Diabetes mellitus in older adults, prevalence and incidence: results of the FIBRA study

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Abstract

Objective: to estimate the prevalence and incidence of diabetes *mellitus* in a retrospective cohort of older adults, identify the main factors associated with the disease for both periods 2008-2009 and 2016-2017 and describe the prevalence of diabetes according to overweight status. *Method:* a retrospective longitudinal study with 442 community-dwelling older adults (≥65 years old) participating in the FIBRA study (baseline 2008-2009 and follow-up 2016-2017) in Campinas and Ermelino Matarazzo (São Paulo State). Prevalences were estimated and associations were verified using Pearson's chi-square test or Fisher's exact test (p<0.05). Crude and adjusted prevalence ratios for sex, age and education were also estimated using Poisson regression. *Results:* the prevalence of diabetes *mellitus* increased from 21.95% to 27.46% in nine years (p=0.001), and the incidence was 5.51%. At baseline, the prevalence was higher among older adults who were overweight and had a worse perception of health. Overweight status remained associated at follow-up, together with the presence of two or more chronic diseases and the consumption of 3 to 5 snacks/day. *Conclusion:* in 2008-2009, one in five older adults had diabetes and, in 2016-2017, this ratio was about one in four. The importance of being overweight in determining the disease in both periods is highlighted. Educational interventions, expansion of care coverage, greater frequency of care and multi-professional assessment that considers comorbidities, the social and family insertion of the older adult, and their support network are required.

Keywords: Diabetes Mellitus. Chronic Disease. Health of the Elderly. Aging. Obesity. Longitudinal Studies.

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INTRODUCTION

Data on morbidity and mortality from diabetes demonstrate the importance of the disease as a public health problem in the world population – globally, one in five people aged between 65 and 69 years live with diabetes (about 136 million)[1]. The number of individuals over 65 years of age with diabetes is projected to reach 195.2 million in 2030 and 276.2 million in 2045[2,3]. This progressive increase is mainly due to the increase in type 2 diabetes mellitus (insulin resistance), which represents 90% to 95% of cases and mostly affects adults and the elderly[4].

Worldwide, the prevalence of diabetes is driven by a complex interplay of socioeconomic, demographic, environmental, genetic and behavioral factors. Growing levels of the adoption of unhealthy lifestyles (unhealthy diets and a sedentary lifestyle that can lead to obesity) and progressive urbanization are largely responsible for the increase in the incidence and prevalence of diabetes. Chronic complications or those that develop over a long time may appear in people with diabetes, especially in older adults, at the time of diagnosis. In this sense, early detection and treatment are essential to prevent disability and death[5].

For the majority of countries, the greater use of health services by individuals with diabetes, the loss of productivity and long-term care required to treat their chronic complications (kidney failure, heart problems, diabetic foot, among others) represents an expense between 5 and 20% of total health expenditure, and a major challenge for health systems[5]. In Brazil, in 2018, the Unified Health System (SUS) expenses on hospitalizations, outpatient procedures and medications corresponded to 30% for diabetes (more than BRL 1 billion) and 11% for obesity (more than BRL 370 million). The costs of obesity as a risk factor for diabetes are also high[6].

In Brazil, the economic[4,7] and social costs of diabetes – those attributable to premature mortality, temporary and permanent disabilities, compromised quality of life, and feelings of family responsibility – are expressive both for families and the SUS[4,7]. According to data from the 2019 *Pesquisa Nacional de Saúde* (PNS) [National Health Survey], about 7.7% of the population was diagnosed with the disease (12.3 million people) and 80.0% reported medical assistance in the preceding year, which corresponds to 9.7 million people. It is worth noting that 66.5% received care within the public health network (SUS), with half of all consultations carried out at health centers throughout the country[8]. Data on the prevalence of diabetes in population subgroups are frequent, though estimates of the incidence of the disease are reported less in the national literature.

Although aging is not synonymous with illness, in older adults there is an increase in clinical-functional vulnerability and predisposition to chronic non-communicable diseases (NCDs)[9]. Regarding the prevalence of diabetes in Brazilian older adults, PNS data from 2013 and 2019 indicated 17.7% and 19.9%, respectively, for the age group 65 to 74 years old, while for those 75 years of age and over, the values were 19.5% and 21.1%, with no significant increase between these surveys[10,11]. The prevalences observed in population-based studies make deeper analyses of the importance of chronic complications resulting from diabetes possible, while also indicating the magnitude of the disease burden for older adults, family members, health services and for society as a whole[4].

