Biopsychosocial factors associated with complaints of dizziness in older adults with Type 2 Diabetes *Mellitus*

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Abstract

Objective: To analyze the biopsychosocial factors associated with complaints of dizziness in older adults with Type 2 Diabetes Mellitus. *Methods:* A cross-sectional, descriptive study with a sample selected for convenience was performed in a university hospital. The participants were individuals aged 60 years or older diagnosed with type 2 Diabetes Mellitus. Patients were assessed using a multidimensional survey, containing sociodemographic, clinical-functional, psycho-psychological and cognitive data. The Mini-Mental State Exam and the Short Geriatric Depression Scale (GDS-15) were used to screen for cognitive deficits and depressive symptoms, respectively, and the Timed Up and Go Test was used to assess mobility. Data analysis was performed using the Chi-square and Mann-Whitney tests. *Results:* The sample consisted of 157 older adults of whom 45.22% complained of dizziness. There was a statistically significant association between dizziness and the variables: female sex, being unmarried, a low level of education, a negative self-perception of general health and vision, complaints of pain in the lower limbs, a fear of falling, a tendency to fall, cognitive impairment and psychological symptoms. *Conclusion:* Knowledge of the factors associated with the complaint of dizziness in older adults with DM2 allows improved targeting of prevention, assessment and intervention actions, in order to minimize the occurrence of falls, maintain or optimize functional capacity and cognitive skills, and thus improve quality of life.

Keywords: Health of the Elderly. Dizziness. Diabetes Mellitus Type 2.

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INTRODUCTION

The increase in the number of older adults and growing life expectancy has led to concerns among public health authorities[1,2], as the process of human aging leads to a reduction in organic functions, functional decline, increased dependence and risk factors for chronic non-communicable diseases (NCDs)[2,3], which lead to high costs for governments due to the greater use of health services and the lower productivity of the individual in the labor market. Notable NCDs include cardiovascular diseases (hypertension, heart failure), respiratory diseases, cancer and impaired glucose metabolism (Diabetes Mellitus) [1-3].

Diabetes Mellitus (DM) is an endocrine-metabolic disease characterized by failures in the secretion and action of insulin, as well as in the regulation of hepatic glucose production, which consequently generates blood hyperglycemia. The chronicity of blood hyperglycemia can cause several types of damage to systems and organs, especially the kidneys, nerves, heart, blood vessels and the visual, somatosensory and vestibular systems[4-6].

About nine million Brazilians are self-reported sufferers of DM, according to the National Health Survey[7], a total which corresponds to 6.2% of the adult Brazilian population. However, half of DM patients do not know they have the disease[7].

Among the subclassifications of DM, Type 2 Diabetes Mellitus (DM2) stands out, being the most frequently found glucose metabolism dysfunction among the population, representing around 90% of total cases of DM[4].

In this context, DM2 is responsible for disturbances in postural balance (PB), such as dizziness[6]. Over time, individuals with DM2 can develop diseases such as retinopathy[8] and/or peripheral neuropathy[9] and changes in the vestibular system[10,11], as the inner ear has intense metabolic activity and no energy reserve, which makes it sensitive to acute or chronic disorders in blood glucose levels. Thus, the sensory systems involved in sending information to the Central Nervous System (CNS) to maintain body balance may be altered[8-11].

However, studies that include older adults with DM2 in their samples are scarce[12-14], although dizziness is considered one of the complications of this condition[11].

Dizziness has a great impact on the lives of older adults, as it tends to cause various conditions such as: physical and psychological insecurity, irritability, anxiety, phobias, panic, depression and falls[15,16]. It is therefore extremely necessary to identify the biopsychosocial factors that are associated with dizziness in patients with DM2, as this will represent an important contribution towards developing effective preventive and rehabilitative strategies and, thus, systematizing an ideal model of care for this population.

Therefore, the present study aims to analyze the biopsychosocial factors associated with complaints of dizziness in older adults with type 2 diabetes mellitus.

METHOD

An observational, cross-sectional, descriptive study was carried out in a university hospital offering medium and high complexity care. Data collection took place from November 2016 to November 2017.

The sample calculation was performed from a pilot sample from the study population itself. A power of 80% and a 5% significance level were used for two-tailed hypothesis testing. Among the variables, the largest sample size was obtained for the Time Up Go Test (TUGT)[17]. Thus, it was found that the sample size necessary for the study was at least 138 patients (69 in each group).

