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EVALUATION OF THE ACTIVITIES OF DAILY LIVING OF THE ELDERLY WITH DIFFERENT LEVELS OF DEMENTIA

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ABSTRACT

Objective: To compare the performance of elderly people with different levels of severity of dementia using questionnaires on basic activities of daily living (BADLs) and instrumental activities of daily living (IADLs). Also, to verify whether there were any association between the IADL questionnaires applied. Method: Ninety elderly people, aged 75.46 ± 7.66 years with a clinical diagnosis of dementia (DSM-IV/APA) who were seen at the Minas Gerais Reference Center for the Elderly, were randomized selected and classified according to the level of severity of their dementia (Clinical Dementia Rating). Their BADLs were assessed using the Katz Index and their IADLs by the Lawton-Brody and Pfeffer indexes. The Kruskal-Wallis and Mann-Whitney tests were used in order to investigate the elderly people's performance regarding BADLs, while the Spearman correlation was used to investigate the relationships among the IADL ($\alpha < 0.05$). Results: Statistically significant differences in performance were found between the elderly people with different levels of severity of dementia, as assessed by the BADL and IADL questionnaires ($p < 0.001$). The IADL questionnaires presented significant correlation for the total sample ($p < 0.0001$; r = -0.818) as well as for the groups with mild dementia ($p = 0.007$; r = -0.530) and severe dementia ($p < 0.0001$; r = -0.723). Conclusion: The severity of the dementia process interfered with the elderly people's performance of the elderly in BADLs and IADLs. The IADLs were more affected in the early stages of dementia whereas the BADLs were more affected in the more advanced stages. Despite structural particularities, the IADL questionnaires utilized seemed to be measuring a common construct. The variability in the clinical condition of the individuals with moderate dementia may be an explanation for the lack of correlation between the questionnaires in this specific group.

Key words: elderly; dementia; assessment; ADL.

INTRODUCTION

As the number of elderly people increases, the prevalence and incidence of chronic degenerative diseases also significantly increase. Among such diseases dementia is an important cause of morbidity and mortality. Dementia makes up the sixth largest group of medical conditions with the most important impact on functioning and morbidity for the elderly[1,2]. Complaints regarding declines in cognition and independence in functional activities are common among elderly people, and a strong association has been observed between cognitive performance and functional abilities[3].

Functional deficits are usually caused by diseases and/or common conditions in the elderly. Conditions involving dementia are regarded as the main factors that lead to functional dependence[5]. Among the five different areas that contribute to functionality, the basic activities of daily living (BADL) are related to self-care and the instrumental activities of daily living (IADL) are connected to the ability to manage the life environment inside and outside of the home[5,6].

Some studies demonstrate have demonstrated that alterations in the performance of activities of daily living (ADL) can occur even in the initial stages of dementia[3]. Additionally, the severity of dementia has been found to be a strong predictor for decreased performance of ADL in the elderly[6]. According to some authors, there is an association between severity of cognitive alterations and the functional performance of daily activities: mild cognitive deficits are related to functional difficulties, mainly in IADL, while performance of BADL would be impaired only in more severe stages of dementia[3]. However, there is no consensus about such patterns in the literature. Thomas and collaborators[7] stated that the hierarchy of impairments from IADL to BADL is always valid in the elderly.

Regardless of such a hierarchy, functional deficits, if not addressed by a focused multiprofessional approach, can lead to institutionalization, increased incidence of chronic degenerative diseases, increased financial costs, decreased quality of life and greater risks of mortality. This situation can be even more common in countries where most of the current and future elderly people lived within precarious health conditions when young, as is the case with the Brazilian population[1].

Since functional status is a basic domain of gerontological assessment[8,9], several specific questionnaires for the assessment of ADL were developed and are commonly utilized[5,6,9,10,11,12], specially the Kats Index (BADL)[9,10,13], the Lawton-Brody Index[9,14] and the Pfeffer Index (IADL)[9,14,15]. However, in Brazil, these questionnaires have not yet been systematically utilized.

Considering the strong associations between functional performance and severity of dementia[5,12] and the utilization of several instruments to assess functionality in the absence of a consensus regarding which instrument to use for elderly people with specific conditions, the objective of the present study was to compare the performance of BADL and IADL among elderly people with different levels of severity of dementia. An additional objective of the study was to verify whether there was any association between two questionnaires commonly used in clinical settings and research studies to assess IADL.