In the United States, a survey of adults aged 20 years or older (n=58,186) identified higher prevalence of type 2 diabetes in males, in individuals with lower levels of education and family income, in those who were overweight, and in older adults (age ≥65 years old), in whom prevalence reached 18.2%[12]. In the population-based longitudinal study on older adults known as EpiFloripa, the prevalence of diabetes was 22.1%, higher in older adults who had no formal education, in those who studied between 5 and 8 years versus ≥12 years, and in those whose waist circumference increased and who had arterial hypertension[13]. A study conducted in the city of Viçosa, MG, on 621 older adults (aged 60 to 98 years old) determined a prevalence of 22.4% of diabetes and that occurrence was higher in women, in those with worse perception of health, with a history of hypertension, with dyslipidemia, and with abdominal obesity; education level was inversely associated with disease[14].

As a measure of disease frequency, new cases (incidence) of diabetes in older adults estimate the average risk of this population acquiring the disease, while also constituting a parameter for evaluating the impact achieved by prevention measures[4]. In addition, identifying risk factors associated with the disease enables the finance strategies for health promotion and prevention, at the individual and collective levels, in order to reduce the burden of diabetes regarding the for the SUS, the individual and society. The objectives of this study were to estimate the prevalence and incidence of diabetes mellitus in a retrospective cohort of older adults, to identify the main factors associated with the disease in two periods, 2008-2009 and 2016-2017, and to describe the prevalence of diabetes according to overweight status.

METHODS

A retrospective longitudinal study on older adults aged 65 years and over, was conducted using baseline (2008-2009) and follow-up (2016-2017) data from the FIBRA study in Campinas, SP, and Ermelino Matarazzo, a subdistrict of the city of São Paulo, Brazil.

At baseline, 90 urban census tracts in Campinas and 62 in Ermelino Matarazzo were selected through simple sampling, for which samples for the population of men and women by age were estimated: 900 older adults in Campinas and 384 in Ermelino Matarazzo[15]. In the follow-up (2016-2017), recruitment began with lists of household addresses registered in the baseline databases, which were visited the recruiters to carry out data collection. In both cities, up to three attempts were made to locate the participant and confirmation of deaths and information on the deceased were obtained from a family member and/or an acquaintance or neighbour of the older adult.

In this study, we considered older adults who were present at baseline and at follow-up, and who answered the question on the medical diagnosis of diabetes (n=442). For the analysis of factors associated with diabetes in older adults, the following variables were considered:

- *Sociodemographics*: sex (female or male), age group (65 to 69, 70 to 79 and 80 years old or over), education in years of study (0, 1 to 4 and 5 or more), and living arrangements (alone, with a partner, or with children/others).

- *Number of chronic diseases and depressive symptoms*: the number of diseases (0 to 1, 2 or more) was obtained through self-reporting by older adults regarding previous diagnosis of the following chronic diseases/conditions: systemic arterial hypertension, heart disease, stroke/ischemia, cancer, arthritis or rheumatism, depression, lung disease, and osteoporosis (yes or no). The Brazilian version of the Geriatric Depression Scale (GDS-15), composed of 15 dichotomous items (yes or no) was applied and a cutoff point of ≥6 was adopted for screening older adults with depressive symptoms[16].

- *Overweight status and health-related behaviors*: the waist-to-height ratio (WHR) was used to classify the older adults as overweight, calculated by measuring waist circumference divided by height, in centimeters. WHtR values were categorized according to cutoff points defined for male and female older adults: WHtR values ≥0.58 were considered indicative of being overweight[17]; smoking (never smoked, ex-smoker, smoker); and consumption of alcohol (non-drinker, 1 to 4 times/month, ≥2 times/week). Physical activity was assessed through physical exercises and active sports performed during leisure time, extracted from the Brazilian version of the Minnesota Leisure Time Activity Questionnaire, consisting of 16 items[18]. The purpose was to investigate whether the older adult practiced the activity or not (yes or no), how many times a week and how many minutes per session. Then, the absolute intensities were calculated in metabolic equivalents[19], after which the total was classified into quintiles, according to sex. Older adults located in the 1st quintile of the distribution obtained were considered inactive in the context of leisure time activities.