This is a sample selected for convenience, consisting of 157 individuals aged 60 years or over, of both sexes, with a clinical diagnosis of DM2, according to the criteria of the American Diabetes Association (ADA), referred by the Endocrinology, Otoneurology and Geriatrics outpatient clinics of a university hospital. The referred older adults were entered into register created by the Liga Acadêmica de Atenção as Pessoas com Diabetes Mellitus (the Academic League for Care of People with Diabetes Mellitus) (performed by the outpatient clinics mentioned above) and, from this, were

invited to a telephone evaluation. During this telephone contact the objectives of the research were explained and the tests carried out and the date of the evaluation was scheduled for those older adults who demonstrated interest.

The study excluded older adults who (a) were experiencing a dizzying crisis at the time of the evaluation (b) had complained of dizziness in the last 30 days[18], (c) had physical and cognitive limitations that prevented the evaluation protocol from being carried out, such as the inability to understand and respond to simple verbal commands and/or imitate movements, (d) had severely reduced visual and hearing acuity that rendered them incapacitated for the performance of activities of daily living, even with the use of corrective lenses and/or hearing aids, (e) had suffered lower limb amputation, regardless of degree (f) were unable to walk (e) could move around by wheelchair only or (f) presented a major discomfort that would make the tests unfeasible.

Following inclusion in the research, the older adults were allocated to the group with complaints of dizziness or without complaints of dizziness, according to their answer to the question *Do you feel dizzy*? It should be noted that the older adults were referred from the outpatient clinics mentioned above, and therefore brought with them tests that proved the complaint of dizziness.

For the evaluation of the older adults treated, an evaluation protocol was applied containing questions related to sociodemographic, clinical-functional and psycho-cognitive data.

The sociodemographic data were composed of the variables: sex, age, age group (from 60 to 69 years old/over 70 years old), marital status and education.

The clinical-functional data consisted of questions related to the self-perception of general health, vision and hearing, which were categorized as excellent, very good, good, poor or very poor; number of drugs in use, number of concomitant diseases, time since diagnosis of DM2, laboratory tests performed in the last six months for the control of DM2 (fasting glucose and glycated hemoglobin), presence of pain in the lower limbs (lower limbs), number of falls in the last year (12 months), tendency to fall and fear of falling. Finally, the TUGT[17] was used to assess mobility.

The TUGT[17] analyzes the time spent in seconds that older adult needs to perform the proposed task, which consists of getting up from a chair with armrests (46 cm high), walking 3 meters, turning around a cone, returning to the chair and sitting down. Before starting the test, the older adults were sitting on the chair, with their arms supported, wearing their normal shoes. When the instructor gave the order to go, the subject started the task. The test was completed the moment the older adult sat in the starting position.

Weight was measured using a BalmakActlife® platform scale and height was measured by a tape measure attached to the wall. For the analysis of pain intensity in lower limbs, the Visual Analogue Scale (VAS) was used, while for the investigation of falls in the last year, tendency to fall and fear of falling the following questions were used: *have you fallen in the last year ?*, *Do you sometimes feel like you are going to fall, but don't?*, *Are you afraid of falling?*, respectively.

The psychological and cognitive data were obtained through the application of the Mini-Mental State Exam (MMSE)[19] and the Geriatric Depression Scale (GDS-15)[20] to screen for cognitive deficit and depressive symptoms, respectively. Values of 13 for illiterate, 18 for low and medium levels of schooling and 26 for high levels of schooling were adopted as cut-off points for the MMSE[19].

The analysis of data distribution was carried out by means of the Kolmogorov-Smirnov test, which identified non-parametric characteristics of the sample. For inferential analysis, associations were made between the dependent variable of the qualitative type of complaint of dizziness (yes or no) and the independent dichotomous variables using the Chi-square test. To analyze the association of the complaint of dizziness with the non-categorical variables (age, years of schooling, number of medications, time since diagnosis of DM2, glycated hemoglobin, VAS of pain in LL, TUGT, MMSE and GDS-15) the Mann-Whitney test was used. It should be noted that for this type of analysis, the median of each quantitative variable is used.