METHODS

The present study is a part of a masters dissertation that consisted of the transcultural adaptation of the *Southampton Assessment of Mobility* (SAM) for Brazilian elderly people living with dementia in the community[16]. In 2004, 90 individuals with a clinical diagnosis of dementia according to the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association (DSM-IV/APA) were contacted. These individuals were randomly selected from 1030 elderly people assisted by the medical services of the Reference Center for Assistance of the Elderly (RCAE) of a university hospital. The calculation of the sample size took into account the range of all possible SAM scores that individuals could obtain and determined the necessary number or individuals in each group of dementia severity (mild, moderate, severe). Individuals were selected with a randomization table[16] and measures were obtained for all selected individuals. They took part in the study after the "Free and Informed Consent Form" was signed by the caregiver or by the person responsible for the elderly. The project was approved by the Ethics Committee of the Federal University of Minas Gerais (protocol number 349/04) and by the Education and Research Board of the University Hospital (protocol number 102/04).

The following inclusion criteria were used: to be 60 or more years old, to be registered and clinically stable according to the assessment by the medical board of RCAE, to live in the community and be able to walk with or without assistive devices. Elderly people with Lewy Bodies Dementia were excluded from the study because of their unstable clinical situation with fluctuations of cognitive functions and levels of consciousness[16].

A standardized questionnaire of clinical and demographic data was used to characterize the sample. Severity of dementia was classified as mild, moderate and severe according to the Clinical Dementia Rating (CDR)[17]. The sensitivity of this scale is 91,2% and specificity is 100%. It is commonly used in geriatrics and gerontology services and in scientific research to classify severity of dementia and relates cognitive losses with the ability of the elderly to perform BADL and IADL[2]. According to performance in motor and cognitive tests (memory, spatio-temporal orientation, judgment, problem solving, and performance in BADL and IADL) dementia as classified in their level of severity: none (CDR= 0); suspect (CDR= 0.5); mild (CDR= 1); moderate (CDR= 2); severe (CDR= 3)[2]. In the present study, the CDR version developed by Morris[17] was used. Participants were classified in relation to severity of dementia through reaching consensus between the two researchers.

Performance of the elderly in ADL was assessed with the instruments used in the RCAE: Katz Index (10) (KI) for BADL and Lawton-Brody Index[14] (LBI) and Pfeffer Index[15] (PI) for IADL. The KI was developed to assess the impact of therapeutic interventions on functioning and to assist in determining the prognosis of the elderly and adults with chronic diseases. The KI is composed of hierarchically related activities that include, for example, taking a shower, dressing themselves, eating and other BADL[6,10]. The task performance of patients was analyzed using a Likert scale, with scores varying from 0 to 3 which were attributed to each item, with 0 representing complete independence and 3 complete dependence. Therefore, lower scores indicated greater independence.

In a recent systematic review about standardized instruments to assess the functional status of the elderly, the IK was regarded as one of the few ADL instruments with complete and satisfactory qualities. Construct, predictive and concurrent validity were considered robust in the review. Brorsson and colleagues[13] investigated the construct validity and the reliability of the IK and reported a coefficient of scalability of 0.81 and 0.88 for the first assessment of each examiner and 0.76 and 0.74 for the second assessment of the same examiners. These values demonstrated adequate construct validity and adequate inter and intra-examiner reliability. Additionally, the KI is easy to apply and understand[9,13] and is recommended as a basic measure of functional ability in for the elderly[13]. The instrument is frequently used in clinical practice[4] and in research studies[5,6] and was used in 94 studies included in the present research review.

The LBI was developed to assess ability to perform IADL[14] and is composed of items related to use of the

telephone and preparation of food, for example. Higher scores indicate greater independence[14]. The LBI is also very frequently used in clinical practice and scientific research[9,11]. Lawton and colleagues[14] reported inter-examiner reliability of 0.91, test-retest reliability of 0.96 and adequate concurrent validity for the ILB (Pearson correlations with scales that assess similar constructs with $p< 0.01$). Additionally, other studies on its psychometric properties reported adequate reliability and validity [9].

The PI is also composed of items related to ability to perform IADL and cognitive/social functions, such as shopping, preparing food, keeping oneself updated, paying attention to radio and TV shows and discussing them. Lower scores indicate greater independence. Pfeffer and colleagues[15] reported high inter-examiner reliability values (ranging between 0.80 and 0.97) and adequate predictive validity (sensitivity of 0.85 and specificity of 0.81) for the IP. Other studies on the psychometric characteristics of the instrument also reported adequate validity and reliability [9]. Additionally, the PI is also very frequently used in clinical practice and in scientific studies[19,20]. Because scoring in these instruments can be obtained by interview with caregivers, all data were collected by two previously trained physical therapists in a single interview.

Descriptive statistical analysis was used for all clinical and demographic variables. Kruskal-Wallis and Mann-Whitney tests were performed to compare BADL and IADL performance between the three dementia groups of various levels of severity. The Spearman Rank correlation was used to investigate the associations between scores of the two IADL instruments. The level of significance was set to $a< 0.05$. Statistical analyses were performed with SPSS 8.0 for Windows.

