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Association between underweight and overweight/obesity with oral health among independently living Brazilian elderly

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ABSTRACT

Objective: Poor oral status, represented by partial/complete tooth loss, may lead to changes in food choice, which may ultimately lead to underweight, overweight, or obesity. The aim of this study is to evaluate whether poor oral status is associated with underweight or overweight/obesity, regardless of physical activity.

Methods: This cross-sectional study is part of a major project, The Frailty in Brazilian Elderly Study, carried out in Campinas, Brazil (2008–2009). The sample was composed of 900 independent-living older adults. Complete data were available for 875 individuals including sociodemographic, self-reported amount of medications used and eating difficulty questionnaire, smoking habit, depressive symptoms, physical activity, oral examination, and anthropometric assessments according to the WHO criteria. Body mass index was used as an outcome. Multinomial logistic regression was adjusted for confounding variables.

Results: The mean age of the sample was 72.7 y (±5.81) and the prevalence of edentulism was 47.7%. Edentate individuals not wearing dentures were more likely to be underweight [odds ratio (OR) = 3.94, 95% confidence interval (CI) 1.14–13.64] and overweight/obese (OR = 2.88, 95%CI 1.12–7.40). Males (OR = 0.56, 95%CI 0.36–0.85) and those not using medications (OR = 0.41 95%CI 0.24–0.70) were less likely to be overweight/obese. Individuals who smoke (OR = 2.62, 95%CI 1.26–5.44) were more likely to be underweight. Older individuals with family income between 3.1 and 5 minimum wage (OR = 1.69, 95%CI 1.00–2.87) were more likely to be overweight/obese.

Conclusion: To our knowledge, this is one of the first studies associating poor oral health, represented by edentulism not rehabilitated with dentures, with unfavorable body mass, regardless of the two major confounders, physical activity and depression symptoms.

Introduction

The elderly population in Brazil is growing fast; by 2050 it is expected that elderly people will represent 18% of the population [1]. According to national data, less than 10% of Brazilian older individuals from 65 to 74 y old have 20 teeth or more [2].

Poor oral health and poor general health are interrelated, especially among older individuals, due to common risk factors [3]. Oral health changes such as tooth loss influence the individual's life, increasing their chance of having a poor quality of life [4]; it may also result in decreased masticatory efficiency and function [5].

A minimum of 20 teeth are needed for satisfactory chewing ability and functional dentition [6]. Dental status can impact on food choice and on the intake of important nutrients [7–9]. More edentate individuals than dentate individuals tend to consume less than the recommendations of most nutrients [9–14].

The number of teeth, regardless of whether they are replaced or natural, may have an impact on the body mass index (BMI) [15]. Thus, oral rehabilitation with complete dentures does not necessarily imply a perfect chewing ability [16]. Denture use is associated with decreased masticatory capacity [17]. In addition, it can be a determinant of poor nutrition because older adults

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tend to change their eating habits as a result of the reduced masticatory efficiency [11,18–20].

Furthermore, poor nutrition can possibly lead to changes in BMI. Partial or complete tooth loss not rehabilitated with dentures was associated with obesity in a population from Southern Brazil [21]. Obesity is increasing worldwide, representing not only a global outbreak [22] but also a public health problem [23] due to its association with disability, which directly affects health care costs [24]. According to some studies, there is a relationship between low physical activity, high BMI, and inadequate dietary standards [25,26]. According to Tsai et al. [27], physical activity seems to have the potential of impacting the aging-associated anthropometric changes. Despite being a key factor for weight gain and obesity, the effects of physical activity have not been well established in this relationship up until recently [11,21]. Although a significant number of studies have shown that oral status, mainly partial and complete tooth loss, is associated with BMI, there is no evidence showing if this relationship keeps its significance if adjusted to physical activity.

Difficulty in chewing or swallowing was associated with lower BMI among older women in the USA [19]. Significant increased mortality risk was also associated with underweight [28]. Therefore, it is complex to study the nutritious status in older adults because their health is a result of the interaction between the way they aged and lived and the habits they had throughout their lives.

The hypothesis of the present study is that oral status, represented by partial or complete tooth loss not rehabilitated with dentures, is positively associated with underweight or overweight/obesity, regardless of confounders, including physical activity. The aim of this study was to evaluate the relationship between underweight and overweight/obesity and oral health status using data from the FIBRA study.

Materials and methods

Study design

This cross-sectional study is part of a larger study on independent-living older individuals from the city of Campinas, Brazil—the "Rede FIBRA" study, The Frailty in Brazilian Elderly Study which is a multicenter and multidisciplinary study designed to understand better the prevalence, characteristics, and primary factors associated with frailty in Brazilian elderly.