To identify the independent predictive factors for the presence of dizziness, multiple logistic regression analysis was performed. For this, the Stepwise Forward Selection Procedure method was used, in which the variables that make up the model were grouped into blocks, and ordered according to their significance statistic. The modeling was initiated by the lowest p value of the Chi-square test, that is, greater statistical significance, and the other variables were then added one by one, with a critical p value of <0.25 used to compose the model. The permanence of the variable in the multiple analysis occurred through verisimilitude (Likelihood Ratio Test), the absence of multicollinearity, as well as the ability of the variable to improve the model through the Hosmer and Lemeshow test, without interfering with confidence intervals. Finally, waste analysis was performed to isolate cases that exerted undue influence on the model, causing little adherence. In all analyzes a significance level of 5% was considered.

The research was approved by the Ethics Committee on Research with Human Beings under opinion number 1132574. All the older adults signed an informed consent form (ICF) after the objectives, protocols and possible risks of the research were explained.

RESULTS

A total of 212 older adults were contacted to make up the sample. However, 20 were not interested in participating in the research, three died between the period of telephone contact and the date of evaluation and, during the evaluation, five fell ill, 25 did not appear and two were discharged from the clinic and changed their cell phone number. Thus, the sample consisted of 157 older adults (Figure).

The average age of the interviewees was 69.1 (+6.54) years, with a maximum age of 86 years and an average schooling of 6.83 (+5.47) years. The most frequently reported marital status was that of married (including civil unions) (63.7%) and women (65.6%) predominated among the study population.

A total of 45.22% of the total population complained of dizziness. Of this group, 71.23% had rotational dizziness, 13.69% non-rotating, 6.84% both types (rotational and non-rotating) and 8.21% were unable to say which type they suffered from. In addition, 60.64% of this population reported having suffered from dizziness for 3 to 5 years. It is worth mentioning that 51.5% of those experiencing dizziness were women and 46.8% were 70 years old or more. The sociodemographic data of the groups with and without complaints of dizziness are shown in table 1.

When analyzing the clinical-functional variables in relation to the groups studied, there was a higher frequency of older adults with dizziness in the categories of poor or very poor self-perception of general health ($p < 0.0001$) and vision ($p=0.001$), pain in lower limbs ($p = 0.007$), fear of falling ($p = 0.040$), tendency to fall ($p = 0.002$) in comparison with older adults who did not complain of dizziness (Table 2).

Table 3 shows that people with less education have a greater complaint of dizziness (5.17 ± 0.80). As for the visual analog scale, there was a difference in the means of the two groups, and in the group of people with complaints of dizziness, the intensity of pain in the lower limbs is greater (4.79 ± 0.74). In relation to the psycho-cognitive variables, it is seen that they had a lower score on the MMSE and higher scores on the GDS-15, which points to a greater risk of cognitive deficit and a greater number of depressive symptoms.

No statistically significant associations were found between older adults with complaints of dizziness and the variables: age group, self-perceived hearing, number of diseases, falls in the last year, glycated hemoglobin, fasting glucose, number of medications, time since diagnosis of DM, VAS and TUGT.

In the multivariate analysis (Table 4) the variables: poor or very poor self-perception of general health (PR 1.61; 95% CI 1.04-2.48), poor or very poor self-perception of vision (PR 1.62; 95% CI 1.02-2.58) and being unmarried (including civil unions) (PR 1.66; 95% CI 1.14-2.40) exhibited a positive association with the group that reported having dizziness, adjusted for the impaired hearing and falls in the previous year variables.

