

## Factors associated to the dependence of older adults with diabetes mellitus type 2

*Fatores associados à dependência entre idosos com diabetes mellitus tipo 2*  
*Factores asociados a la dependencia entre ancianos con diabetes mellitus tipo 2*

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### ABSTRACT

**Objective:** to identify factors associated to the dependence of older adults with Diabetes Mellitus, Type 2 **Method:** analytical and epidemiological study with 99 older adults. The Brazilian Multidimensional Functional Assessment Questionnaire and a questionnaire composed by socio-demographic and clinical variables were used. The independent variables were described and compared to the level of dependence obtained by the chi-square test or the Fisher test, the strength of association was estimated by Odds Ratio and multiple regression. **Results:** the level of dependence prevailed in 79.8% of the sample. Higher chances of dependence were associated to: cutting toenails; performing household chores; presenting geriatric problems; urinary incontinence; time of diagnosis of diabetes; falls in the past year; and physical inactivity. **Conclusion:** considering the positive association of diabetes mellitus to the increased chance of dependence among older adults, there is need for direction and adoption of effective measures to ensure the functionality and quality of life of older adults with diabetes mellitus in a fair and democratic way.

**Descriptors:** Geriatric Nursing; Older Adult; Older Adult's Health; Diabetes Mellitus; Risk Factors.

### RESUMO

**Objetivo:** identificar fatores associados à dependência entre idosos com *Diabetes Mellitus* (DM) tipo 2. **Método:** estudo epidemiológico-analítico com 99 idosos. Utilizados o Questionário Brasileiro de Avaliação Funcional Multidimensional e um questionário com variáveis sociodemográficas e clínicas. Descreveram-se as variáveis independentes comparando-as com o grau de dependência obtido pelo teste do Qui-Quadrado ou de Fisher, e estimou-se a força de associação por *Odds Ratio* e regressão múltipla. **Resultados:** prevaleceu o nível de dependência em 79,8% da amostra. Associaram-se com maior chance de dependência: cortar unhas dos pés; realizar limpeza doméstica; apresentar problemas geriátricos; incontinência urinária; tempo de diagnóstico de diabetes; queda no último ano; e inatividade física. **Conclusão:** considerando-se a associação positiva do DM com o aumento da chance de dependência entre idosos, há necessidade de direcionamento e adoção de medidas eficazes para garantir a funcionalidade e qualidade de vida dos idosos com DM de maneira equânime e democrática.

**Descritores:** Enfermagem Geriátrica; Idoso; Saúde do Idoso; *Diabetes Mellitus*; Fatores de Risco.

### RESUMEN

**Objetivo:** identificar factores asociados a la posibilidad de dependencia entre ancianos con *diabetes mellitus* (DM) tipo 2. **Método:** estudio epidemiológico-analítico con muestra de 99 ancianos. Para la recolección de los datos, han sido utilizados el Cuestionario Brasileño de Evaluación Funcional Multidimensional y un cuestionario con variables sociodemográficas y clínicas. Se describieron las variables independientes comparándolas con el grado de dependencia obtenido por medio de la prueba Chi-Cuadrado o de Fisher, y se estimó la fuerza de asociación por *odds ratio* y regresión múltiple. **Resultados:**

prevalció el nivel de dependencia en el 79,8% de la muestra. Se asociaron a una mayor posibilidad de dependencia: cortar las uñas de los pies; desarrollar actividad de limpieza doméstica; presentar problemas geriátricos; incontinencia urinaria; tiempo de diagnóstico de diabetes; caída en el último año; e inactividad física. **Conclusión:** considerándose la asociación positiva de DM con el aumento de la posibilidad de dependencia entre ancianos, se evidencia la necesidad de direccionamiento y adopción de medidas eficaces para garantizar la funcionalidad y calidad de vida de los ancianos con DM de manera ecuánime y democrática.

**Descriptores:** Enfermería Geriátrica; Anciano; Salud del Anciano; *Diabetes Mellitus*; Factores de Riesgo.

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## INTRODUCTION

Since last century, the epidemiological and demographic profile of Brazil has gone through transformations due to the aging population and the increase of non-communicable diseases. These conditions are prevalent and long-lasting, thus demanding constant interventions from the public health system and from the Brazilian social security, multidisciplinary teams, early retirement, high rates of investment in human resources and materials<sup>(1)</sup>.