- *Snacks* (follow-up): assessed through the question, "How many snacks between meals do you have per day?", scored as 0 to 1, 2, and 3 or more.

Descriptive statistics (mean, standard deviation and proportion) were used to characterize the older adults in terms of age and sex at baseline and

follow-up. The prevalence of diabetes at baseline and follow-up was estimated and its association with the variables considered in the study was verified using Pearson's chi-square test or Fisher's exact test, considering a significance level of 5%. Next, crude and adjusted prevalence ratios for sex, age and education (characteristics related to the occurrence of chronic noncommunicable diseases and the use of health services) were estimated[7,20,21] using Poisson regression with robust variance.

The frequency (exact and confidence interval, 95%CI) of older adults with diabetes was also verified, according to overweight status (yes or no). Considering the losses during the interval, the non-response pattern was initially analyzed and, later, a fully conditional method of multiple imputation, involving five imputations and the following predictor variables were performed: age, sex, education, diabetes, hypertension and overweight status at baseline to recompose missing data.

The FIBRA study projects were submitted and approved by the Research Ethics Committee of the State University of Campinas, under protocol numbers CAAE - 39547014.0.1001.5404 (baseline) and 49987615.3.0000.5404 and 92684517.5.1001.5404 (follow-up). All the older adults were informed regarding the research objectives, procedures and their rights, and signed a term of free and informed consent.

RESULTS

The criteria used to select the older adult participants in this study are shown in Figure 1 (n=442).