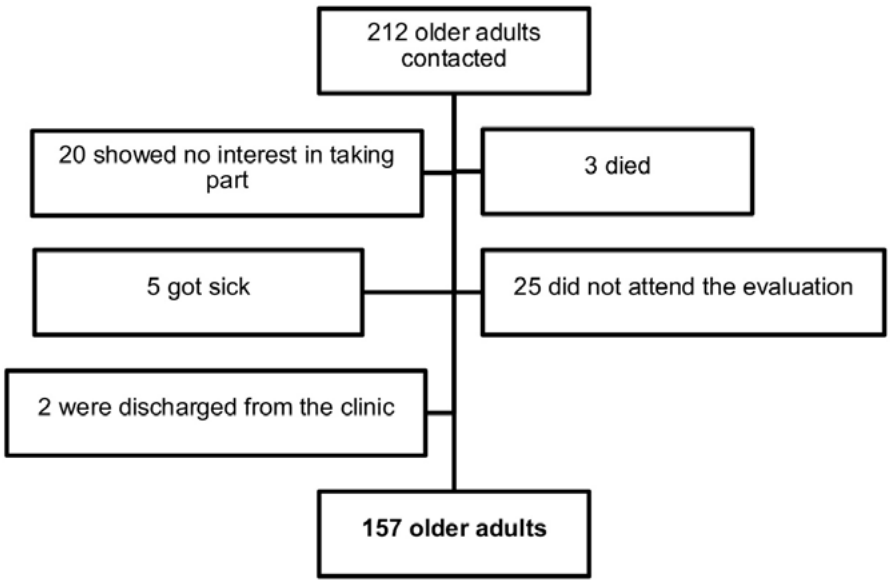

Figure 1. Flowchart of the study sample from contact at the clinic to the time of assessment. Natal, Rio Grande do Norte, Brazil, 2017.

Table 1. Sociodemographic characterization of the sample of older adults with and without complaints of dizziness (N = 157). Natal, Rio Grande do Norte, Brazil, 2017.

Variables	Dizziness Yes (N=71) (%)	Dizziness No (N=86) (%)	Prevalence Ratio	Confidence Interval (95%)	*p*-value (Chi-squared)
Sex					
Female	53 (51.5%)	50 (48.5%)	1,54	1.013 – 2.352	**0.030**
Male	18 (33.3%)	36 (66.7%)			
Age group (years)					
70 or more	29 (46.8%)	33 (53.2%)	1.058	0.747 – 1.499	0.752
60-69	42 (44.2%)	53 (55.8%)			
Marital status					
Married (including civil unions)	35 (61.4%)	22 (38.6%)	1.706	1223 - 2.379	**0.002**
Unmarried	36 (36.0%)	64 (64.0%)			
Years of Schooling					
1 to 3	45 (52.3%)	41 (47.7%)	1.429	0.990 – 2.061	**0.049**
4 or greater	26 (36.6%)	45 (63.4%)			

Table 2. Clinical and functional characterization of the sample of older adults with and without dizziness (N=157). Natal, Rio Grande do Norte, Brazil, 2017.

Variables	Dizziness Yes (N=71) (%)	Dizziness No (N=86) (%)	Confidence Interval (95%)	*p*-value (Chi-squared)
Self-perception of general health				
PoorPoor or very poorpoor	43 (60.6%)	28 (39.4%)	1.301 – 2.659	**<0.0001**
Excellent, very good, good	28 (32.6%)	58 (67.4%)		
Self-perception of vision				
Poor or very poor	43 (58.9%)	30 (41.1%)	1.235 - 2528	**0.001**
Excellent, very good, good	28 (33.3%)	56 (66.7%)		
Hearing self-perception				
Poor or very poor	23 (52.3%)	21 (47.7%)	0.863 – 1.754	0.268
Excellent, very good, good	48 (42.5%)	65 (57.5%)		
Number of diseases				
5 or more diseases	31 (53.4%)	27 (46.6%)	0.943 – 1.857	0.113
1 to 4 diseases	40 (40.4%)	59 (59.6%)		
Glycated Hemoglobin				
Normal (up to 8%)	24 (44.4%)	30 (55.6%)	0.667 – 1.555	0.932
Altered (8.1% or more)	24 (43.6%)	31 (56.4%)		
Fasting Glucose				
Altered (131mg / dL or more)	31 (44.9%)	38 (55.1%)	0.758 – 1.620	0.596
Normal (up to 130mg / dL)	30 (40.5%)	44 (59.5%)		
Complaint of pain in LL				
Yes	46 (55.4%)	37 (44.6%)	1.130 - 2.382	**0.007**
No	25 (33.8%)	49 (66.2%)		
Falls in the last year				
Yes	33 (52.4%)	30 (47.6%)	0.922 – 1.821	0.140
No	38 (40.4%)	56 (59.6%)		
Fear of Falling				
Yes	60 (49.2%)	62 (50.8%)	0.964 – 2.901	**0.040**
No	10 (29.4%)	24 (70.6%)		
Tendency to Fall				
Yes	47 (56.6%)	36 (43.4%)	1220 - 2647	**0.002**
No	23 (31.5%)	50 (68.5%)		

LL: lower limb;

Table 3. Clinical-functional and psycho-cognitive characterization of the sample (N=157) by quantitative variables. Natal, Rio Grande do Norte, Brazil, 2017.