Aging is a natural and physiological process, in which, among others, physical, biological, psychological and social changes occur. Although aging does not necessarily relate to non-communicable diseases and disabilities (NCDs), older adults become more vulnerable to such morbidities<sup>(2)</sup>.

Diabetes Mellitus type 2 is highlighted among these conditions because of the exponential increase of its prevalence, being considered an important public health problem. Despite increasingly diverse and sophisticated technological and pharmacological developments to control diabetes mellitus, a multifactorial approach is still necessary, by means of a multidisciplinary team involved from primary to tertiary care. When mentioning a multidisciplinary approach, the role of the nursing professional must be considered. This professional develops a work with transformative potential in achieving justice and social equality in every age group, including older adults with chronic diseases. Given this context, on a fair and democratic assistance, it is essential that nursing develops actions to promote health and disease prevention, as well as therapeutic interventions able to minimize the factors that interfere with functional capacity<sup>(3)</sup>.

Functional capacity is the state of independence to perform the Activities of Daily Living (ADL) that a human being must possess to live with autonomy both in his/her home and in the community<sup>(4)</sup>. The years lived, associated with comorbidities such as diabetes mellitus, favor greater chances of developing functional dependence<sup>(1,4)</sup>. In this sense, the evaluation of the functional capacity of older persons is essential for the identification of impairment and the need for aid on their activities<sup>(5)</sup>.

Several clinical data, standardized and validated tests and scales are used in Brazil to analyze the functional status of older individuals, for example: Katz index, Lawton index, Timed Up & Go Test (TUG), Functional Reach Test (FRT), Older Americans Research and Services (OARS), Brazilian Multidimensional Functional Assessment Questionnaire (BOMFAQ), Functional Independence Measure (FIM), Mini-mental State Examination (MMSE), among others<sup>(6-8)</sup>. However, there is still a gold standard method set. These instruments measure the functional capacity

of the older adult to execute the ADL through some criteria: eating, bathing, dressing, going to the restroom, walking, moving from the bed to a chair, moving in bed, presenting control of urinary and anal sphincters and performing Instrumental Activities of Daily Living (IADL), in this case to measure the autonomy to prepare food, wash clothes, take care of the house, go shopping, go to the doctor and attend social meetings<sup>(6)</sup>.

Considering what was presented, we note the importance of obtaining information about the living and health conditions of this population group, which could subsidize the identification of their needs and, subsequently, the appropriate planning for the implementation of interventions, monitoring of the evolution of the problem and resolution, to better understand and measure the functional capacity of the older population with diabetes mellitus. Thus, the objective of this study was to identify factors associated to the dependence of older adults with diabetes mellitus type 2.

## OBJETIVO

The objective of this study was to identify factors associated to the dependence of older adults with diabetes mellitus type 2.

## METHOD

### Ethical aspects

This study followed the ethical precepts established by Resolution No. 466/2012 of the National Health Council (CNS – *Conselho Nacional de Saúde*), which regulates research involving human beings. The research project was reviewed and approved by the Research Ethics Committee of the Federal University of São Paulo (CEP UNIFESP). All participants signed the Informed Consent Form to ensure the confidentiality of the information collected.

### Study design, place and period

Epidemiological, analytical and population-based study with all older adults diagnosed with diabetes registered in nine teams of Brazil's Family Health Strategy (FHS) of the municipality of Montes Claros, north of Minas Gerais State, Brazil.

### Sample and inclusion and exclusion criteria

The data collection took place from January to March of 2011, at the home of the older adults. The subjects were defined through a search of patient records of the FHS – within the scope of the Family Health Support Centers (NASF – *Núcleo de Apoio à Saúde da Família*) to identify the number of older

adults of 60 years or older with a diagnosis of diabetes mellitus type 2 registered in the HIPERDIA Program. This Program is intended to register and monitor patients with hypertension and/or diabetes mellitus treated in the ambulatory network of the Unified Health System (SUS – *Sistema Único de Saúde*), and also provides information for acquisition, dispensing and distribution of medicines regularly and systematically to all registered patients. The search found 167 older adults, out of these, 99 composed the final sample, due to losses during data collection, as 28 presented only the hypertension diagnosis; 16 had died at the time of the research; 10 changed their address at the time of data collection; and 14 did not meet the inclusion criteria proposed in the research (two did not score more than 14 points in the cognitive measurement performed by the Mini-mental test); 11 were not found at their homes after three attempts to contact them and one was not located at the address provided.

