Contribution of chronic diseases to the prevalence of disability in basic and instrumental activities of daily living in elderly Brazilians: the *National Health Survey* (2013)

Contribuição das doenças crônicas na prevalência da incapacidade para as atividades básicas e instrumentais de vida diária entre idosos brasileiros: *Pesquisa Nacional de Saúde* (2013)

Contribución de enfermedades crónicas a la prevalencia de incapacidad en actividades básicas e instrumentales de la vida diaria entre ancianos brasileños: *Encuesta Nacional de Salud* (2013)

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Abstract

This study's objective was to assess the contribution of selected chronic diseases to the prevalence of disability in elderly Brazilians, based on data from the National Health Survey *(PNS 2013). Disability was defined as some degree of difficulty in performing ten activities, considering three levels: (i) without disability; (ii) disabled only in some instrumental activity of daily living (IADL); and (iii) disabled in some basic activity of daily living (BADL). The multinomial additive hazards model was the attribution method used to assess the contribution of each self-reported chronic condition (hypertension, diabetes, arthritis, stroke, depression, heart disease, and lung disease) to the prevalence of disability in this population, stratified by sex and age bracket (60 to 74 years and 75 or older). Study participants included 10,537 elderly Brazilians with a mean age of 70.0 years (SD = 7.9 years) and predominance of women (57.4%). Prevalence rates for disability in at least one IADL and at least one BADL were 14% (95%CI: 12.9; 15.1) and 14.9% (95%CI: 13.8; 16.1), respectively. In general, the contribution of chronic diseases to prevalence of disability was greater in younger elderly (60 to 74 years) and in the group with greatest severity (disabled in BADL), highlighting the relevance of stroke and arthritis in men, and arthritis, hypertension, and diabetes in women. This knowledge can help orient health services to target specific groups, considering age, sex, and current illnesses, aimed at preventing disability in the elderly.*

Disabled Persons; Chronic Disease; Aging

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Introduction

Chronic non-communicable diseases have become an increasingly serious public health problem due to rapid population aging. Such diseases are associated with increased risk of mortality and impaired quality of life, particularly due to the increase in the risk of functional limitation [1]. Disability is a multidimensional condition resulting from the interaction between individuals and their physical and social environment and can be defined in terms of the individual's inability or difficulty in performing basic or more complex daily tasks within a socially accepted standard [1,2]. A person's ability to perform basic activities of daily living (BADL) and/or instrumental activities of daily living (IADL) is widely used in epidemiological and clinical studies to assess physical functioning. The former scale includes the more basic activities involved in independent daily functioning (bathing, getting dressed, eating, etc.). IADL are activities needed to adapt to the environment, emphasizing social activities (shopping, managing money, etc.) [3,4].

Various studies have shown an association between functional decline and presence of one or more chronic diseases in the elderly [5,6,7,8,9,10,11,12,13]. The diseases most commonly associated with functional decline are cardiovascular disease, lung disease, hypertension, diabetes, and joint disease, which have a greater effect on functionality. However, some authors propose other analytical approaches in addition to the verification of statistical association, for example estimation of the contribution of chronic diseases to disability [14,15,16,17,18,19]. In the Netherlands [17], from 2001 to 2007, musculoskeletal diseases (arthritis and back pain) and cardiovascular diseases (stroke, heart disease, and peripheral vascular diseases) were the conditions that most contributed to disability in the population 55 years or older. Likewise, in individuals 55 years or older [14], the estimated contribution of chronic diseases to disability in Belgium (from 1997 to 2008) showed that musculoskeletal diseases, cardiovascular disease, and lung disease made the largest contribution. In Brazil, a recent study [15] of 10,290 elderly individuals representing the elderly Brazilian population participating in the *National Health Survey* (PNS) investigated these contributions, exploring differences by sex, and showed that stroke, back pain, and arthritis were the diseases that most contributed to disability in men and diabetes, heart disease, and arthritis in women. In these studies, disability was considered present when the individual presented some degree of difficulty in at least one selected BADL or IADL, without differentiating between these two levels of activities. However, additional comparisons such as the contribution of chronic diseases between age brackets or different measures of disability have not been previously addressed by studies.