Variables	Dizziness Yes (n=71)			Dizziness No (n=86)			*p*-value (Mann Whitney)
	Mean (SD)	Median	CI (95%)	Mean (SD)	Median	CI (95%)	
Number of medications	6,38 (0,53)	6,00	5,29-7,47	5,70 (0,438)	5,00	4,82-6,59	0,929
Time since DM2 diagnosis (months)	8,59	6,00	6,01-11,17	13,02 (1,679)	10,00	9,63-16,40	0,677
TUGT (seconds)	14,48 (3,13)	10,40	8,06-20,89	10,63 (0,46)	10,00	9,70-11,56	0,214
MMSE (total score)	22,62 (0,802)	23,00	20,98-24,26	25,34 (0,60)	26,50	24,13- 26,55	0,002
GDS-15 (total score)	6,00 (0,566)	5,00	4,84-7,16	4,11 (0,393)	3,00	3,32-4,91	0,030

TUGT: *Timed Up and Go Test; MMSE*: *Mini-Mental State Exam; GDS-15*: *Short Geriatric Depression Scale.*

Table 4. Prevalence ratio of the occurrence of dizziness according to sociodemographic, clinical-functional, cognitive and psychological well-being of older adults with Type 2 Diabetes Mellitus (n = 157). Natal, Rio Grande do Norte, Brazil, 2017.

Variables	Dizziness					
	Yes	No				
	(N=71) (%)	(N=86) (%)	PR	PR Adjusted	CI 95%	*p*-value
Self-perception of general health						
Poor or very poor	43 (60,6%)	28 (39,4%)	1,86	1,61	1,04-2,48	0,033
Excellent, very good, good	28 (32,6%)	58 (67,4%)				
Marital status						
Unmarried	35 (61,4%)	22 (38,6%)	1,71	1,66	1,14-2,40	0,007
Married (including civil unions)	36 (36,0%)	64 (64,0%)				
Self-perception of vision						
Poor or very poor	43 (58,9%)	30 (41,1%)	1,77	1,62	1,02-2,58	0,041
Excellent, very good, good	28 (33,3%)	56 (66,7%)				

Hosmer and Lemeshow Test =0.910; Resid; R2 Nagelkerke =0.194; Model adjusted by the variables Hearing and Falls in previous year.

DISCUSSION

Older adults with DM2 commonly develop, over time, changes in the visual[8], somatosensory[9] and vestibular[10,11] systems which are responsible for PB, and which can make complaints of dizziness more common in this population.

The occurrence of complaints of dizziness in the present study was 45.22% of whom 71.23% presented rotational dizziness, a similar proportion to that found in the population-based study by Moraes et al.[12] who studied 391 older adults, 176 of whom complained of dizziness, of which 70.4% had rotational dizziness and 43.9% DM.

Among the variables studied, the complaint of dizziness in elderly diabetics exhibited an association with sex, education, marital status, self-perception of general health and vision, complaint and intensity of pain in the lower limbs, fear of falling, tendency to fall, psychological symptoms and cognitive changes.

Among the individuals who complained of dizziness, 51.5% were female and 52.3% had a low level of education. The predominance of women can be attributed to hormonal variations, relevant to sex, and to the fact that this population seeks care more frequently[21,22]. The low level of education is a controversial finding in literature. Some studies[23,24] have identified low educational levels in older adults with complaints and/ or the diagnosis of dizziness while others[12,25] have not made this association. It is known, however, that a low level of schooling compromises access to health education and the understanding of medical guidelines. Therefore, these older adults are more likely to have difficulties with the proper follow-up of the treatment advised by the medical team and to have erroneous perceptions of self-care, thus adding to the harm caused by disease carried and, consequently, leading to a decrease in quality of life[26].

Most of older adults with complaints of dizziness were not married (61.4%), a finding which agrees with some studies found in literature[23,25]. From this perspective, the study by Gonçalves et al.[27] deserves to be highlighted, as it found that more than 50.0% of older adults who were married (including civil unions) were cared for by their spouses. Thus, the importance of affective bonds in older adults is highlighted, as well as the role of the caregiver. Both promote health, prevent disabilities and help to maintain the functional capacity of the person cared for, which results in a reduction in hospitalizations, inappropriate use of medications and isolation[28]. These factors may be associated with the presence of complaints of dizziness[23,29]. It is worth noting that no studies were found that identified an association between marital status and complaints of dizziness in the population with DM2.