### Study protocol

To identify the social, economic, demographic and health profile of the older adults, a structured questionnaire was applied in the form of an interview containing the following variables: age, sex, marital status, level of education and monthly income.

Among the clinical variables, the predisposing factors for change in the functional capacity of the older adults were researched: pain, use of medications, hospitalization in the past year, history of falls; variables related to geriatric problems, such as the presence of partial or total immobility, postural instability, iatrogeneses, urinary and fecal incontinence, cognitive and family impairment; memory self-reported as excellent, good, regular and bad and perception of health as excellent, good, regular, bad and cannot inform.

Variables related to the diagnosis of diabetes mellitus type 2 were also researched: time of diagnosis (less than one year, one to three years, four to seven years, eight to eleven years, twelve to fifteen years, sixteen to nineteen years and twenty years or more); presence of other comorbidities; presence of macrovascular and microvascular complications (coronary artery disease, cerebrovascular disease and peripheral vascular disease); treatment of diabetes mellitus; and self-reported perception that diabetes mellitus hampers activities.

Regarding self-reported global function at home, we assessed: walking alone without support; restriction to the bed; paralysis of limbs; difficulty of cutting toenails; performing household tasks; practicing physical activity; travelling and driving. For the assessment of daily activities and estimating the level of dependence we used a structured questionnaire based on the Brazilian Multidimensional Functional Assessment Questionnaire (BOMFAQ) – which is based on the OARS Multidimensional Functional Assessment Questionnaire (OMFAQ), one of the first instruments for the multidimensional assessment of older adults, developed in the USA by the Center for the Study of Aging and Human Development<sup>(9)</sup>.

The instrument is composed by 15 questions: seven referring to ADL (laying down/getting out of bed, eating, walking on a flat surface, bathing, dressing, going to the restroom in time and going up stairs) and eight to investigate the IADL (taking care of appearance, taking the medications on time, walking close to home, shopping, preparing meals, cutting

toenails, using public transportation and performing household tasks). For each question a point was awarded for answers like “I have much or little difficulty” and zero point for the answer: “I have no difficulty”. Subsequently, the scores of the answers were added, allowing us to evaluate the level of dependence, the scores of: zero = no dependence; one to three points = mild dependence; four to six points = moderate dependence and seven or more = severe dependence.

### Analysis of results and statistics

Regarding data analysis, the dependent variable of the study was the level of dependence, defined as “dependence” (0) “no dependence” (1). The independent variables were socio-economic, clinical, of global function, described in accordance to their distribution of absolute frequency (n) and percentage (%), and according to descriptive statistics, namely: mean value, standard deviation (SD), median and minimum and maximum values ( $f_{max}$  and  $f_{min}$ ), when necessary.

Univariate analysis was used to compare the level of dependence with the independent variables through the chi-square test ( $X^2$ ) or Fisher's exact test. We decided to consider as the baseline for the level of dependence, no dependence and socio-economic, clinic and global function characteristics of the older adults with mild, moderate or severe dependence. We note that in this analysis the independent variables had their categories grouped. We estimated the strength of association using Odds Ratio (OR) with confidence interval of 95% (95% CI).

Multinomial logistic regression analysis was then used to analyze the relations between the dependent variable “level of dependence” with the independent variables (geriatric problems, cutting toenails, performing household tasks, presenting urinary incontinence). For the inclusion of independent variables in this technique we selected those that presented  $p < 0.2$  on the univariate analysis. The entry process was done by Stepwise (one variable at a time), considering possible confounding variables. The OR risk measures were estimated for each variable individually in the gross OR model and in the OR adjusted by the model. The statistical package SAS 9.1.3 was used.

## RESULTS

Of the 99 participants, 72.7% (n = 72) were women; the average age was 68.8 years (standard deviation of 7.2 years and median of 67); 41.5% (n = 41) were illiterate; 45.5% (n = 45) reported to be widows; 44.4% (n = 44) lived with their sons/daughters; and 90.9% (n = 90) reported not exercising any remunerated activity, with 57.6% (n = 57) having monthly income of up to 01 (one) monthly minimum wage.

