

Research Article

Prevalence and Factors Associated with Impairment of Instrumental Activities of Daily Living in Older People: A Population Study

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Abstract

Objective: To identify the prevalence and factors associated with functional disability for Instrumental Activities of Daily Living (IADL) among older people in a Brazilian capital. **Methods:** This is a cross-sectional study carried out on 927 older people in the city of Goiânia, Goiás, Brazil. Lawton's scale was used to assess IADL. Functional disability was characterized as difficulty in performing at least one activity. Multiple logistic regression was employed for the analysis of association. **Results:** A 58.2% prevalence of disability was identified, and the most compromised activities were doing manual work, doing the laundry, and ironing. There was an association between disability and old age, poor/very poor self-rated health, cerebrovascular accident, widowhood, cognitive impairment, musculoskeletal disorder, and living alone. **Conclusions:** The prevalence of functional disability for IADL was higher than that of national and international studies. We verified associated factors that can be modified by health promotion initiatives, which are configured as priority areas for interventions.

Keywords: Older people; Aging; Daily activities; Cross-sectional studies; Geriatric nursing

Introduction

Decreased functional capacity among older adults occurs at a hierarchical level, beginning with Instrumental Activities of Daily Living (IADL), until reaching basic Activities of Daily Living (ADL), related to self-care. IADL are more complex with regard to physical and neuropsychological functioning, are developed in the social environment, and are essential for maintaining autonomy and independence in this group [1-4].

Several studies worldwide use the Lawton's scale for assessing the performance in IADL [1,5-8]. We highlight the study carried out in the city of São Paulo (SP), Brazil, whose authors assessed the pattern of IADL impairment over a period of 10 years, and identified a prevalence of difficulty accounting for 35.4; 45.8; and 41.0%, respectively, in the years 2000, 2006, and 2010 [2]. The functional worsening of each age group reinforces the need to know the factors associated with dependence among older adults.

Studies carried out in different Brazilian regions have demonstrated several factors related to IADL functional disability in older people, namely: old age, women, widowhood, low education level, low income, nonwhite ethnicity, multimorbidities, cognitive impairment, poor self-rated health, low level of physical activity,

former smoker, and depression [9-14]. Considering these aspects, functional decline causes negative repercussions for older people, family members, and healthcare services.

Regarding older adults, the risk of negative events, such as social isolation, hospitalization, and demand for care needs (presence of caregiver), and increases. As for the family, relatives must be reorganized in order to provide care for the dependent older adult and, according to the demand for care, it may generate care burden. Therefore, we verify the need for considering these factors when planning healthcare actions aimed at preserving functional capacity, considering that it contributes to the quality of life of older adults and their family members, providing well-being in old age [11,15].

Thus, in this study we aimed at identifying the prevalence and factors associated with functional disability for Instrumental Activities of Daily Living (IADL) among older people in a Brazilian capital.

Methods

This is a population-based study with a cross-sectional design, which is part of the research entitled *Situação de Saúde da população idosa do município de Goiânia (GO)* (Health status of older people

living in the city of Goiânia (GO), Brazil). Individuals aged 60 years or older, living in the urban area of Goiânia, state of Goiás, Brazil, and who lived in the household visited for the survey were considered eligible for the study.

The number of older people (60 years and over) residing in Goiânia, in 2007, corresponded to 7% of the population of the municipality (1,249,645 inhabitants). Sample size was calculated based on a 95% confidence interval, a 5% significance level, 30% expected frequency for health conditions assessed in the matrix project, 5% absolute precision, Design Effect (DEFF) of 1.8, and an increase of 11% for possible losses. The representative sample of the population of older adults living in the urban area of Goiânia consisted in 934 older people.