A probabilistic, cluster sample was used, taking into consideration urban census sectors. The number of elderly individuals in Campinas was calculated as 82 560 (≥65 y old), corresponding to 7.8% of the city's population. Based on this number, the sample was calculated through the formula of finite population, taking into account the achievement of statistical representativeness to describe the prevalence of frailty, use and need of dental prosthesis, presence of teeth, and oral soft tissue injuries. Older individuals were invited from their homes to take part in the study. Data were collected in a single session from September 2008 to June 2009.

Population and sample

The inclusion criteria included the following: 65 y old or more, able to understand the instructions, and permanent resident in the home and the census sector. The exclusion criteria [29] included the following: severe cognitive impairment, temporary or permanent inability to walk, localized strength loss and aphasia due to serious stroke, serious impairment due to Parkinson, severe communication difficulties, chemotherapy treatment, severe sensory deficit, and terminal stage cancer.

Ninety of the 835 urban census sectors of Campinas were randomly selected. On average, 10 elderly persons were randomly selected in each census sector. The sample size was calculated in 900 older people living independently in the community and 875 individuals answered the data and participated in this study.

Ethics

This study was carried out after approval from the Research Ethics Committee involving Human Beings of the Piracicaba Dental School/University of Campinas (No. 15/2009).

Measurements

The purpose of the study was explained to participants before informed consent was obtained. The interview started with identification and the Mini Mental State Exam (cut off according to Brucki et al. [30]).

Variables

Questionnaire

Sociodemographic data, self-reported intake of medications, smoking habits, self-reported eating difficulties questionnaire, and depressive symptoms assessment. Sociodemographic data included information regarding age, monthly family income, schooling, race/skin color, gender, and marital status. Sociodemographic variables and current smoking status were assessed through the application of an interview questionnaire. Independent variables of monthly family income and age were transformed from continuous into ordinal variables.

The intake of medications was assessed as the amount of medications daily taken, prescribed or not over the last 3 mo. A summary measure of the number of medications was used in the analyses.

Self-reported eating difficulties assessment was performed through the following question: Have you had difficulties in chewing or swallowing food over the last 12 mo?

Depressive symptoms were assessed with the Geriatric Depression Scale (GDS), Brazilian Portuguese short version [31]. The cutoff point was ≤5 for the absence and >5 for the presence of symptoms.

Physical activity assessment. Physical activity assessment was obtained through self-reporting of the regular practice of physical activities (those who expended weekly at least 150 min on exercise of moderate intensity or at least 120 min of high intensity were considered active), based on recommendations of the American College of Sports Medicine (ACSM), and American Heart Association [32]. The ones that expended less than that were considered sedentary. The exercise intensity classification was according to Haskell et al. [33], who considered energy expenditure under 3 metabolic equivalents of task (METs) as mild intensity, 3-6 METs as moderate intensity, and more than 6 METs as high intensity.

Sixteen items were used to assess physical exercise and active sports (walking, stair climbing as a way of exercise, cycling, ballroom dancing, gymnastics, stretching, yoga, tai-chi, jogging, mild or vigorous walking, working out, swimming, playing volleyball, playing soccer, and refereeing soccer games); there was also an open question about any other type of exercise not included in the previous items.

Anthropometric measures

Height and weight were used to calculate the BMI, which is a ratio between weight in kilograms and the height in meters squared (kg/m^2). Anthropometric measures were carried out using classic protocols that required digital plate scales (standardized to every data collection) and measuring tape. Participants were classified as underweight (<23 kg/m^2), eutrophic (23–27.99 kg/m^2), overweight (28–29.99 kg/m^2), and obese (>30 kg/m^2) according to Pan American Health Organization recommendations for older individuals [34]. For analysis purposes, overweight and obese categories were considered a single category. The reference category was eutrophic.

Oral examinations

Number of teeth and presence of dental prosthesis. All examinations were carried out by three trained dentists and dental status was assessed by recording the number of natural teeth and the use of dental prostheses for both arches according to the World Health Organization (WHO) criteria [35]. Data regarding the number of natural teeth and presence of dental prostheses were used to generate a new variable named "Oral Status." The WHO [36] recommends the presence of at least 20 teeth for function and esthetic natural dentition. Thus, participants were categorized into the following: edentulous wearing none or one complete denture, edentulous wearing upper and lower complete denture, <20 teeth without prosthesis, <20 teeth with prosthesis, ≥20 teeth without prosthesis, and ≥20 teeth with prosthesis.

Statistical analyses

The χ^2 test was performed for categorical variables. To test the study hypothesis, all independent variables that showed an association with $P < 0.25$ in the univariate analyses were candidates to the multivariate model [37]. Variables that did not contribute to the model ($P > 0.25$) were excluded and a new model was developed. The old and new models were always compared using the likelihood ratio test. A multinomial logistic regression analysis was used to estimate the crude and adjusted odds ratio (OR) and 95% confidence intervals were calculated for the variables of interest with both categories of the BMI outcomes (underweight and overweight/obesity).