From the sample, 24.2% (n = 24) reported being diagnosed with the disease for more than 20 years and 94.9% (n = 94) claimed to have other problems besides diabetes mellitus. Regarding the complications generated by diabetes mellitus, 54.5% (n = 54) claimed to have developed a problem, being diabetic retinopathy (DR) the most prevalent, present in 38.4% (n = 38) of the respondents. As for the drug treatment, 98% (n = 97) performed it.

Regarding the clinical variables, 99% (n = 98) reported use of prescription drugs, 58 (58.6%) denied the practice of

self-medication; 73.7 (n=73) denied the occurrence of an episode of hospitalization in the past year; 77.8 (n=77) did not present any fall in the last year; and 59.6 % (n=59) presented geriatric problems. Regarding diabetes, 24.2% (24) reported time of diagnosis of 20 years or more. Almost all older adults interviewed, 98% (n=97) did the treatment for diabetes. We highlight that 94.9% (n=94) stated to present other problems, such as coronary artery disease, 12.1% (n=12) and nephropathy, 12.1% (n=12).

Regarding the level of dependence of the older adults according to the BOMFAQ, we identified that 20.2% (n=20) presented no dependence, 40.4% (n=40) presented mild dependence, 20.2% (n=20) moderate dependence and 19.2% (n=19) severe dependence.

Through gross OR it was possible to verify the magnitude of the associations and identify that the socio-economic variables studied (sex, educational level and marital status) presented no statistically significant association to the level of dependence in this study. On the other hand, age obtained an approximate value to the significance level adopted (5%), being age (p=0.072). Regarding the clinical variables, these were associated to the chance of dependence: falls in the past year (p=0.039), presence of geriatric problems (p=0.012), urinary incontinence (p=0.011), time of diagnosis of diabetes (p=0.048), difficulty in cutting toenails (p = 0.022), performing household tasks (p=0.003) and physical inactivity (p=0.020), as shown in Table 1.

**Table 1** – Selected factors (p<0.20) for the adjustment of the multinomial logistic regression model, Montes Claros, Minas Gerais, Brazil, 2011

Variable	Category	Level of dependence		Gross OR [95% CI]	p value
		No dependence n=20	Dependence (Mild, Moderate, Severe) n=79		
Sociodemographic					
Sex	Male	8	19	1.00	0.153
	Female	12	60	2.10 [0.75 – 5.91]	
Age (years)	50 – 69	16	44	1.00	0.072
	≥ 70	4	35	3.18 [0.98 – 10.38]	
Clinic					
Feels pain	No	5	10	1.00	0.169
	Yes	15	69	2.30 [0.69 – 7.71]	
Hospitalization in the past year	No	18	55	1.00	0.088
	Yes	2	24	3.93 [0.84 – 18.27]	
Falls in the past year	No	19	58	1.00	0.039
	Yes	1	21	6.88 [0.87 – 54.62]	
Geriatric problems	No	13	27	1.00	0.012
	Yes	7	52	3.58 [1.28 – 10.02]	
Postural instability	No	17	52	1.00	0.111
	Yes	3	27	2.94 [0.79 – 10.93]	
Urinary incontinence	No	19	52	1.00	0.011
	Yes	1	27	9.87 [1.25 – 77.71]	
Memory	Good/Excellent	15	40	1.00	0.077
	Regular/Bad	5	38	2.85 [0.94 – 8.61]	
Health perception	Good/Great	18	56	1.00	0.091
	Bad/terrible	2	23	3.70 [0.79 – 17.23]	
Diagnosis of diabetes					
Time of diagnosis	≤ 11 years	13	31	1.00	0.048
	≥ 12 years	7	46	2.76 [0.98 – 7.69]	
Global function					
Difficulty of cutting toenails	No	16	39	1.00	0.022
	Yes	4	40	4.10 [1.26 – 13.37]	
Performing household chores	No	19	49	1.00	0.003
	Yes	1	30	11.63 [1.48 – 91.41]	
Travel	No	18	52	1.00	0.052
	Yes	2	27	4.67 [1.00 – 21.65]	
Practice of physical activity	No	19	54	1.00	0.020
	Yes	1	25	8.79 [1.11 – 69.43]	