The population with DM2 who also suffered from dizziness described the self-perception of general health (60.6%) and vision (58.9%) mostly as poor or very poor. Some studies with methodologies similar to that used in the present study identified a negative self-perception of vision in 48.8%[12], 35.4%[25] and 53.3%[12] in relation to general health in the overall older adult population. This higher prevalence of a negative self-perception of vision may be due to the aging process, which brings a greater incidence of eye disorders, such as cataracts and glaucoma, and, consequently, causes a decrease in visual acuity, which negatively affects the maintenance of PB[25]. The negative self-perception of general health may have been caused by the increase in the number of diseases along with the dizziness that reduces the quality of life of its patients[2,3,15].

Older adults with complaints of dizziness also exhibited complaints of pain in the lower limbs (55.4%), which is a common symptom of peripheral neuropathy (PN), a comorbidity commonly developed, over time, by patients with DM2. This condition can interrupt afferent and efferent lower limbs, altering proprioception and, consequently, PB[9,30].

Changes in PB are commonly associated with falls and, therefore, older adults with dizziness report a greater fear of falling and a tendency to fall in relation to the older population in general, as seen in the present study and in literature[31,32]. Duarte and Soldera[32] sought to investigate the association between dizziness, fear of falling and the occurrence of falls in older adults, with the results showing that 97.4% of the total sample studied had a fear of falling and, consequently, found their daily activities restricted. It is worth noting that, in addition to limitations in daily activities, fear of falling can also lead to a reduction in self-confidence, and these factors together cause greater dependence and loss of autonomy[31,32].

In addition, there is a high prevalence of anxiety disorder, phobias and depression in older adults with chronic dizziness[16]. However, the present study focused only on investigating depressive symptoms, as this disease can be screened by any health professional. The results of the present study are similar to those of the study by Peluso et al. which found an association between dizziness and depressive symptoms. Thus, the importance of identifying patients with this type of involvement is emphasized, and is essential that they are referred to specialized care, thus improving the process of intervention in their dizziness and quality of life.

The CNS is one of the systems most affected by anatomic-physiological changes resulting from the aging process. Thus, changes in regions responsible

for cognitive functions are common[33]. Skills such as thinking, remembering, reasoning and producing responses to requests and external stimuli can be deficient and hinder the rehabilitation process[33,34]. Patients with DM2 and complaints of dizziness had lower medians in the MMSE, thus presenting a greater probability of cognitive impairment in this population, a fact that may hinder the balance rehabilitation process, in view of the need to change habits, perform exercises and alter routines[33,34].

Among the variables that showed an association with dizziness, special emphasis should be placed on the self-perception of poor or very poor general health, the self-perception of poor or very poor vision and a marital status of unmarried, as logistic regression analysis showed these to be predictors of dizziness. Thus, older adults in these categories have 61%, 62% and 66% more chance, respectively, of developing dizziness, regardless of the other variables.

Some of the studied variables were not associated with the complaint of dizziness in the study population, namely: self-perceived hearing, age, time since diagnosis and laboratory tests (glycated hemoglobin and fasting glycemia).

It is believed that the complaint of dizziness did not exhibit a statistically significant association with the self-perception of hearing, as it can be directly influenced by several factors, among them life context and experience, culture, education and cognition. In addition, presbycusis (hearing loss common in elderly) has a slow, gradual and progressive character, which allows older adults to develop adaptive strategies and, consequently, reduce the negative self-perception related to hearing loss[35].

It is assumed that the age and time since diagnosis of DM2 were not associated with dizziness due to the fact that all older adults evaluated are constantly being monitored by the multidisciplinary medical team, which allows the disorders caused by DM2 to be reduced.

It should be noted that complaints of dizziness are common in older adults, but are not always sufficiently valued by family members and/or medical staff, as they are vague, unspecific or simply considered innate to the human aging process. However, the description of the complaint provides important information to elucidate the etiology of the condition and/or warn of other disorders, such as hearing, vestibular and memory alterations or risk of falls[8-11].

Therefore, providing diabetic older adults who complain of dizziness with a comprehensive assessment capable of identifying the associated sociodemographic, clinical and psycho-cognitive factors is extremely important from the perspective of developing effective preventive and rehabilitative strategies, as well as to systematize and apply an ideal model of care to this population.