In this study, 7 individuals were excluded because they did not completely answer all the items of the IADL instrument. It was investigated whether the sample of the project was sufficient for functional disability, totaling 927 older people. Hence, the estimation was carried out by using the OpenEpi[®] software, version 2.3.1 (2010) for cross-sectional study with sample by clusters, considering the average frequency of physical mobility in older people residing in Goiânia of approximately 26% 16, absolute precision of 2.6%, and 1.8 DEFF. A sample of 842 individuals was estimated for a power of 80%, in order to certify that the sample of the project was representative for the outcome under study.

Interviewers were properly trained in the application of the consent form, data collection, and clarification of doubts on the part of the study individuals and their families. Data were collected between December 2009 and April 2010.

Functional disability for IADL consisted in the dependent variable of this study. The Lawton-Brody [8] instrument adapted by the Brazilian Ministry of Health [17] was chosen for the study for being widely used in national and international studies and the Brazilian Ministry of Health recommends its use for evaluating the functionality for instrumental activities of older people in primary care. Partial or total dependence on at least one evaluated activity, as reported by the older adults, was considered as IADL disability.

Independent variables were grouped into: socioeconomic and demographic characteristics (sex, age, marital status, education level, income, living alone); health conditions (self-rated health,

hypertension, diabetes, chronic obstructive pulmonary disease, Cerebrovascular Accident (CVA), musculoskeletal disorder, osteoporosis, cancer, acute myocardial infarction, visual impairment, hearing impairment, pain, falls, hospitalization, and cognitive impairment), and lifestyle habits (smoking habit, physical activity, and alcohol consumption).

Cognitive impairment was assessed by the Mini-Mental State Exam. The score was stratified according to education levels. The cutoff point for cognitive impairment was considered as follows: <19 points for illiterates; <23 points for elementary school; <24 points for high school; and <28 points for higher education [18].

The research was approved by the Research Ethics Committee of Universidade Federal de Goiás under protocol No. 050/2009, and complied with Resolution 466/12 of the National Health Council on research involving human beings [19].

Data were entered into the Excel for Windows[®] 2003-2007 program and analyzed using the Stata[®] software version 14.0. For analyzing the association between IADL disability and independent variables, the Chi-Square or Fisher's exact tests were used, with a 5% significance level. Multiple logistic regression analysis was used to identify factors associated with functional disability. The Hosmer-Lemeshow test was performed to verify the goodness of fit of the model [20]. The area under the ROC curve was also calculated to verify the prediction of the final model.

Results

Among the 927 older people, most of them were women (62.8%), aged between 60 and 69 years (48.3%), married (49.7%), with elementary school (47.5%), with income lower than or equal to one minimum wage (42.5%), and lived with other people (87.3%).

The prevalence of functional disability for IADL was 58.2%, and the most compromised activities were: doing manual work (42.4%), doing the laundry and ironing (40.7%), housekeeping (35.3%), using public mode of transportation (28.0%), shopping (24.7%), preparing meals (18.6%), handling finances (17.0%), using the telephone (16.9%), and taking medications correctly (14.5%).

When stratifying IADL by age and sex, we observed differences in relation to sex in the age group of 60 and 69 years for preparing meals and doing manual work. In the age group of 70 to 79 years,

Table 1: Proportion (%) of older people with difficulties in IADL according to age and sex, Goiânia - GO, Brazil (n=927).

Activities	60 to 69 years		70 to 79 years		80 years and older	
	Men	Women	Men	Women	Men	Women
Using the telephone	9.1	8.8	18.3	16.6	36.9	37.4
Using modes of transportation	11.5	16.3	18.3	38	44.6	68.2
Shopping	11.5	13.1	21.7	29.4	43.1*	59.8*
Food preparation	18.2*	5.3*	27.5*	14.4*	46,1	34,9
Housekeeping	26.7	21.2	38.3	35.8	63.1	64.5
Doing manual work	20.6*	37.8*	33.3*	51.9*	55.4*	73.8*
Doing the laundry	34.5	26.4	45,0	42.8	64.6	65.1
Taking medications	9.7	6.4	16.7	11.2	30.8	36.5
Handling finances	7.3	9.9	15.8	18.2	29.2	43

Note: *p<0.05.