It is thus necessary to expand the analysis of the relationship between diseases and disabilities beyond studies of association; it may be useful to estimate the contribution of chronic diseases to disability in different scenarios in order to pursue better public policy strategies aimed at prevention and health promotion, especially among the elderly, considering that they are the population with the highest prevalence of chronic diseases and greatest vulnerability to functional decline. The current study drew on data from the PNS to examine the contribution of selected chronic diseases to prevalence of disability among elderly Brazilians, considering possible differences in relation to age bracket, sex, and type of impaired activities (basic or instrumental activities of daily living).

Methodology

Study population

The data source for the study was the PNS, conducted in a representative national sample of the adult Brazilian population in 2013 by the Brazilian Institute of Geography and Statistics (IBGE) in collaboration with the Brazilian Ministry of Health. The PNS was approved by the Brazilian National Commission on Research Ethics (CONEP), under the Brazilian National Health Council (CNS), case review 328.159 of June 26, 2013. All the individuals were consulted, had the survey explained to them, and agreed to participate [20].

Data collection used structured questionnaires that were applied in the selected households. The questionnaire consisted of 16 thematic modules that included: performance quality of the national

health system (including access to and use of health services and health plan coverage); the population's health conditions and lifestyle; and surveillance of diseases and health conditions and associated risk factors [21,22]. The PNS sampling plan was defined by clusters in three stages: (i) census tracts or sets of census tracts by simple random sampling; (ii) households, also selected by the same criteria used in the first stage; and (iii) adult residents, randomly selected with equiprobability among all eligible individuals over 18 years of age [22].

More than 205,000 Brazilians were interviewed from more than 64,000 households, including 23,815 elderly. The PNS included a specific questionnaire for the population over 60 years, including questions on the degree of difficulty in performing BADL and IADL. The current analysis included 11,177 questionnaires that were answered by the elders themselves when they were included as the randomly selected residents. Of these, 640 elderly were excluded due to missing information, resulting in a sample of 10,537 elderly included in the current study. These elderly, who were also randomly selected, answered a questionnaire on chronic diseases, the object of this analysis.

Variables

Composition of the target outcome considered 10 questions from the PNS assessing the elder's degree of difficulty in performing the following activities: eating, taking a bath, using the toilet, getting dressed, walking at home, getting in and out of bed, shopping, managing money, taking medication, and going out. These questions were divided into two groups, with the first six classified as BADL [23] and the others as IADL [24]. All the questions had four possible answers: (i) not able; (ii) great difficulty; (iii) slight difficulty; and (iv) no difficulty. The response variable was then categorized in three groups: (i) "without disability" if the individual had answered " no difficulty" to all the questions; (ii) "disabled in IADL" if the individual reported some degree of difficulty in at least one of the questions in the IADL group and "no difficulty" to the questions comprising the BADL group; and (iii) "disabled in BADL" when the individual reported some degree of difficulty in at least one of the questions in the BADL group, regardless of whether they had reported disability in IADL.

The selected chronic diseases in this study were hypertension, diabetes, arthritis, heart disease, lung disease, stroke, and depression. Presence of these diseases was defined as any lifetime history of a medical diagnosis or psychiatric diagnosis (in the case of depression) of the respective condition.

For characterization of the sample and adjustment, socio-demographic data (sex, age, and schooling) were also analyzed. Age was categorized in two age brackets (60 to 74 years and 75 or older) and schooling was divided into four categories (none, incomplete/complete primary, incomplete/complete secondary, and university).

Data analysis

A descriptive analysis of the study variables was performed, aimed at general characterization of the sample's prevalence rates for disability and chronic diseases, stratified by sex and age bracket. A description was also performed of the prevalence rates for disability between the groups of elderly that reported each chronic condition, by age bracket and sex. The descriptive analysis of all the variables used the Stata software, version 13.0 (StataCorp LP, College Station, USA), with the survey module, which considers weights and design effect, attributed due to the sampling plan adopted in the study. Confidence intervals were set at 95%.