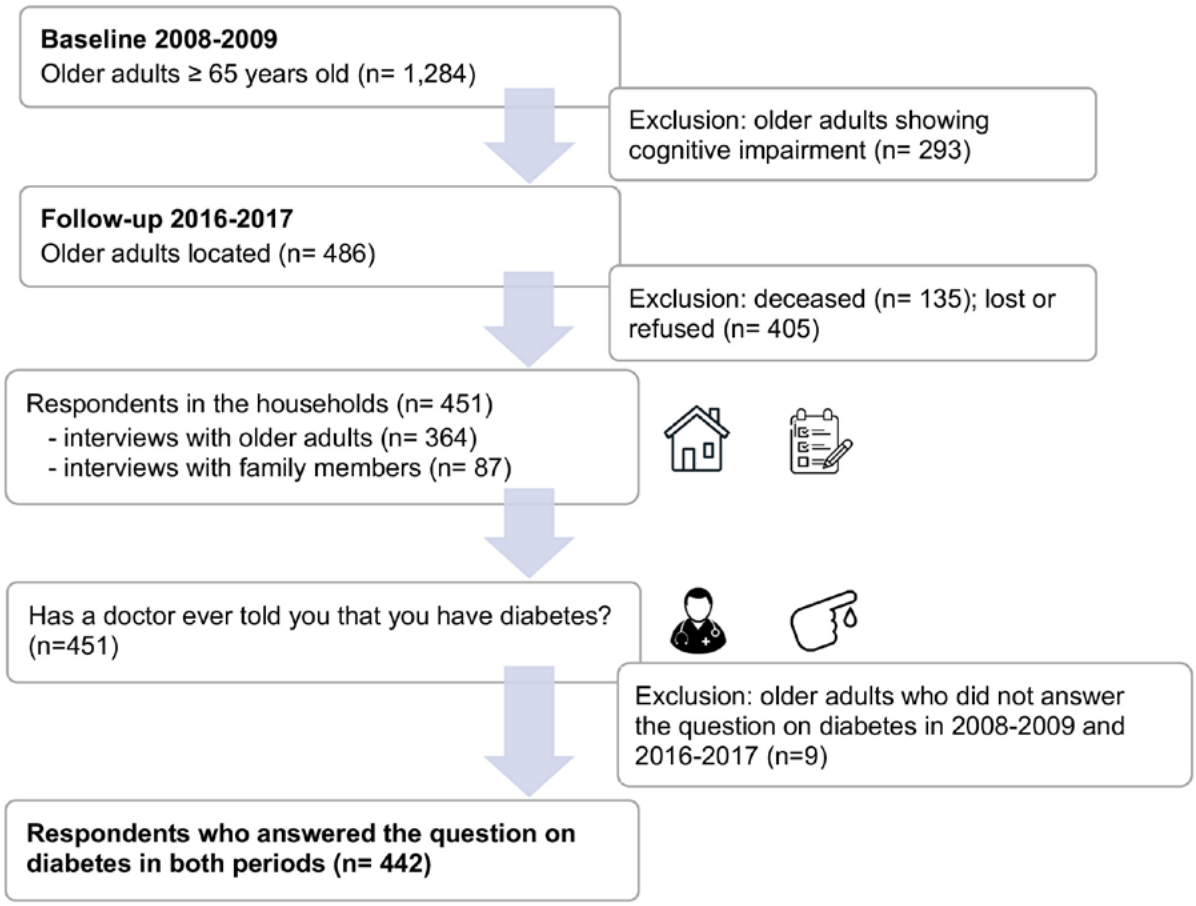

Figure 1. Sample selection flowchart. FIBRA study, Older adults, Campinas and Ermelino Matarazzo, SP, Brazil.

At baseline and follow-up, the mean age of the older adults was 72.07 (±5.12) and 80.62 years old (±4.69), respectively, and 67% were women. For the entire group of older adults, disease prevalence increased (p=0.001) from 21.95% (n=97) to 27.46% (n=121) between assessments, with an incidence of 24 cases of diabetes (5.51%) during this follow-up period. Table 1 presents the results for the occurrence of the disease at baseline and at follow-up, according to the variables considered in the study. At baseline (2008/2009), higher prevalences were observed among older adults who were overweight (p<0.001) and who rated their health worse (p=0.005). At follow-up, in addition to being overweight (p<0.001), the presence of two or more chronic diseases (p=0.038) and the consumption of snacks/day (p=0.015) were associated with diabetes (Table 1).

At baseline, the prevalence of diabetes was higher among older adults who were overweight (PR=1.99; 95%CI: 1.36-2.91) and worse perception of health (PR=1.80; 95%CI%: 1.15-2.80). Overweight status remained associated at follow-up (PR=1.47; 95%CI: 1.05-2.06), together with the presence of two or more chronic diseases (PR=1.60; 95%CI: 1.12-2.28) and the consumption of 3 to 5 snacks/day (PR=2.01; 95%CI: 1.36-2.96) (Table 2).

Table 1. Characterization of the sample and prevalence of diabetes in older adults (≥ 65 years) according to sociodemographic variables, health status, self-rated health, lifestyle, and consumption of snacks. FIBRA study, Older adults, Campinas and Ermelino Matarazzo, SP, Brazil, 2008-2009 and 2016-2017.

Variables	2008-2009		2016-2017	
	n (%)	Prevalence (%)	n (%)	Prevalence (%)
Sex		*p=0.925*[a]		*p=0.380*[a]
Male	143 (32.4)	21.7	143 (32.4)	30.7
Female	299 (67.6)	22.1	299 (67.6)	26.1
Total	442	21.9	442	27.4
Age group (in years)		*p=0.106*[b]		*p=0.696*[a]
65 to 69	163 (36.9)	25.1	--	--
70 to 79	239 (54.1)	21.7	187 (42.3)	28.3
80 or over	40 (9.0)	10.0	255 (57.7)	26.7
Education (in years)		*p=0.123*[a]		*p=0.065*[a]
0	71 (16.1)	31.0	61 (13.8)	34.4
1 - 4	265 (59.9)	20.7	264 (59.7)	29.2
5 or more	106 (24.0)	18.9	117 (26.5)	19.7
Living arrangements		*p=0.903*[a]		*p=0.926*[a]
Alone	66 (15.0)	19.7	78 (17.8)	28.2
With a partner	239 (54.3)	22.2	196 (44.9)	26.5
With children/others	135 (30.7)	22.2	163 (37.3)	28.2
Overweight		***p<0.001***[a]		***p=0.012***[a]
No	226 (51.1)	14.2	184 (42.1)	21.2
Yes	216 (48.9)	30.1	253 (57.9)	32.0
Number of chronic diseases		*p=0.292*[a]		***p=0.038***[a]
0 or 1	161 (36.5)	19.2	163 (38.1)	22.1
2 or more	280 (63.5)	23.6	265 (61.9)	31.3