Table 2: Prevalence of IADL disability according to socioeconomic and demographic characteristics and IADL disability, Goiânia - GO, Brazil (n=927).

Variables	IADL Disability		OR (95% CI)	p*
	Yes f (%)	No f (%)		
Sex				
Men	184 (52.6)	166 (47.4)	1	
Women	356 (61.7)	221 (38.3)	1.9	0.006
Age group				
60 – 69 years	201 (44.9)	247 (55.1)	1	
70 – 79 years	193 (62.9)	114 (37.1)	2.08 (1.54-2.80)	<0.001
80 years or older	146 (84.9)	26 (15.1)	6.90 (4.36-10.89)	<0.001
Marital status				
Married	253 (55.2)	205 (44.8)	1	
Widowed	207 (69.7)	90 (30.3)	1.86 (1.37-2.54)	<0.001
Single	37 (44.0)	47 (56.0)	0.64 (0.39-1.01)	0.06
Divorced	41 (49.4)	42 (50.6)	0.79 (0.49-1.26)	0.326
Education level				
Illiterate	135 (71.0)	55 (29.0)	2.86 (1.71-4.81)	<0.001
Elementary school	264 (60.1)	175 (39.9)	1.76 (1.12-2.77)	0.015
High school	96 (47.3)	107 (52.7)	1.05 (0.64-1.71)	0.857
Higher education	42 (46.2)	49 (53.8)	1	
Income				
≤1 minimum wage or no income	300 (40.6)	205 (59.4)	0.91 (0.61-1.36)	0.654
1 to 3 minimum wages	126 (57.0)	95 (43.0)	0.83 (0.53-1.29)	0.406
>3 minimum wages	77 (61.6)	48 (38.4)	1	
Lives alone				
No	481 (59.8)	323 (40.2)	1	
Yes	55 (47.0)	62 (53.0)	0.60 (0.40-0.88)	0.009

95% CI: 95% Confidence Interval; OR: Odds Ratio; *Chi-square test.

we observed differences related to using modes of transportation, preparing meals, and doing manual work. For long-lived older adults (aged over 80 years), we found associations regarding the use of modes of transportation, shopping, and doing manual work (Table 1).

There was a statistically significant association of socioeconomic and demographic variables – represented by sex, aged over 70 years, widowed marital status, elementary school level of education or illiterate, and living alone – with the IADL disability (Table 2).

Regarding health conditions, IADL disability was significantly associated with fair, poor, or very poor self-rated health, hypertension, diabetes, osteoporosis, cerebrovascular accident, musculoskeletal disorder, visual and hearing impairments, feeling pain, having suffered a fall or being hospitalized in the last year, and cognitive impairment (Table 3).

In Table 4 and 5 we present data on the assessment of lifestyle habits. We can observe that the variables “lack of physical activity” and “consumption of alcoholic beverages” were associated with IADL disability.

In the adjusted analysis, we identified that age older than 70 years

Table 3: Prevalence of IADL disability according to characteristics regarding the older adults' health conditions, Goiânia - GO, Brazil (n=927).