Among the limitations of the present study are the difficulty experienced in obtaining the results of the last laboratory tests (glycated hemoglobin and fasting glucose) of the participants as, although these were requested in advance and access was provided to medical records, there were still losses in the number of patients; the absence of data regarding the triggering factors of the dizziness; and the lack of a causal link, since this study had a cross-sectional design.

It is expected that more studies in this area will be carried out, as literature still provides little information regarding changes in PB in older adults with DM2. With this, it is possible to construct clinical guidelines and public policies that support this population.

CONCLUSION

Among the biopsychosocial factors analyzed in older adults with DM2, it was found that the variables: the female sex, a low education, unmarried marital status, negative self-perception of general health and vision, complaint and intensity of pain in the lower limbs, fear of falling, a tendency to fall, cognitive impairment and psychological symptoms showed a significant association with the complaint of dizziness.

The knowledge of the factors associated with complaints of dizziness in older adults with DM2 allows prevention interventions to be improved, as

well as the methods used to assess postural balance (with the emphasis on sensory systems), general and psycho-cognitive health. Consequently, such knowledge will also help to improve clinical and rehabilitative treatments in order to minimize the occurrence of falls, improve functional capacity and cognitive skills (attention, cognition), thus generating an improvement in quality of life.

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REFERENCES

1. Carneiro DN, Vilela ABA, Meira SS. Evaluation of cognitive deficit, mobility and activities of daily living among elderly. Rev APS. 2016;19(2):203-9.
2. Martinez R, Lloyd-Sherlock P, Soliz P, Ebrahim S, Vega E, Ordunez P, et al. Trends in premature avertable mortality from non-communicable diseases for 195 countries and territories, 1990–2017: a population-based study. Lancet Glob Health. 2020;8(4):511-23.
3. Garcia JS, Ciappina PC, Pereira ECA, Teodoro ECM, Pereira WMP. Evaluation of the functional autonomy of active aged. Rev Ciênc Saúde. 2016;1(1):51-60.
4. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes (2017-2018). São Paulo: AC Farmacêutica; 2017.
5. American Diabetes Association. Classification and Diagnosis of Diabetes. Diabetes Care. 2017;40:11-24.
6. Bittar RSM, Santos MA, Mezzalira R. Glucose metabolism disorders and vestibular manifestations: evaluation through computerized dynamic posturography. Braz J Otorhinolaryngol. 2016;82(4):372-6.
7. Iser BP, Stopa SR, Chueiri OS, Szwarcwald CL, Malta DC, Monteiro HOC, et al. Self-reported diabetes prevalence in Brazil: results from National Health Survey 2013. Epidemiol Serv Saúde 2015;24(2):305-14.
8. Mozetic V, Daou JP, Martimbianco ALC, Riera R. What do Cochrane systematic reviews say about diabetic retinopathy? São Paulo Med J. 2017;135(1):79-87.
9. Maronesi CTP, Cecagno-Zanini SC, Oliveira LZ, Bavaresco SS, Leguisamo CP. Physical exercise in patients with diabetic neuropathy: systematic review and meta-analysis of randomized clinical trials. Fisioter Pesqui. 2016;23(2):216-23.
10. David LZ, Finamor MM, Buss C. Possible hearing implications of diabetes mellitus: a literature review. Rev CEFAC. 2015;17(6):2018-24.
11. Jáuregui-Renaud K, Sánchez B, Olmos A I, González-Barcena D. Neuro- otologic symptoms in patients with type 2 diabetes mellitus. Diabetes Res Clin Pract. 2009;84(3):45- 7.
12. Moraes SA, Soares WJS, Rodrigues RAS, Fett WCR, Ferriolli E, Perracini MR. Dizziness in community-dewelling older adults: a population-based study. Braz J Otorhinolaryngol. 2011;77(6):691-9.
13. Shapovalova MV, Zamergrad MV. Persistent postural perceptual dizziness of the elderly. Zh Nevrol Psikhiatr Im S S Korsakova. 2019;119(9):5-9.
14. Van Vugt VA, Bas G, Van der Wouden JC, Dros J, van Weert HCPM, Yardley L et al. Prognosis and Survival of Older Patients With Dizziness in Primary Care: a 10-Year Prospective Cohort Study. Ann Fam Med. 2020;18(2):100-9.
15. Rocha Júnior PR, Kozan ES, Moraes JF, Pereira FG, Moreno AB. Vestibular rehabilitation in the quality of life and the symptomatology of dizziness among the elderly. Ciênc Saúde Colet. 2014;19(8):3365-74.
16. Peluso ETP, Quintana MI, Ganança FF. Anxiety and depressive disorders in elderly with chronic dizziness of vestibular origin. Braz J Otorhinolaryngol. 2016;82(2):209-14.
17. Podsiadlo D, Richardson S. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc. 1991;39(2):142-8.
18. Van Vugt VA, Van der Horst HE, Payne RA, Maarsingh OR. Chronic vertigo: treat with exercise, not drugs. BMJ. 2017;358:1-10.
19. Bertolucci PH, Brucki SM, Campacci SR, Juliano Y. The Mini-Mental State Examination in a General Population: Impact of Educational Status. Arq Neuropsiquiatr. 1994;52(1): 1-7.
20. Almeida OP, Almeida SA. Confiabilidade da versão brasileira da Escala de Depressão Geriátrica (GDS) versão reduzida. Arq Neuropsiquiatr. 1999;57(2B):421-6.
21. Martins TF, Mancini PC, Souza LM, Santos JN. Prevalence of dizziness in the population of Minas Gerais, Brazil, and its association with demographic and socioeconomic characteristics and health status. Braz J Otorhinolaryngol. 2017;83(1):29-37.