to be continued

Continuation of Table 1

Variables	2008-2009		2016-2017	
	n (%)	Prevalence (%)	n (%)	Prevalence (%)
Self-rated health		***p=0.005***[a]		*p=0.059*[a]
Very good/Good	193 (43.9)	16.6	190 (53.4)	22.1
Regular	176 (40.0)	22.7	139 (39.0)	30.2
Poor/Very poor	71 (16.1)	35.2	27 (7.6)	40.7
Depressive symptoms		*p=0.061*[a]		*p=0.065*[a]
No	358 (81.6)	20.1	292 (82.0)	24.7
Yes	81 (18.4)	29.6	64 (18.0)	35.9
Smoking		*p=0.224*[a]		*p=0.746*[b]
Never smoked	255 (57.7)	19.6	145 (42.3)	26.9
Ex-smoker	145 (32.8)	23.4	187 (54.5)	26.7
Smoker	42 (9.5)	30.9	11 (3.2)	36.4
Alcohol consumption*		*p=0.770*[a]		*p=0.231*[a]
Non-drinker	292 (66.8)	22.9	231 (65.5)	28.6
1 to 4 times a month	103 (23.6)	20.4	88 (24.9)	26.1
≥ 2 times a week	42 (9.6)	19.0	34 (9.6)	14.7
Practice of leisure-time physical activity**		*p=0.666*[a]		*p=0.318*[a]
Active	281 (63.7)	21.3	165 (46.5)	24.2
Inactive	160 (36.3)	23.1	190 (53.5)	28.9
Number of snacks/day***	--	--		***p=0.015***[a]
0 to 1	--	--	206 (47.0)	22.3
2	--	--	165 (37.7)	28.5
3 to 5	--	--	67 (15.3)	40.3

[a] Pearson's chi-square p-value: in bold p<0.05; [b] Fisher's exact test p-value; *Loss of information (n = 89); ** Measures not comparable at baseline and follow-up (n=355); *** Evaluated at follow-up only.

Table 2. Crude, sex-adjusted and age-adjusted prevalence ratios for diabetes in older adults (≥65 years old), according to the year of study. FIBRA study, Older adults, Campinas and Ermelino Matarazzo, SP, Brazil, 2008-2009 and 2016-2017.

Variables 2008-2009	Crude PR[a] (95%CI)	Adjusted PR[b] (95%CI)
Sex		
Male	1	--
Female	1.02 (0.70 - 1.49)	--
Age group (in years)		
65 to 69	1	
70 to 79	0.86 (0.60 - 1.24)	--
80 or over	0.40 (0.15 - 1.05)	--
Education (in years)		
0	1	
1 - 4	0.67 (0.44 - 1.02)	--
5 or more	0.61 (0.36 - 1.03)	--

to be continued

Continuation of Table 2

Variables 2008-2009	Crude PR[a] (95%CI)	Adjusted PR[b] (95%CI)
Overweight		
No	1	1
Yes	2.12 (1.45 - 3.11)	**1.99 (1.36 - 2.91)**
Self-rated health		
Very good/Good	1	1
Regular	1.37 (0.90 - 2.08)	1.25 (0.82 - 1.89)
Poor/Very poor	2.12 (1.36 - 3.32)	**1.80 (1.15 - 2.80)**
Variables 2016-2017		
Sex		
Male	1	--
Female	0.87 (0.63 - 1.19)	--
Age group (in years)		
65 to 69	1	
70 to 79	0.94 (0.69 - 1.28)	--
80 or over	0.28 (0.23 - 0.36)	--
Education (in years)		
0	1	
1 - 4	0.85 (0.57 - 1.26)	--
5 or more	0.57 (0.34 - 0.95)	--
Overweight		
No	1	1
Yes	1.51 (1.08 - 2.10)	**1.47 (1.05 - 2.06)**
Number of chronic diseases		
0 or 1	1	1
2 or more	1.42 (1.01 - 1.99)	**1.60 (1.12 - 2.28)**
Number of snacks/day*		
0 or 1	1	1
2	1.27 (0.90 - 1.81)	1.30 (0.90 - 1.86)
3 to 5	1.80 (1.22 - 2.66)	**2.01 (1.36 - 2.96)**

[a] Crude PR (95%CI): Crude prevalence ratio and 95% confidence interval. [b] Adjusted PR (95%CI): prevalence ratio adjusted for sex, age and education and 95% confidence interval. *Evaluated at follow-up only.