The contribution of chronic diseases to disability was analyzed separately for men and women, considering the sampling weight. In each of the models, age bracket (60 to 74 years and 75 years or older) was used as the stratification variable. The R software, version 3.3.1 (The R Foundation for Statistical Computing, Vienna, Austria; http://www.r-project.org) was used for the analysis of the attribution method, using the "addhaz" package for the model's adjustment (available at https://cran.r-project.org/package=addhaz). The results were then presented as the model's coefficients and respective 95% confidence intervals (95%CI), along with the relative contribution (as a percentage) of each disease to each level of disability according to age bracket and sex.

The model

Attribution method is used to quantify the contribution of a set of explanatory variables to the prevalence of a target outcome in cross-sectional studies [25]. The current study used the method to quantify each chronic condition's contribution to the prevalence of disability among elderly participants in the PNS, taking into account that individuals can have more than one disease and that disability may be present in individuals without any of selected diseases [25].

In attribution method, the prevalence of disability not explained by the model's selected diseases is called "background". Disability in individuals that did not report any disease is attributed entirely to background, while in individuals that reported one or more chronic diseases, the attribution is shared between the reported chronic diseases and the background.

Attribution method assumes that: (i) the distribution of disability according to causes (chronic conditions) is totally explained by the conditions present at the time of the survey and by background; (ii) distribution of the disability due to chronic diseases is proportional to the distribution of risk of becoming disabled in the period prior to the survey; (iii) the starting time of the risk for disability from each cause is the same; (iv) causes of the disability (chronic diseases and background) act as independent concurrent causes; and (v) risk of disability from each selected condition (or from background) is similar for all individuals in the sample [26].

This study used the attribution method based on the multinomial additive hazards model, since the target outcome (disability) was assessed on a multinomial scale with three categories: "without disability", "disabled in IADL", and "disabled in BADL". Further details on the method and its application can be found in other studies [16,19,25,26].

Results

Among the 10,537 elderly participants in this study, age varied from 60 to 101 years, with a mean age of 70.0 years (SD = 7.9 years), and majority of women (57.4%; 95%CI: 55.7; 59.0) and younger elderly (60 to 74 years) (74.6%; 95%CI: 73.1; 76.0). As for schooling, 30.6% of the elderly had no education and 46.1% had gone to primary school or the equivalent. Considering the total sample included in the analysis, the most frequent chronic condition was hypertension (52.3%; 95%CI: 50.5; 54.1), followed by diabetes (19%; 95%CI: 17.8; 20.4), arthritis (17%; 95%CI: 15.7; 18.3), and heart disease (11.9%; 95%CI: 10.7; 13.2). Depression was the fifth most prevalent disease, with 9.9% (95%CI: 8.9; 11.0), followed by stroke and lung disease, with prevalence rates of 5.1% (95%CI: 4.4; 5.9) and 3.8% (95%CI: 3.1; 4.6), respectively. Disability was present in 28.9% of the elderly: 14% (95%CI: 12.9; 15.1) were only disabled in IADL and 14.9% (95%CI: 13.8; 16.1) were disabled in BADL.

Table 1 shows the prevalence rates for disability and chronic diseases according to sex and age bracket. In general, this descriptive analysis shows that prevalence of disability in both IADL and BADL is more frequent in women and in the population 75 years or older. Concerning distribution of the selected chronic diseases, hypertension was the most common condition in all the strata, followed by diabetes and heart disease in men and arthritis and diabetes in women, independently of age bracket.

Table 2 shows the prevalence of disability in IADL and BADL among elderly that reported each of the selected chronic diseases according to sex and age bracket. Despite important variations, the prevalence of disability in IADL is only apparently lower when compared to BADL for all the selected diseases in both sexes and in both age brackets. Importantly, the highest prevalence rates for disability in BADL were seen in elderly with a history of stroke, in both sexes and in both age brackets.

