± 7.6 years, varying from 60 to 95 years.

In relation to oral health, the mean number of teeth was 8.80 ± 8.91 . Satisfaction with chewing was reported by 131 individuals (52.2%) and dissatisfaction by 120 (47.8%).

Based on the analysis of the results, a significant association was found between the mean number mean of teeth and age range, self-perception of health, CVA, CAD and SAH (Table 1). A lower mean number of

teeth was observed in the elderly with aged 80 years and over, with fair/poor perception of health and report of CVA, CAD and SAH. This association was not seen with sex, obesity or DM.

Table 1. Differences in mean of number of teeth according to demographic and clinical characteristics in participants of the Multidimensional Study of Elderly of Porto Alegre – EMIPOA (Porto Alegre-RS, 2005).

Variable	N teeth (mean±SD)	P
Age range		0.018*
60-69 years	11.1±9.30 ^a	
70-79 years	8.2±8.67 ^a	
80 years or more	7.2±9.33 ^a	
Sex		0.129
Female	8.8±8.92	
Male	10.7±9.69	
Self-perception of health		0.002*
Optimal	12.3±10.28 ^a	
Good	11.5±9.55 ^a	
Fair	7.6±7.89 ^b	
Poor	4.3±7.84 ^b	
Awful	10.5±11.42 ^{ab}	
Cerebrovascular Accident		<0.001
With CVA	2.7±3.62	
Without CVA	9.7±9.24	
CAD		0.022
With CAD	7.2±8.48	
Without CAD	10.2±9.35	
Systemic Arterial Hypertension		0.047
With SAH	8.33±8.90	
Without SAH	10.66±9.44	
Obesity		0.057
With obesity	7.8±8.49	
Without obesity	10.1±9.40	
Diabetes mellitus		0.059
With DM	6.9±8.72	
Without DM	9.8±9.19	

* Bonferroni posthoc multicomparison test: levels with the same letter are not statistically different.
SD: standard deviation; CVA: cerebrovascular accident; CAD: coronary artery disease; SAH: systemic arterial hypertension; DM: diabetes mellitus; P: ANOVA.

Table 2 presents the associations related to chewing satisfaction. There was a significant association between satisfaction with chewing ability and the mean number teeth, diabetes mellitus and self-perception of health. The elderly dissatisfied with chewing had a mean number of teeth that was significantly less compared to the satisfied individuals, as well as greater frequency of DM and poor/awful self-perception of health. There was no significant association between chewing satisfaction and age, sex, SAH, CAD or obesity.

Table 2. Association between chewing satisfaction and demographic and clinical characteristics in participants of the Multidimensional Study of Elderly of Porto Alegre – EMIPOA (Porto Alegre-RS, 2005).

Variable	Chewing satisfaction		P
	Satisfied	Dissatisfied	
Age (mean±SD)	73.2±8.25	71.8±6.90	0.150
Number of teeth (mean±SD)	10.6±10.16	8.1±7.82	0.032
Sex [N(%)]			0.296 [†]
Male	44 (57.3%)	33 (42.9%)	
Female	87 (50.0%)	87 (50.0%)	
Morbidity [N(%)]			
Systemic arterial hypertension	64 (48.5%)	68 (51.5%)	0.866 [#]
CAD	32 (47.8%)	35 (52.2%)	0.389 [#]
CVA	2 (20.0%)	8 (80.0%)	0.052 [#]
Obesity	37 (48.7%)	39 (51.3%)	0.464 [†]
Diabetes mellitus	16 (37.2%)	27 (62.8%)	0.030[#]
Au Self-perception of health [N(%)]			0.005[‡]
Optimal	29 (69.0)	13 (31.0)	
Good	35 (53.8)	30 (46.2)	
Fair	59 (49.2)	61 (50.8)	
Poor	4 (33.3)	8 (66.7)	
Awful	4 (33.3)	8 (66.7)	

SD: standard deviation; CAD: coronary artery disease; CVA: cerebrovascular accident; P: Student's t-test; [†] chi-squared; [‡] chi-squared test for trend.

DISCUSSION

The present study aimed to observe the association of oral health and the prevalence of cardiometabolic diseases. Oral health was assessed in community dwelling older adults using only number of teeth and satisfaction of chewing, which are two important parameters of oral health. In the present study, older adults who had the highest average number of teeth were more satisfied with chewing. The finding agreed with a survey to evaluate the nutritional status and oral elderly in southern Brazil found that edentulous individuals were more dissatisfied with chewing, besides being more prone to the risk of malnutrition.⁶ The participants in this study who were dissatisfied with chewing had a lower average of teeth, comparing with those satisfied. In another survey of Brazilian elderly community found that participants with more than 8 teeth were less likely to have central obesity compared with the group with only 1-8 natural teeth in the oral cavity,¹² these results are important since lower satisfaction with chew is related to food restriction and lower quality of life.¹³

Other significant find it is the report of fewer number of teeth observed on those 80 years and older participants. The phenomenon was also reported

on older adults registered on a primary care set on Londrina Brazil,¹⁴ and also reported on institutionalized older adults in Belo Horizonte, Brazil.¹⁵

Total or partial tooth loss may be considered a major problem on oldest old and might be related to the dental practice on older adults prevalent in Brazil before 1970's where the treatment were focus on mutilation and extracting procedures that were replaced to a much preventive and restoration approach which took place much recently. Thus oldest old population tends to have much less number of teeth than younger older adults.¹⁰