Variables	IADL Disability		OR (95% CI)	p*
	Yes f (%)	No f (%)		
Self-rated health				
Very good/Good	182 (47.5)	201 (52.5)	1	
Fair	228 (60.6)	148 (39.4)	1.70 (1.27-2.27)	<0.001
Poor/Very poor	77 (85.6)	13 (14.4)	6.54 (3.51-12.17)	<0.001
Hypertension				
No	194 (52.0)	179 (48.0)	1	
Yes	343 (62.3)	208 (37.7)	1.52 (1.16-1.98)	0.002
Diabetes				
No	419 (55.8)	332 (44.2)	1	
Yes	121 (69.1)	54 (30.9)	1.78 (1.25-2.52)	0.001
Osteoporosis				
No	385 (55.2)	313 (44.8)	1	
Yes	153 (67.4)	74 (32.6)	1.68 (1.23-2.30)	0.001
Cancer				
No	492 (57.7)	361 (42.3)	1	
Yes	47 (67.1)	23 (32.9)	1.50 (0.89-2.51)	0.125
Cerebrovascular accident				
No	488 (56.6)	374 (43.4)	1	
Yes	52 (85.2)	9 (14.8)	4.43 (2.15-9.09)	<0.001
Acute myocardial infarction				
No	501 (58.0)	363 (42.0)	1	
Yes	36 (63.2)	21 (36.8)	1.24 (0.71-2.16)	0.444
Chronic obstructive pulmonary disease				
No	445 (57.1)	335 (42.9)	1	
Yes	91 (64.5)	50 (35.5)	1.37 (0.94-1.99)	0.098
Musculoskeletal disorder				
No	392 (55.0)	321 (45.0)	1	
Yes	135 (69.2)	60 (30.8)	1.84 (1.31-2.58)	<0.001
Visual impairment				
No	59 (46.1)	69 (53.9)	1	
Yes	478 (60.2)	316 (39.8)	1.77 (1.21-2.58)	0.003
Hearing impairment				
No	359 (53.3)	314 (46.7)	1	
Yes	177 (70.8)	73 (29.2)	2.12 (1.55-2.90)	<0.001
Pain				
No	193 (52.3)	176 (47.7)	1	
Yes	331 (61.4)	208 (38.6)	1.9	0.006
Fall				
No	320 (53.4)	279 (46.6)	1	
Yes	212 (66.5)	107 (33.5)	1.73 (1.30-2.29)	<0.001
Hospitalization				
No	351 (55.4)	283 (44.6)	1	
Yes	150 (73.2)	55 (26.8)	2.20 (1.55-3.11)	<0.001
Cognitive impairment				
No	298 (51.8)	277 (48.2)	1	
Yes	121 (67.2)	59 (32.8)	1.91 (1.34-2.71)	<0.001

Note: Round numeric data. 95% CI: 95% Confidence Interval.

Table 4: Prevalence of IADL disability according to characteristics regarding the older adults' lifestyle habits, Goiânia - GO, Brazil (n=927).

Variables	IADL Disability		OR (95% CI)	p*
	Yes f (%)	No f (%)		
Smoking habit				
No	287 (56.9)	217 (43.1)	1	
Yes	50 (56.2)	39 (43.8)	0.97 (0.61-1.52)	0.893
Former smoker	201 (60.5)	131 (39.5)	1.16 (0.87-1.53)	0.302
Physical activity				
No	392 (62.2)	238 (37.8)	1.69 (1.27-2.24)	<0.001
Yes	144 (49.3)	148 (50.7)	1	
Consumption of alcoholic beverages				
No	447 (60.8)	288 (39.2)	1	
Yes	92 (48.9)	96 (51.1)	0.62 (0.44-0.85)	0.003

95% CI: 95% confidence interval; OR: Odds Ratio; *Chi-square test.

Table 5: Factors associated with IADL disability, Goiânia - GO, Brazil, Dec. 2009-Apr. 2010 (n=927).

Variables	OR _{adj}	CI (95%)	P _{adj}
Age group			
60 - 69 years	1		
70 - 79 years	1.72	1.16 – 2.57	0.007
80 years or older	6.54	3.26 – 13.14	<0.001
Marital status			
Married	1		
Widowed	1.71	1.07 – 2.76	0.025
Single	0.69	0.35 – 1.36	0.286
Divorced	0.92	0.48 – 1.75	0.8
Lives alone			
No	1		
Yes	0.47	0.26 – 0.87	0.017
Cerebrovascular accident			
No	1		
Yes	2.4	1.01 – 5.73	0.048
Self-rated health			
Very good/Good	1		
Fair	1.36	0.93 – 2.01	0.114
Poor/Very poor	4.56	1.94 – 10.73	0.001
Cognitive impairment			
No	1		
Yes	1.7	1.08 – 2.69	0.021
Musculoskeletal disorder			
No	1		
Yes	1.69	1.08 – 2.65	0.022

95% CI: 95% Confidence Interval; OR: Odds ratio.