Table 3 shows the coefficients (and 95%CI) estimated by the model, as well as the relative contribution from each disease to disability in IADL and BADL, according to sex and age bracket. Considering the report of difficulties in performing IADLs, the results show fewer diseases and smaller relative contribution to this outcome in both sexes when compared to the more severe level of disability (BADL), emphasizing the role of arthritis and stroke in men and hypertension, depression, and heart disease in women. Meanwhile, there was a larger contribution of the selected chronic diseases to prevalence of disability in performing basic activities (BADL) in men and women, emphasizing

Table 1

Prevalence of disability and chronic diseases in elderly Brazilians according to sex and age bracket. *National Health Survey*, 2013.

Variables	Total (%)	95%CI	60-74 years		75+ years	
			%	95%CI	%	95%CI
Men						
Disability						
With disability	74.9	72.4; 77.2	81.3	78.6; 83.8	55.5	49.7; 60.1
Disabled in IADL	11.4	9.8; 13.3	8.3	6.7; 10.1	21.0	16.9; 25.7
Disabled in BADL	13.6	11.9; 15.6	10.4	8.5; 12.6	23.5	19.4; 28.3
Chronic diseases						
Arthritis	10.1	8.3; 12.2	9.7	7.7; 12.1	11.2	8.0; 15.4
Hypertension	47.6	44.7; 50.5	46.3	42.9; 49.6	51.4	46.0; 56.8
Diabetes	17.3	15.1; 19.7	17.0	14.4; 19.9	18.2	14.3; 22.8
Stroke	6.3	5.0; 7.8	5.1	3.8; 6.9	9.8	7.0; 13.5
Depression	4.9	3.7; 6.6	5.4	3.8; 7.6	3.5	2.0; 5.9
Lung disease	4.2	3.1; 5.6	3.9	2.7; 5.7	4.8	3.0; 7.7
Heart disease	13.1	11.0; 15.6	12.2	9.9; 15.0	16.0	12.0; 20.1
Women						
Disability						
With disability	68.1	66.2; 70.1	77.5	75.4; 79.5	41.2	37.3; 45.3
Disabled in IADL	15.9	14.4; 17.5	11.2	9.7; 12.9	29.5	25.7; 33.4
Disabled in BADL	15.9	14.5; 17.5	11.2	9.8; 12.8	29.3	25.9; 33.0
Chronic diseases						
Arthritis	22.1	20.4; 24.0	20.9	19.0; 23.0	25.6	22.1; 29.4
Hypertension	55.8	53.5; 58.1	54.1	51.5; 56.8	60.6	56.3; 64.7
Diabetes	20.4	18.7; 22.2	19.7	17.8; 21.7	22.3	19.0; 26.0
Stroke	4.2	3.5; 5.1	3.7	2.9; 4.7	5.9	4.5; 7.8
Depression	13.6	12.0; 15.3	14.9	13.0; 16.9	9.9	7.6; 12.7
Lung disease	3.6	2.8; 4.5	3.4	2.5; 4.7	3.9	2.7; 5.6
Heart disease	10.9	9.7; 12.4	10.3	8.8; 12.1	12.8	10.5; 15.4

95%CI: 95% confidence interval; BADL: basic activities of daily living; IADL: instrumental activities of daily living.

arthritis and stroke in men and arthritis, hypertension, and diabetes in women. In the comparison of age brackets, the contribution of diseases was consistently higher in younger elderly, except for contribution of stroke to disability in BADL among men.

Discussion

The study estimated the contribution of the leading chronic diseases to prevalence of disability in elderly Brazilians, considering differences by sex, age bracket, and level of disability. The results generally showed that: (i) the selected diseases showed a greater impact in more severe disability (BADL) when compared to elderly that only reported difficulties in IADL; (ii) the relative contributions of these diseases were greater in the younger elderly, except for the effect of stroke in more severe disability in men; (iii) arthritis and stroke were the diseases that contributed most consistently to disability in this population, independently of sex and age bracket; and (iv) hypertension and heart disease only contributed the most to disability in women, and diabetes only showed a significant contribution to disability in BADL.

Table 2

Prevalence of disability in instrumental activities of daily living (IADL) and basic activities of daily living (BADL) in elderly Brazilians with diagnosis of chronic diseases, according to sex and age bracket. *National Health Survey*, 2013.