Figures 2a and 2b show the prevalence of diabetes and the distribution of older adults with diabetes, according to overweight status for 2008-2009 and 2016-2017 data. A higher frequency of those overweight was observed in both periods, with maintenance of the pattern observed (roughly twice as many). It is worth highlighting that, through multiple imputation, the prevalence of diabetes was 30.28% (95%CI: 27.40-33.15), statistically similar to the values observed, considering the losses during the follow-up period (27.46%; 95%CI: 23.28-31.64). Regarding overweight status, again no significant difference was observed: 18.54% (95%CI: 14.89-22.18) and 21.76% (95%CI: 19.17-24.34) for data without and with multiple imputation, respectively.

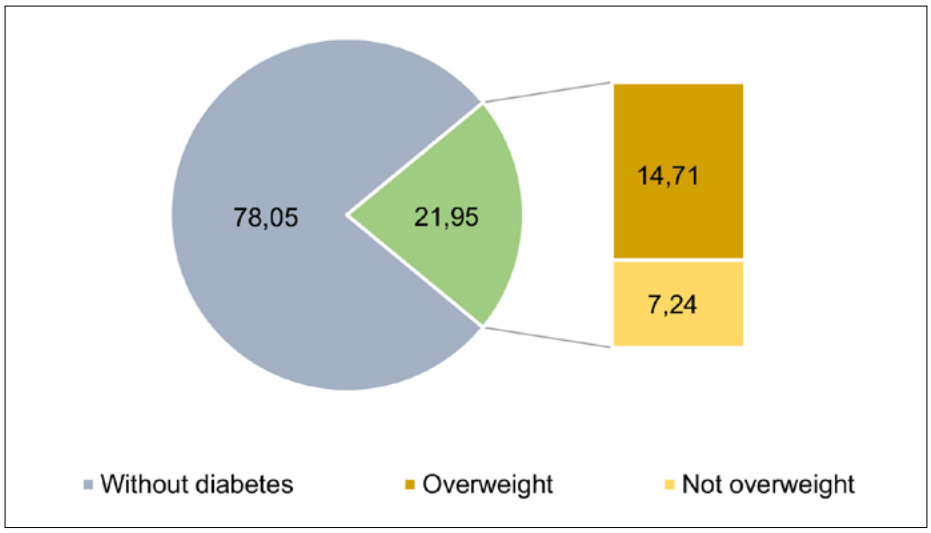

Figure 2a. Prevalence of diabetes, according to overweight status. FIBRA study, Older adults, Campinas and Ermelino Matarazzo, SP, Brazil, 2008-2009.