Hosmer Lemeshow (p=0.080) Area under the ROC curve (AUC=0.765).

Adjusted for sex, diabetes, hospitalization, hearing impairment, osteoporosis, and hypertension.

(OR=1.72; p=0.007), or 80 years of age or older (OR=6.54; p<0.001), widowed marital status (OR=1.71; p=0.025), having suffered a

cerebrovascular accident (OR=2.40; p=0.048), poor or very poor self-rated health (OR=4.56; p=0.001), presenting cognitive impairment (OR=1.70; p=0.021), musculoskeletal disorder (OR=1.69; p=0.022), and living alone (OR=0.47; p=0.017) were factors associated with functional disability for IADL, and living alone proved to be the only protective factor. The final model was considered adequate (Hosmer-Lemeshow, p=0.508) and with a predictive capacity of 76.5%.

Discussion

The present study allowed us to evaluate the functional capacity of a representative sample of older people living in the city of Goiânia-GO, Brazil. The prevalence of IADL disability (58.2%) was higher than findings at the international level, in which the prevalence of IADL disability accounted for 8.0% and 35.75% [21-24] and was higher or similar to the results of studies performed in the national scenario, in which the prevalence of disability was between 34.2% and 78.3% [2,7,9,25,26].

This is possibly due to the use of different instruments for assessing functional capacity, or even the use of the Lawton's scale adapted according to the reality of the studied population, excluding or adding items from the original scale [23-26]. It is worth noting that the studies were carried out in different regions, some with greater social vulnerability, showing a higher prevalence of impairment of IADL [9,25].

The high prevalence of IADL disability is a worrisome fact, since it is a factor that potentiates the risks for health problems, social isolation, institutionalization and hospitalization, and it may decline more rapidly in relation to ADL, thus increasing the older adults' level of dependence [7-25]. Hence, the need for investigating factors associated with the condition of disability in carrying out daily activities in older people is emphasized, in order to develop policies and strategies that minimize this type of limitation.

Concerning IADL with greater impairment among older individuals, we identified doing manual work, doing the laundry, ironing, and housekeeping, which are similar to those reported by other studies [4,10,14,27]. We found no studies whose authors evaluated the item "doing manual work," even after its inclusion by the Brazilian Ministry of Health in 2006 [17]. However, our results suggest that the inclusion of the evaluation of manual work is extremely important for the functional assessment, considering that this item was identified as the main functional impairment in IADL among the studied population. In addition, after stratification by age and sex, doing manual work was the only activity that remained statistically significant in all age groups and for both sexes.

In this study, we identified that age older than 70 years, widowed marital status, having suffered a cerebrovascular accident, poor or very poor self-rated health, having cognitive impairment, musculoskeletal disorder, and living alone were factors associated with IADL disability in the adjusted analysis.

Authors of several studies have pointed out the association between increasing age and higher frequency of functional disability for IADL [7,9,21,22,26,28], which may be related to changes inherent in the aging process that contribute to the higher frequency of this outcome. Regarding widowhood, a meta-analysis carried out by

authors who sought to analyze the association between marital status and health conditions demonstrated that widowhood is a determining factor of quality of health, especially among older adults, but the way it is affected has not yet been fully understood [29]. A justification for this finding is that widowhood can lead to social isolation and depressive symptoms, thus having a negative impact on the general health condition of the older adult [30].