Variables	Prevalence of disability (%)							
	60-74 years				75+ years			
	IADL	95%CI	BADL	95%CI	IADL	95%CI	BADL	95%CI
Men								
Arthritis	11.9	6.6; 20.4	27.0	17.0; 40.0	21.8	12.0; 36.3	35.6	22.4; 51.6
Hypertension	9.2	7.0; 12.0	13.1	10.1; 16.9	22.1	16.6; 28.7	23.9	18.2; 30.8
Diabetes	10.2	6.6; 15.4	12.3	8.5; 17.5	16.1	9.6; 25.7	31.6	21.7; 43.5
Stroke	16.8	8.1; 31.7	46.6	32.6; 61.1	19.5	10.5; 33.3	70.2	55.6; 81.5
Depression	8.4	4.0; 16.5	26.3	12.9; 46.3	25.1	10.2; 49.7	21.8	8.1; 46.7
Lung disease	11.5	3.5; 32.2	30.6	14.4; 53.6	16.5	7.3; 33.2	40.4	21.3; 63.0
Heart disease	13.1	7.9; 21.1	15.9	10.0; 24.2	25.2	15.9; 37.4	29.6	18.5; 43.8
Women								
Arthritis	10.8	8.4; 13.8	18.9	15.2; 23.3	27.2	21.2; 34.0	40.7	33.0; 49.0
Hypertension	12.5	10.6; 14.8	14.7	12.4; 17.2	29.6	25.2; 34.4	30.4	26.0; 35.1
Diabetes	12.2	9.5; 15.5	18.1	14.2; 22.9	29.8	22.4; 38.5	37.9	29.1; 47.4
Stroke	15.3	8.9; 25.1	34.6	23.5; 47.8	24.8	15.0; 38.3	59.2	45.6; 71.5
Depression	17.2	12.2; 23.7	14.3	10.2; 19.6	37.0	24.8; 51.0	35.8	25.2; 48.0
Lung disease	17.2	8.9; 30.7	12.9	6.2; 25.1	26.1	13.8; 43.8	44.2	27.0; 62.9
Heart disease	20.8	15.0; 28.0	19.3	14.1; 25.9	31.8	23.3; 41.6	43.3	33.7; 53.4

95%CI: 95% confidence interval.

Some hypotheses can be proposed to explain the pattern of disability in these different scenarios. The first is that the diseases show a greater contribution to the prevalence of more severe disability, that is, with impairment of basic activities of daily living. This may be explained in part by the higher prevalence of disability in BADL among individuals that reported the chronic diseases analyzed here, with few exceptions (Table 2). These diseases thus appear to have greater impact on the performance of basic activities, raising the hypothesis that biological or psychosocially primary mechanisms associated with these diseases may explain the relationship with this level of disability [27], suggesting the importance of further studies on the subject. This result thus emphasizes the importance of elucidating the impact of chronic diseases on different levels of disability, an issue not addressed by previous studies [14,15,17,18], which did not differentiate between the impacts of diseases on BADL versus IADL. These findings should be considered in the follow-up of patients with diagnosis of chronic diseases, given the relevance of these conditions as factors contributing to disability in basic activities, which lead to a growing burden for family and society [28].

Among the younger elderly (60 to 74 years), the relative contribution of chronic diseases to the prevalence of disability was greater than in older seniors. Although the prevalence rates of disability and chronic diseases showed an upward trend with age (except for depression), corroborating other studies [16,17,18], the size of this increase does not follow the same trend in these events. Even without considering statistical differences, while prevalence rates for the two levels of disability more than doubled between the two age brackets, the prevalence rates of the diseases increased less (Table 1). This may be attributed to higher mortality from these diseases among the oldest old [29], consequently leading to the lower increase in the prevalence of these diseases and smaller contribution to disability in this age bracket. In the attribution method, the contribution of chronic diseases to disability depends on both the prevalence of the disease in the target population and the condition's disabling impact (related to disability's prevalence among individuals with the illness) [16]. Thus, the disabling impact from the diseases among younger elders appears to carry more weight, while other factors besides the reported diseases contribute to the prevalence of disability during aging, leading to the

Table 3

Coefficient (95%CI) and relative contribution of selected chronic diseases to disability in elderly Brazilians, according to sex, age bracket, and type of disability. *National Health Survey*, 2013.