**Table 2** – Logistic regression models of the factors associated to the dependence of older adults, Montes Claros, Minas Gerais, Brazil, 2011

Variables	Dependence	
	OR <sub>gross</sub> (95%CI)	OR <sub>adjusted</sub> (95%CI)
Model 1*		
Geriatric problems		
No	1.00	1.00
Yes	3.58 [1.28 – 10.02]	3.02 [1.05 – 8.69]
Difficulty to cut toenails		
No	1.00	1.00
Yes	4.10 [1.26 – 13.37]	3.47 [1.04 – 11.59]
Model 2**		
Difficulty in home cleaning		
No	1.00	1.00
Yes	11.63 [1.48 – 91.41]	10.05 [1.15 – 88.26]
Urinary incontinence		
No	1.00	1.00
Yes	9.87 [1.25 – 77.71]	9.98 [1.15 – 86.42]
Uses clean socks		
Yes	1.00	1.00
No	5.55 [1.11-37.44]	5.61 [1.11-28.32]
Model 3***		
Age (years)		
50 – 69	1.00	1.00
≥ 70	3.18 [0.98 – 10.38]	4.94 [1.30 – 18.74]
Geriatric problems		
No	1.00	1.00
Yes	3.58 [1.28 – 10.02]	3.53 [1.10 – 11.31]
Diabetes hinders daily activity		
No	1.00	1.00
Yes	4.67 [1.00 – 21.65]	5.25 [1.03 – 26.78]

Note: \* Chi-square test of the model = 10.84 (two-degree-of-freedom) ( $p=0.004$ ); \*\* Model adjusted by sex and activity of cutting toenails. Chi-square test of the model = 26.14 (five-degree-of-freedom) ( $p<0.0001$ ); \*\*\* Model adjusted by sex time of diagnosis of diabetes. Chi-square test of the model = 21.05 (five-degree-of-freedom) ( $p=0.001$ ).

Table 1 presents the association of clinical variables of participants and their relation to the chance of developing some degree of dependence.

Table 2 shows the results of the multiple logistic regression. On model 1, bivariate analysis showed that the chance of the older adults to develop dependence set by the independent factors presented a small decrease in relation to two variables respectively: geriatric problems, (OR=3.58) to (OR=3.02), and difficulty of cutting toenails, (OR=4.10) to (OR=3.47). On model 2, after bivariate analysis of the dependent variable (dependence on the ADL) with independent variables (sex and cutting toenails (OR=4.10) [95% CI=1.26-13.37], we note that the chance of developing dependence on the variable difficulty on household tasks decreased: (OR=11.63) to (OR=10.05). An increased chance of developing dependence was found regarding urinary incontinence: (OR=9.87) to (OR=9.98). On the logistic regression model 3, bivariate analysis of the dependent variable (dependence on the ADL) with independent variables (sex and time of diagnosis of diabetes) demonstrates a greater chance for dependence between respondents aged 70 years or more, because there was an

increase: (OR=3.18) to (OR=4.94). However, the variable analysis of geriatric problems reveals a slight decrease in the chance to develop dependence when compared to sex and time of diagnosis of diabetes (OR=3.58) to (OR=3.53). There was also a significant increase in the chance of developing dependence on the respondents who claimed that diabetes mellitus interferes on daily life activities, going from (OR=4.67) to (OR=5.25).

## DISCUSSION

Assessing functional capacity is fundamental to identify the commitment and the need for aid for the activities of maintenance and promotion of personal health and management of the home environment by older adults. Assessing it also allows public policies for health care and social policies to be directed towards this group, providing the basis for the nursing practice to work on building a more democratic society<sup>(10)</sup>. Thus, following and guiding actions specific to the older population group is crucial to prevent dependencies and to promote a more active life, since most of the time during the aging process these people are sedentary, with a decline in physical and functional capacities<sup>(11)</sup>.

The development of gerontological care to diabetes mellitus demands interaction to understand and comprehend their way of living as well as their families and/or individuals involved in the process.

A study developed in the south region of Brazil shows that older patients with diabetes are two to three times more likely to become unable to perform some usual activities, such as going up stairs and walking around a block, when compared to those without diabetes<sup>(12)</sup>.