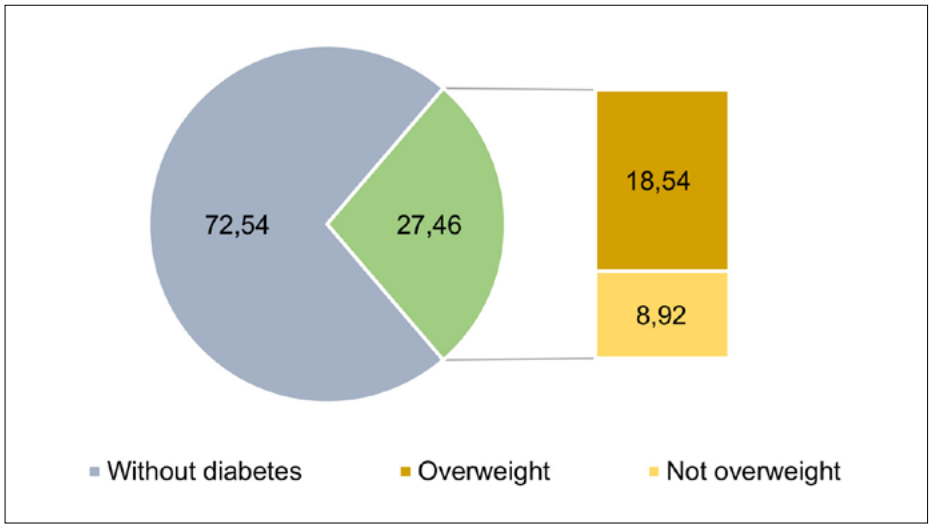

Figure 2b. Prevalence of diabetes, according to overweight status. FIBRA study, Older adults, Campinas and Ermelino Matarazzo, SP, Brazil, 2016-2017.

DISCUSSION

The results obtained in this study showed that in 2008-2009, one in five older adults had diabetes, while in 2016-2017, this ratio was around one in four. For the entire period (average of 9 years) the disease incidence in older adults was 5.51%. Worse perception of health and overweight status were associated with diabetes in older adults at baseline; at follow-up, the latter remained associated, together with the presence of two or more chronic diseases and the consumption of 3 to 5 snacks/day.

Regarding prevalence, similar data were observed for older adults from Florianópolis, SC, (age ≥60 years old) in 2009-2010 (22.1%; 95%CI: 20.1-24.1) during the EpiFloripa study; in relation to disease incidence, after a mean of four years follow-up, 8.3% (95%CI: 6.7-10.3) presented the disease[13]. Data from the 2013 PNS showed that the mean age

at diagnosis of diabetes was 58.5 years old among older adults aged ≥65 years, and about 75% had received a medical diagnosis before reaching this age[22]. This highlights the importance of preventing its occurrence (primary) and, for those affected, its acute and chronic complications (secondary), considering the prolonged course of diabetes mellitus – in this study, the average age of the older adults with diabetes was 71.36 and 80.31 years at baseline and follow-up –, and the presence of multimorbidity, which directly reflects the greater demand for health services[7,20,23].

Self-rated health (SRH) is an important indicator to identify people at higher risk of adverse events, such as mortality and functional disability. A study that used the EuroQol (VAS EQ) to investigate SRH as an independent predictor of vascular events and complications in individuals with type 2 diabetes determined, after controlling for clinical risk factors, that a higher self-rated health score (VAS EQ) >10 points) was associated with 6% and 22% lower risks of vascular events and diabetes complications, respectively[24]. SRH is characterized as a comprehensive health status screening tool and provides important information regarding the magnitude of the disease's effects on the individual[25]. In this study, worse SRH was associated with diabetes at baseline, but not at follow-up. It is important to consider that the increase in chronological age at follow-up (at baseline, the older adults were already 65 years old) may produce overestimated positive evaluations as a result of psychological adaptation, resulting from downward social comparison processes, that is, older adults may feel higher satisfaction than their contemporaries when they perceive themselves as having better health status, even with chronic conditions like diabetes[26].

In this study, overweight status was associated with diabetes at baseline and follow-up. The literature shows a relation between being overweight and diabetes regardless of the indicator used[12,13,23,27]. In older adults, in addition to obesity, aging itself is associated with greater infiltration of fatty tissue in the muscles and liver, which is related to insulin resistance and glucose intolerance[28]. Several anthropometric indices are used to diagnose being overweight[29,30]. It is important to highlight that the waist-to-height ratio, the indicator used in this study to determine overweight status, is recognized as the best anthropometric marker in relation to other indices (body mass index, waist circumference, and waist-to-hip ratio)[29], because in addition to showing better prediction of cardiometabolic risk factors, the adjustment for height enables the definition of a single threshold applicable to the general population, regardless of age, sex or ethnicity[30].

Among the diseases considered by the FIBRA study, both arterial hypertension and heart disease have risk factors in common, particularly being overweight or obese, which are associated with other chronic non-communicable diseases, including diabetes[9]. Furthermore, in this study, about 85% of the older adults with diabetes presented arterial hypertension, which is a morbidity and, at the same time, a risk factor for other diseases[9,14]. It is important to consider that at follow-up, the mean age of the older adults evaluated was 80.62 years old, increasing the risk of the incidence of chronic diseases and multimorbidity, which was also associated with a higher occurrence of diabetes.