Chronic diseases	Disability in IADL				Disability in BADL			
	Coefficient	95%CI	Relative contribution (%)		Coefficient	95%CI	Relative contribution (%)	
			60-74 years	75+ years			60-74 years	75+ years
Men								
Background	-	-	75.77	87.14	-	-	46.51	57.87
Arthritis	0.04 *	0.01; 0.07	3.81	1.96	0.20 *	0.18; 0.23	14.38	8.50
Hypertension	0.01	-0.01; 0.01	6.09	3.02	0.01	-0.04; 0.03	4.78	2.59
Diabetes	-0.002	-0.01; 0.02	-0.52	-0.22	0.03 *	0.01; 0.04	5.03	2.90
Stroke	0.18 *	0.15; 0.22	5.59	3.07	0.81 *	0.79; 1.05	20.49	22.62
Depression	0.01	-0.04; 0.04	0.95	0.33	0.01 *	0.00; 0.08	0.71	0.23
Lung disease	-0.03	-0.06; 0.07	-1.20	-0.64	0.15*	0.01; 0.21	4.46	3.05
Heart disease	0.07	-0.01; 0.10	9.5	5.31	0.04	-0.01; 0.08	3.60	2.22
Women								
Background	-	-	73.17	90.79	-	-	27.26	69.86
Arthritis	-0.01	-0.03; 0.02	-2.35	-0.95	0.11 *	0.09; 0.14	17.51	7.31
Hypertension	0.01 *	0.01; 0.02	6.56	2.72	0.05 *	0.05; 0.06	20.10	7.58
Diabetes	0.01	-0.01; 0.00	1.45	0.57	0.09 *	0.07; 0.15	13.77	5.15
Stroke	0.07 *	0.01; 0.17	1.47	0.67	0.42 *	0.35; 0.51	8.73	5.43
Depression	0.08 *	0.01; 0.12	8.92	2.01	0.04	-0.00; 0.04	4.33	0.90
Lung disease	0.05	-0.01; 0.06	1.42	0.45	0.01	-0.11; 0.17	0.30	0.12
Heart disease	0.13 *	0.06; 0.16	9.34	3.71	0.13 *	0.08; 0.14	7.96	3.60

95%CI: 95% confidence interval; BADL: basic activities of daily living; IADL: instrumental activities of daily living.

* p < 0.05.

observation of higher background values among the oldest old. Although chronic diseases are consistently associated with disability [5,6,7,8,9,10,11,12,13,30,31,32], other factors are also determinant in this event, such as socio-demographic conditions and health behaviors [33,34], which were not examined in detail in this study, but which are present in the background. One can thus suggest that the other factors show an uneven distribution between the age brackets, being more common among older seniors and exerting greater influence on prevalence of disability in this age group, contrary to the chronic diseases analyzed in the study. For example, among the elderly participating in the PNS, disability in some activity was greater in older smokers (43.4%), as opposed to smokers under 75 years of age (22%) (data not shown), which may partially explain the disability reported in this age group.

These results show the importance of early intervention, aimed at adequate control of the reported diseases, considering that in this life phase (under 75 years) the diseases play a greater role in the determination of disability, which may favor the drop in this prevalence at more advanced ages. The only exception is the relative contribution of stroke to disability in BADL in men, the effect of which increases with age, potentially attributable to the high percentage of disabled elderly in BADL in the older age bracket (70.2%) among those with a history of stroke, contrary to this prevalence in the younger group (46.6%). This pattern of greater contribution of disease to disability among older seniors has been seen in other populations [17,18] for the majority of the selected diseases, besides stroke, but these studies did not differentiate between levels of disability, used different ways of measuring this outcome, included greater age variation (considering non-elderly as well), and were conducted in European populations, which may have influenced the results.