In this study, the analysis of the functional capacity of older adults with diabetes mellitus, type 2 through the recognition of the degree of difficulty in the ADL and IADL, showed that 79.8% of the participants presented some level of dependence: 40.4% mild dependence, 20.2% moderate dependence and 19.2% severe dependence. The result demonstrates the magnitude of the effects of diabetes mellitus, type 2 on functional capacity for the ADL and IADL.

Cutting toenails, cleaning the house and climbing stairs were the actions that presented greater difficulties. These results corroborate with other Brazilian studies, which identified the activities with the highest degree of difficulty as: going up and down stairs, cutting toenails, driving, using public means of transportation, cleaning the house, leaving the house, performing household chores, shopping for various things, taking

the medication on time, walking nearby home<sup>(13)</sup>, handling money, performing housework, washing any article of clothing and using the phone<sup>(14)</sup>.

The obstacles present in the realization of the ADL and the IADL are associated to the reduction of basal metabolism, of energy reserves, of muscle/bone mass and of the capacity of reaction to stressors. These characteristics accompany the aging process and can lead to frailty syndrome, which exposes autonomous older adults to functional loss and dependence<sup>(15)</sup>.

Chronic diseases such as diabetes mellitus tend to manifest more expressively on older adults and at this stage of life they often occur concomitantly with other diseases. Such conditions tend to significantly impair the quality of life of older adults<sup>(16)</sup>.

The findings of this research are consistent with a study carried out in the countryside of Minas Gerais, which noted the dependence of 23.9% of older adults with diabetes mellitus type 2 to cut toenails, especially among those with a diagnostic time equal to or more than five years<sup>(16-17)</sup>. The self-care with the hygiene of the feet and the constant inspection to detect any injury will depend on the ability of the individual to examine him/herself. In unfavorable conditions when the older adult tries to perform these actions, the risk of developing injuries, infections and, consequently amputations is increased<sup>(18-20)</sup>. To prevent these complications, it is important to detect the factors that expose the feet to risk early and to intensify the educational process of the family and of the patients with diabetes mellitus type 2 on the need for cleaning, daily inspection, use of proper footwear and actions that avoid trauma to the feet<sup>(17)</sup>.

To properly manage chronic conditions, patients and their families need help and support, especially for older adults. The treatment of chronic diseases should be oriented with focus on the patient and on the family, since diabetes mellitus demands constant care to maintain the quality of life and metabolic control, therefore, developing self-care skills is essential for the management of the disease<sup>(12)</sup>.

The results of this study are similar to those of other studies regarding house cleaning, since we identified the need for aid for some older adults to perform activities that require more muscle strength, such as cleaning the floor or windows. Other respondents performed no activities due to physical limitations or not knowing how to perform them<sup>(14,18)</sup>.

Regarding the practice of physical activities, a research developed in the state of Rio Grande do Sul, Brazil, corroborates with this study by pointing that individuals classified as sedentary were nearly three times more likely to develop functional incapacity when compared to those who constantly practiced physical exercise<sup>(19)</sup>.

Regarding the Basic Activities of Daily Living (BADL), we identified a significant association between the development of dependence of the older adults and concomitant urinary incontinence with diabetes mellitus, which confirms other studies<sup>(14,16,19)</sup>. This is worrying, since the embarrassment caused can lead to social isolation<sup>(20-21)</sup>, interfere with the sex life, in performing domestic chores and working<sup>(21)</sup>, as well as contributing to changes in self-esteem and self-image and impairing the realization of instrumental activities of daily living<sup>(16)</sup>.

Association between urinary incontinence and diabetes

mellitus was observed. A study in Pernambuco, Brazil (2009) identified a high prevalence of urinary incontinence in almost 50% of the sample of surveyed women, especially those of advanced ages, housewives and diabetic<sup>(22)</sup>.