In this research, the prevalence of diabetes was twice as high in older adults who consumed a greater number of snacks per day (3 to 5 *vs* 0 to 1). According to the Brazilian Society of Diabetes, food plans for people with diabetes should consider the consumption of five to six meals a day, the three main ones (breakfast, lunch and dinner) and another two or three consisting of snacks, aimed at promoting satiety[4]. However, the quality of food consumed in snacks is essential to prevent body weight gain and maintain glycemic control.

The *Protocolo de Uso do Guia Alimentar para a População Brasileira* [Protocol for Using the Food Guide for the Brazilian Population] for older adults recommends the consumption of *in natura* or minimally processed foods, including fresh or dried fruits, oilseeds, tapioca, milk and natural yogurt, and that the consumption of ultra-processed foods, such as cookies/biscuits, packaged breads, sausages, juice boxes/soft drinks, including those with nutritional claims of "high in fiber", diet or light, should be avoided[31]. An intervention study identified that more frequent food consumption (6 *vs* 3 meals/day), in

smaller amounts, improved glucose concentrations, glycemic control, reduced the sensation of hunger and the desire to eat in obese individuals, and promoted body weight stability[32]. The results obtained in this study suggest that FIBRA participants prioritized the consumption of ultra-processed foods as snacks, and indicated the need for actions to promote healthy eating practices.

Diabetes mellitus remains asymptomatic for many years, resulting in delayed diagnosis and sometimes accompanied by micro and macrovascular systemic complications (cardiovascular diseases, peripheral neuropathy, retinopathy and nephropathy). For this reason, primary care plays an important role in the control of risk factors (unhealthy eating habits, sedentary lifestyle, and obesity), health education, screening and early diagnosis, monitoring, glycemic control, and adequate treatment. From this perspective, disease- and age-specific management, knowledge concerning the risks inherent to poor adherence to treatment and encouragement of self-care are tools that contribute to better control of diabetes and to a reduction in the use of health services[4,33].

This study provides data on the occurrence of self-reported diabetes in older adults – 70 and 80-year-olds – residing in the community. Participants in the FIBRA study are a sample of older adults without cognitive impairment, with better physical, emotional and cognitive status, who attended public spaces for data collection[15], which may have introduced a selection bias that reflects in the underestimation of the condition studied. With regard to the occurrence of diabetes, both the best conditions at baseline and the length of follow-up (around 9 years) may have influenced the magnitude of risk (incidence) over this period. Particularly in relation to the variable use of alcohol, there was a loss of information during follow-up (which could be different if related to exposure), making it impossible to assess the differences between the prevalences. In relation to the variable the practice of leisure-time physical activity, the measurements were not comparable at baseline and follow-up.

Regarding the care of older adults with diabetes, qualified listening, expanded clinical care – understanding the importance of nutritional guidance that considers socioeconomic conditions and living arrangements, in addition to drug treatment – and the recognition of older adults as the main agent in the health-disease-care process, and their autonomy in relation to its treatment, according to Baade and Bueno, constitute:

> powerful strategies to understand living and dealing with diabetes as a unique shared process between patients and health professionals, where the disease is a part of life and not life a part of the disease[34].

CONCLUSION

The results obtained in the study showed an increase in the prevalence of diabetes among older adults and the importance of being overweight in determining the disease, in both periods. The presence of two or more chronic diseases and higher consumption of snacks were also related to diabetes. The findings indicate that older adults with diabetes require specific care management, which includes the provision of educational interventions by health professionals, in addition to expanding care coverage, with greater frequency of care and multidisciplinary assessment, and one that considers comorbidities and other health problems, the social insertion and living arrangements of the older adult, and their support network.

In the context of public policies, in addition to investments aimed at drug treatment and adequate care for patients, governmental programs and campaigns are also essential in order to encourage behavioral changes – the consumption of healthy foods and physical activity, among others –, that favor a reduction in the incidence of diabetes mellitus and its most frequent complications.

Follow-up studies with larger samples, which include others groups older adults residing in the community (the bedridden and those presenting cognitive impairment) and which consider other predictive variables, could contribute to more comprehensive estimates of the incidence of the disease in this age subgroup.

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