Stroke and arthritis were the diseases that contributed most consistently to disability in this population, independently of sex and age bracket. Both have a direct impact on the body systems

related to movement [35,36,37,38], and the measures of disability used in the current study feature those related to performing physical tasks (mobility and manual skills), more sensitive to the perception of neurological and musculoskeletal dysfunctions and their sequelae, more than other domains related to cognition. These measures of physical performance still predominate in studies focused on aspects of functionality and disability [6,7,9,10,17,31], which may explain the consistently important role of these diseases in the disability observed in this and other studies.

Hypertension and heart disease only showed a significant contribution to the prevalence of both levels of disability in women. A similar pattern has been reported in other populations, showing that both hypertension [39] and myocardial infarction [40] were the most important determinants of disability in women. This difference may be explained by the higher prevalence of diseases in the female population, including their greater ability to report the chronic condition or even the greater occurrence of non-fatal disease, when compared to the male population [39,40,41]. Meanwhile, diabetes only showed a significant contribution to limitations in BADL, in both sexes. Like arthritis and stroke, diabetes may involve impairment of neuromuscular functions, in addition to sensory (visual) and circulatory functions [13], especially at more advanced ages, in which it is assumed that time with the disease is longer and consequently entails more (and more serious) sequelae [13,42]. Such sequelae can thus lead to greater impact on the performance of basic activities of daily living, as observed in an Italian study [43], reinforcing the importance of this disease in more severe disability.

Another feature in the current study is the relative contribution of depression to the prevalence of disability in IADL in younger elderly women, second only to the contribution of heart disease. Other studies have already identified the association of disability with depression, predominantly in women [44,45,46], and the current study corroborates these findings, besides measuring the contribution's proportion. Although the results point to a reduction in the prevalence of depression with age, the prevalence of disability in women with a diagnosis of depression appears to show the opposite association (increasing with age). For purposes of calculation, since attribution method considers these two estimates, the effect of the disease appears to be more important in younger elderly women and for limitations in tasks requiring a higher degree of cognition (IADL).

According to the PNS, 45% of the Brazilian adult population reports some chronic non-communicable disease, and among these the highest prevalence of disability was due to stroke, followed by arthritis, back pain, and musculoskeletal conditions, highlighting the relevance of these conditions for disability [47]. In general, the relationship between chronic diseases and disability has been investigated in cross-sectional studies using regression models that only estimate associations [5,6,7,8,9,10,11,12,13,30,31,32], while few studies have used the attribution method to calculate the specific contribution of each disease to disability as the outcome [14,15,16,17,18,19]. Of these, only one study [15] assessed the contribution of chronic diseases to the prevalence of disability in elderly Brazilians from the perspective of disparities between the sexes, using data from the PNS (2013). However, in the study, the outcome of disability was investigated from a binomial approach (with versus without disability), and the analysis failed to include a comparison of these contributions between different age groups, as had been explored in other populations [14,17,18]. The current study was thus the first to assess possible differences in the contribution of chronic diseases to the prevalence of disability, considering sex, age bracket, and different levels of disability in elderly Brazilians.

The study's potential limitations include its cross-sectional design, which does not allow establishing a temporal relationship between the variables, which may have led to biased interpretations, especially in cases where the disability may have preceded the disease. The exclusive use of self-reported information may also have introduced an information bias, since the ability to report the conditions included in the analysis is dependent on gender, age bracket, and use of health services, for example. In addition, comparisons with other studies should be done with caution, due to the different ways of measuring disability. In this study, disability was measured according to World Health Organization criteria [2], considering any degree of the elder's difficulty in performing a given task, but not including information on the need for assistance from others, which could lead to differences in the estimates of prevalence [48]. Finally, the study did not aim to establish the determinants of the relative contribution of the diseases to the disability, i.e., the discussion only raised possible hypotheses for the observed differences in relation to age bracket, sex, and type of impaired activity. As mentioned previously, the contribution estimated in this study is the result of a complex

combination of the prevalence of the disease in the elderly Brazilian population and the chronic condition's disabling impact, besides potentially being determined by other factors not measured in the analysis (background). On the other hand, the study was conducted in a representative sample of the elderly Brazilian population that used standardized data collection procedures, as the first study to present important differences in the contribution of selected diseases in relation to the stratification variables.