In our research, CVA consisted in one of the three factors strongly associated with dependence concerning IADL. Frequently, after a stroke episode, people may have physical, cognitive and behavioral sequelae, which in turn compromise the functional capacity, interfering with autonomy and independence [31]. Authors of a study conducted with data from North American civilian residents highlighted that 29.2% of CVA survivors reported needing help with IADL, whereas only 4.2% of individuals without a history of CVA needed help in relation to IADL [32].

Research involving older people living in the city of São Paulo (SP), Brazil, showed a significant association between IADL disability and poor self-rated health, which corroborates our study. It was emphasized that dependence regarding IADL causes older adults to be 5.33 times more likely to have worse self-rated health [33]. Zanesco et al. [34] obtained similar results, verifying that older people who presented some limitation for IADL were 2.04 times more likely to report a negative perception of health. Possibly, older adults perceive their negative health status due to the difficulty in independently carrying out activities that involve living in the community, noticing a compromise of their physical and cognitive integrity, thus reducing their autonomy [26,34].

Another factor associated with IADL disability in this study was to present cognitive impairment. Functional loss related to IADL is evident from milder stages of cognitive impairment. In a study carried out on older people in the North of the state of Minas Gerais, Brazil, a high prevalence of IADL impairment (78.3%) and some degree of cognitive impairment (79.2%) were observed, emphasizing that IADL require greater cognitive integrity when compared with ADL [9]. Researchers show that cognitive impairment, assessed by different scales or medical diagnosis, negatively influences the functional capacity of older adults as for IADL, whether it is mild, moderate, or severe, and in both sexes [12,35,36].

Concerning diseases, IADL disability was significantly associated with musculoskeletal disorders. According to the literature, musculoskeletal disorders interfere with the functional capacity of older people, causing pain and limiting their mobility [37-39]. Among musculoskeletal disorders, the one with the greatest relationship with functional impairment is osteoarthritis. In Turkey, this condition was found to significantly affect the ability to prepare meals, and individuals with this morbidity were 2.82 times more likely to be unable to perform this IADL, one of the difficulties that was also verified in our study [36].

All the aforementioned factors were related to IADL disability. Conversely, living alone was identified as a protective factor against functional disability for IADL. Nunes et al. [12] and Aguiar et al. [9], as well as in this study, showed that living alone was statistically associated with decreased IADL disability. These findings are probably

related to the greater independence and autonomy that older people must have when living alone, which often does not occur when they are with other people, and they may even be deprived of performing more complex tasks [9,40]. On the other hand, it is important for older adults to have social and family support, in such a way to prevent the feeling of loneliness and the development of depressive symptoms [41].

Conclusion

Our results allow us to conclude that the prevalence of functional disability for IADL was 58.2%. The most compromised activities were doing manual work, doing the laundry, ironing, and housekeeping.

We also observed differences in relation to sex in the age group of 60 and 69 years for preparing meals and doing manual work. In the age group of 70 to 79 years, differences were observed as for the use of modes of transportation, preparing meals, and doing manual work. For long-lived older adults, we found associations regarding the use of modes of transportation, shopping, and doing manual work.

Factors associated with functional disability for IADL were age older than 70 years, widowed marital status, having suffered a CVA, poor or very poor self-rated health, having cognitive impairment, and musculoskeletal disorder; living alone was deemed a protective factor.

The loss of the capacity for IADL is a warning for other changes in the older adults' functionality and, consequently, in all its outcomes such as hospitalization and loss of autonomy.

Investment in health promotion and coping strategies in all age groups aiming at promoting health and preventing injuries that compromise musculoskeletal mobility and flexibility may guarantee autonomy and independence for as long as possible. The expansion of formal and informal support networks could favor the social insertion of older adults. In this sense, the interdisciplinary and intersectoral articulation between health, transportation, education, and social assistance sectors is necessary.

Moreover, considering that capacity impairments could be affected by environmental conditions, we suggest that these factors should also be considered in future research in IADL.

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