Despite urinary incontinence presenting a multifactorial cause, factors such as predisposing diseases, advanced age, multiparity, previous surgeries and hypoestrogenism significantly contribute to the loss of sphincter function, due to the clinical picture of vulnerability of the pelvic floor, atrophy of muscles and tissues, decrease on the functional capacity of the nervous and circulatory systems and decrease on the bladder volume due to aging<sup>(23-24)</sup>. This is a worrying condition because the lack of control of sphincters can lead to social isolation, changes in self-esteem and self-image and harm the IADL<sup>(10)</sup>. In addition, urinary incontinence has a strong relation with the history of falls, another significant factor in this study. Physiological conditions of aging are known to be closely related to conditions that contribute to falls. Estimations claim that in the period of a year, about 30% of the older adults with 65 years or older suffer some kind of fall. Among those aged 80 to 85 years this index is even higher, approximately 40%<sup>(23)</sup>. Falls are the main disabling events for a healthful living above 60 years old, since they can lead to a pathological condition that demands assistance<sup>(24)</sup>.

An analytical and observational study developed with a group of diabetics and a control group, observed that when the fall involves people with diabetes mellitus there is higher incidence of cognitive disorders and functional mobility, in addition to worse mobility on those with greater cognitive decline. The worse functional mobility and worse cognitive performance of patients with diabetes can be a result of poor glycemic control, overlapped to other aspects inherent to the disease<sup>(25)</sup>.

Although pain presented no statistical relation in this study, a population survey with older adults without cognitive deficit, residents in the city of São Paulo, Brazil, showed that the risk of falling was greater (48%) among those with pain and urinary incontinence diagnosis, i.e., the association between chronic pain and urinary incontinence significantly increased the chances of falling<sup>(26)</sup>.

Regarding the time of diagnosis, the longer a person lives with diabetes, the greater the chance of developing some level of dependence. Thus, a late diagnosis and/or the absence of glycemic control increases the likelihood of complications, consequently, affecting the activities of daily living. Estimations claim a ratio of 50% of non-diagnosed people with diabetes mellitus type 2 susceptible to complications of the disease. We highlight that in several countries diabetes is the main cause of blindness, heart diseases, kidney failure and amputation of the lower limbs<sup>(27)</sup>.

The process of functional dependence developed by older adults with diabetes mellitus type 2 can lead to the loss of autonomy, therefore, requiring the assistance of other persons to perform some activities, since not performing them could harm his/her social life even more, causing problems to the person and family<sup>(14)</sup>.

### Limitations of the study

Among the potential and expected limitations of this study, we highlight the research design itself because for being a cross-sectional study, implicit causal relationships between the variables used cannot be studied.

### Contributions to the area of nursing and public health

Identifying the functional capacity of older adults and their competence to perform the activities of daily living brings the health care professional to the reality of these people, as well as their caregivers, allowing better planning of the assistance to be provided. This makes the care for older adults directly more democratic and indirectly for their caregivers. Thus, the independence, the participation, the care, the self-satisfaction, the possibility of acting in different social contexts and assigning new meanings to life in advanced age are currently strategic concepts that need to be covered by any policy for older adults<sup>(28-29)</sup>.

The Nursing must discuss the role of its professionals in the implementation of improvements in the care for older adults with chronic diseases, since it is a discipline directed towards human care and teaching of self-care<sup>(30)</sup>. The objective of these improvements must be the better quality of life and the maintenance of the independence and autonomy.

### CONCLUSION

We conclude that diabetes mellitus is a relevant factor for the risk of dependence on the performance of BADL and IADL among older adults because it increases the chances of

becoming dependent in 4.67 times when compared to those without this pathology. Given this context, health professionals, especially those of Brazil's Family Health Strategy, must pay attention to the monitoring of glycemic control and ensure to the older adults the use of technologies such as ADL measurement scales and periodic clinical exams, capable of highlighting changes on the BADL and IADL and directing the adoption of effective measures to control and optimize the functionality, guaranteeing the quality of life at home.

Thus, the technical training of the nursing staff is essential for the assessment of the specific needs of older adults, such as preventing falls, skin care, urinary incontinence and extremities, all of extreme relevance to the global attention to the health of the older adult.

This study confirmed the association between the deficit in functional capacity of the diabetic with increasing age ( $\geq 70$  years) and with the report that the diabetes makes it difficult to perform daily activities. Therefore, this study is of great relevance, considering the significant historical and social importance and engagement of Nursing in various contexts to provide care – both individual and collective – can promote significant changes in caregiving for the older adult with chronic diseases such as diabetes.

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