22. Bittar RSM, Lins EMDVS. Clinical characteristics of patients with persistent postural-perceptual dizziness. Braz J Otorhinolaryngol. 2015;81(3):276-82.

23. Ferreira LMBM, Jerez-Roig J, Ribeiro KMOBF, Moreira FSM, Lima KC. Association between continuous use drugs and dizziness in institutionalized elderly people. Rev CEFAC. 2017;19(3):381-6.

24. Gazzola JM, Ganança FF, Aratani MC, Perracini MR, Ganança MM. Clinical evaluation of elderly people with chronic vestibular disorder. Rev Bras Otorrinolaringol. 2006;72(4):515-22.

25. Rosa TS, Moraes AB, Santos Filha VAV. The institutionalized elderly: sociodemographic and clinical-functional profiles related to dizziness. Braz J Otorhinolaryngol. 2016;82(2):159-69.

26. Andrade JMO. Influence of socioeconomic factors on the quality of life of elderly hypertensive individuals. Ciênc Saúde Colet. 2014;19(8):3497-504.

27. Gonçalves LHT, Costa MAM, Martins MM, Nassar SM, Zunino R. A dinâmica da família de idosos mais idosos no contexto de Porto, Portugal. Rev Latinoam Enferm. 2011;19 (3):1-9.

28. Brasil. Ministério da Saúde, Secretaria de Atenção à Saúde, Secretaria de Gestão do Trabalho e da Educação na Saúde. Guia prático do cuidador. Brasília, DF: MS; 2008.

29. Sousa RF, Gazzola JM, Ganança MM, Paulino CA. Correlation between the body balance and functional capacity from elderly with chronic vestibular disorders. Braz J Otorhinolaryngol. 2011;77(6): 791-8.

30. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes (2015-2016). São Paulo: AC Farmacêutica; 2016.

31. Nascimento JS, Tavares DMS. Prevalence and factors associated with falls in the elderly.Texto Contexto Enferm. 2016;25(2): e0360015 [9 p.].

32. Duarte GA, Soldera CLC. Associação entre queixa de tontura, medo de cair e ocorrência prévia de idosos. Rev Bras Geriatr Gerontol. 2013;7(3):208-14.

33. Andrade FLJP, Lima JMR, Fidelis KNM, Jerez-Roig J, Lima KL. Cognitive impairment and associated factors among institutionalized elderly persons in Natal, Rio Grande do Norte, Brazil. Rev Bras Geriatr Gerontol. 2017;20(2):186-97.

34. Melo BRS, Diniz MA, Casemiro FG, Figueiredo LC, Santos-Orlandi AA, Haas VJ et al. Cognitive and functional assessment about elderly people users of health public servisse. Esc Anna Nery Rev Enferm. 2017;21(4): e20160388 [8 p.].

35. Costa-Guarisco LP, Dalpubel D, Labanca L, Nisihara MH. Perception of hearing loss: use of the subjective faces scale to screen hearing among the elderly. Ciênc Saúde Colet. 2017;22(11):3579-88.