Physical limitations, visual and cognitive problems frequent in older adults might impair proper oral care by requiring the intervention of a care provider to perform oral hygiene, which often is not satisfactory done.¹⁶

Many older people present a diversity of systemic diseases, multimorbidity, that have an impact on your oral health. This study observed that participants who reported a previous stroke, presence of cardiovascular disease, and hypertension presented significant lower number of teeth then those healthy folks. The results are similar to other study which explored the association between oral health, tooth loss in older adults submitted to coronary angiographic exam, confirming the hypothesis that subjects with higher number of tooth loss and worst oral health had a higher prevalence of coronary heart disease.¹⁷

Periodontal disease leads to the release of inflammatory markers in the blood stream that can worst metabolic conditions related to Metabolic Syndrome and coronary artery disease.¹⁸

The higher frequency of edentulous older adults in the present study and the association with lower chewing satisfaction is a reflex of poor oral health status and lead to restriction to food intake like grains, vegetables and fruits resulting in higher risk of obesity and metabolic syndrome.¹⁹ Ekback et al, observed the health self assessment and oral health self assessment and the association of obesity in 6078 Sweden older adults and found that the obese group reported worst oral health perception and chewing ability and teeth appearance.²⁰

Scully et al in 2007 conducted a survey in the U.S. by reviewing some of the oral health care needed for the 10 most common diseases that affect the elderly (Arthritis, Cancer, Chronic Obstructive Pulmonary Disease, Diabetes, Heart Disease, Hypertension, Mental Disorders, osteoporosis, Parkinson's Disease and stroke (CVA). The older adults studied at EMIPOA who present vascular and cardiometabolic diseases and DM, were the most dissatisfied with chewing. Diabetes

can lead to oral diseases such as periodontal disease, hyposalivation, xerostomia, and candidiasis, in addition to infection and healing impairment. Another study on the influence of oral health on quality of life of diabetic patients found that factors such as dissatisfaction with the teeth or mouth negatively influenced their quality of life.²¹ Contrariwise, in a dissertation on the evolution of eating habits in diabetics, 72.7% reported to be able to chew food satisfactory.²²

The older adults in our study with history of stroke also showed dissatisfied with chewing, this disease is a leading cause of permanent disability in adults. The neurological damage resulting from a stroke can result in motor sequel, changes in speech, language and swallowing. Thus dysphagia is common in patients with history of stroke. In a recent study in southern Brazil that investigated adults undergoing angiography, the association of oral health and tooth loss confirmed the hypothesis of a significant association between poor oral health, measured as the number of missing teeth, and the presence of atherosclerotic disease.¹⁷

Most older adults in this study who reported health self-perception (HSP) as good (69.0%) were satisfied with their chewing. In the other hand, and most older adults who were not satisfied with chewing (66.7%) rated the state health as poor and very poor, i.e., the worse the outcome regarding satisfaction with HSP worst chewing. In the perception of the elderly on poor chewing ability is a strong predictor of perceived general health, especially those with a history of chronic diseases.²³ Self-evaluation of chewing ability is not objective, but it is considered an index to evaluate the approximate sequential and dynamic process of chew. It has been used in large-scale epidemiological studies due to its simplicity of administration, and has been significantly related to a variety of measures of general health among the elderly.²⁴ In another study, which also investigated the self-perception of oral health among the elderly, 42.5% considered self-perceived chewing as good self-perceived appearance was strongly associated with self-perceived oral health.²⁵

In general, human longevity will increase by 50% of those born in the year 2000 and such live beyond 100 years of age. In the future, many people will reach old age and require extensive care, so new strategies for oral health should be taken with the elderly. A functional dentition is considered necessary for the success of healthy aging. In this study Renvert et al²⁶ evaluated the systemic and oral conditions in individuals between 60 and 95 years with access to the dentist. Systemic diseases were frequent findings and there was a prevalence of periodontitis (causative factor of tooth loss) with increasing age. Despite

frequent visits to the dentist the overall health of the elderly was poor and precarious. The World Health Organization set a goal that people throughout life must keep at least 20 natural teeth.⁸

Thus routine self-perception of oral health assessment is important to promote the adherence to healthy lifestyle behaviors. The assessment seems to be much informative to how the disease affects the life of the older adults than more objective measures of oral diseases. In Brazil, public dental health assistance to older adult needs to be improved and amplified. The identification of the oral condition by assessing the self perception of oral health might be the first step to the elaboration of programs that include preventive educational and rehabilitation actions on oral health.²⁷

Following the WHO recommendations, the epidemiologic health surveys can determine the extension of oral health services cover facing the needs of treatment prioritizing a program of dental care, since tooth loss is a severe public health problem with a wide range of consequences expressed by the decrease on functional conditions of chewing leading to nutritional, psychological and self-esteem problems.²⁸

In conclusion, the oral health of the EMIPPOA older adult participants was associated with age, hypertension, diabetes mellitus, coronary artery disease, stroke, and self-rated health. We expect that these results might contribute to the better understand of the conditions of the oral health of the community dwelling older adults, subsiding the implementation of preventive and educative measures to these individuals to able to establish a satisfactory oral condition, aiming better conditions to an adequate food intake, preventing the development of obesity, under nutrition and other chronic diseases decreasing the impact of cardiometabolic diseases in the older adults.

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