Conclusion

The results showed that the selected chronic diseases generally made a larger contribution to more severe disability (BADL) and that this contribution was greater in women and among the younger elderly. In addition, elderly with a diagnosis of arthritis, stroke, or diabetes should be monitored more effectively, considering the important contribution of these conditions to disability. This knowledge can orient action by health services to specific groups, considering age, sex, and concurrent diseases, aimed at the prevention of disability in the elderly.

Contributors

All authors participated in all stages of the article's production.

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Resumo

O objetivo desse trabalho foi avaliar a contribuição de doenças crônicas selecionadas na prevalência de incapacidade de idosos brasileiros, com base nos dados da Pesquisa Nacional de Saúde *(2013). A incapacidade foi definida como algum grau de dificuldade para execução de dez atividades, considerando três níveis: (i) sem incapacidade; (ii) incapaz somente para alguma atividade instrumental de vida diária (AIVD); e (iii) incapaz para atividade básica de vida diária (ABVD). O modelo aditivo de riscos multinomial foi o método de atribuição utilizado para avaliar a contribuição de cada condição crônica auto referida (hipertensão, diabetes, artrite, acidente vascular cerebral – AVC, depressão, doenças do coração e do pulmão) na prevalência da incapacidade dessa população, estratificada por sexo e faixa etária (60 a 74 e 75 anos ou mais). Participaram desse estudo 10.537 idosos brasileiros, com idade média de 70,0 anos (DP = 7,9 anos) e predomínio de mulheres (57,4%). A prevalência de incapacidade para pelos menos uma AIVD e para pelo menos uma ABVD foi de 14% (IC95%: 12,9; 15,1) e 14,9% (IC95%: 13,8; 16,1), respectivamente. De maneira geral, a contribuição das doenças para a prevalência da incapacidade foi maior entre os idosos mais jovens (60 a 74 anos) e para o grupo com maior gravidade (incapaz par ABVD), destacando-se a relevância do AVC e artrite entre os homens e da artrite, hipertensão e diabetes entre as mulheres. Esse conhecimento pode direcionar a atuação dos serviços de saúde a grupos específicos, considerando idade, sexo e doenças presentes, visando à prevenção da incapacidade entre idosos.*

Pessoas com Deficiência; Doença Crônica; Envelhecimento

Resumen

El objetivo de este trabajo fue evaluar la contribución de algunas enfermedades crónicas seleccionadas en la prevalencia de incapacidad de ancianos brasileños, basándose en los datos de la Encuesta Nacional de Salud *(2013). La incapacidad fue definida como algún grado de dificultad para la ejecución de diez actividades, considerando tres niveles: (i) sin incapacidad; (ii) incapaz sólo para alguna actividad instrumental de la vida diaria (AIVD); e (iii) incapaz para la actividad básica de vida diaria (ABVD). El modelo aditivo de riesgos multinomial fue el método de atribución utilizado para evaluar la contribución de cada condición crónica autorreferida (hipertensión, diabetes, artritis, accidente cerebrovascular -ACV, depresión, enfermedades del corazón y del pulmón) en la prevalencia de la incapacidad de esa población, estratificada por sexo y franja etaria (60 a 74 y 75 años o más). Participaron en este estudio 10.537 ancianos brasileños, con una edad media de 70,0 años (DP = 7,9 años) y predominio de mujeres (57,4%). La prevalencia de incapacidad para al menos una AIVD y al menos una ABVD fue de un 14% (IC95%: 12,9; 15,1) y un 14,9% (IC95%: 13,8; 16,1), respectivamente. De manera general, la contribución de estas enfermedades en la prevalencia de incapacidad fue mayor entre los ancianos más jóvenes (60 a 74 años) y para el grupo con mayor gravedad (incapaz para ABVD), destacándose la relevancia del ACV y artritis entre los hombres, y de la artritis, hipertensión y diabetes entre las mujeres. Estos resultados pueden orientar la actuación de los servicios de salud hacia grupos específicos, considerando edad, sexo y enfermedades presentes, con el fin de prevenir la incapacidad entre ancianos.*

Personas con Discapacidad; Enfermedad Crónica; Envejecimiento