RESULTS

Ninety elderly people were assessed (age 75.46 years ± 7.66). Most were females (75.5%), 45.5% were married, 46.7% were widowed and 24.4% were illiterate. The most prevalent clinical diagnosis was Alzheimer's Disease (82.2%) followed by vascular (7.8%), mixed (4.4%) and frontotemporal dementia (2.2%) (Table 1). About half (45.56%) of the individuals were classified as having severe dementia, 25.56% were moderate and 28.9% were mild, according to the CDR. The Kruskal Wallis (H Test) detected a significant performance differences between the three severity groups for all variables assessed ($p< 0.001$). In order to identify differences between pairs of groups the Mann-Whitney U was performed and

Table 1. Clinical and socio-demographic characteristics of the assessed group.

Variable	Individuals (n= 90)
Gender	
Male	22 (24.4%)
Female	68 (75.5%)
Age	75.46 ±7.66
Education	no education= 22 (24.4%)
	from 1 to 7 years of education= 51 (56.6%)
	8 or more years of education= 17 (18.8%)
Marital status	single= 4 (4.4%)
	married= 41 (45.5%)
	widowed= 42 (46.7%)
	divorced= 3 (3.3%)
Clinical diagnosis of dementia	Alzheimer= 74 (82.2%)
	Vascular= 7 (7.8%)
	Mixed= 4 (4.4%)
	Frontotemporal= 2 (2.2%)
	Others types*= 3 (3.3%)

In the categorical variables (gender, education and marital status): frequency and percentage; In the continuous variable (age): mean and standard deviation; *Dementia caused by traumatic brain injury or by normal pressure hydrocephalus.

Table 2. Performance of the elderly people with different levels of dementia in the instruments used to assess the basic and instrumental ADL: *Kruskal-Wallis* (A) and *Mann-Whitne* (B) test.

A)

	Median (Minimum - Maximum)			*Kruskal-Wallis*
Instruments	**Mild**	**Moderate**	**Severe**	***H Test (p value)***
Katz	00 (00-05)	02 (00-06)	07 (00-21)	44.28 (<0.01)
Lawton	23 (11-30)	16 (11-21)	11 (10-20)	58.30 (<0.01)
Pfeffer	15 (03-23)	25 (16-30)	30 (22-30)	64.32 (<0.01)

B)

	Multiple Comparisons, Mann-Whitne - U Test (p value)		
Instruments	**Mild-Moderate**	**Moderate-Severe**	**Mild-Severe**
Katz	159 (< 0.01)	74.5 (< 0.01)	158 (< 0.01)
Lawton	49.00 (< 0.01)	124.5 (< 0.01)	30.5(< 0.01)
Pfeffer	23.50 (< 0.01)	120.5 (< 0.01)	6.5 (< 0.01)

significant differences between the three severity groups were found for all assessed variables (Table 2).

A significant negative correlation was found between IADL questionnaires for the complete sample ($p < 0.0001$; $r = -0.818$). When correlations were assessed in each severity group, significance was found only for mild ($p = 0.007$ and $r = -0.530$) and severe ($p < 0.0001$ and $r = -0.723$) dementia groups. In the specific group of elderly with moderate dementia, scores of the two questionnaires were not significantly correlated ($p = 0.56$ and $r = -0.445$).

DISCUSSION

The objective of this study was to compare the performance of BADL and IADL between three groups of elderly people with different levels of severity of dementia as classified by the CDR. For all instruments used in this study, results demonstrated that functional dependence was significantly higher as severity of dementia increased ($p < 0.001$). Additionally, considering the whole sample and the groups of individuals classified as having mild and severe dementia, a significant correlation was found between the two instruments used to assess IADL ($p < 0.001$).

Literature regarding functional performance of Brazilian elderly people with dementia is sparse. This fact limits the comparison of results found in the present study with those reported by other researchers. Considering the demographic characteristics of the sample, results of this study are in general similar to what is described in the literature for elderly people with dementia. Herrera et al.[19] investigated the prevalence of dementia and the relative frequency of causative factors in a population of elderly living in the community in the city of Catanduva, São Paulo. They found the majority of individuals to be between 65 and 74 years old (65%). Fifty-nine percent of individuals were females and 34.2% were classified as illiterate. Alzheimer's disease was the most common diagnosis of dementia (55.1%)[19]. Bustamente et al.[21] investigated the precision of the association of a functional assessment scale and a cognitive test to diagnose dementia. They found the mean age of the individuals to be 73.9 years and also found a greater proportion of females (53%).

Regarding severity of dementia, results found in this study differed from results reported by Herrera et al.[19]. The number of elderly people with severe dementia in the present study (45.56 %) was greater than the number of elderly with mild (28,89%) and moderate (25,56%) dementia, while the study by Herrera et al.[19] reported the opposite findings: 39% of individuals had mild dementia, 37% had moderate dementia and only 24% had severe dementia. One possible explanation for the conflicting findings may be the origin of the samples. While the population-based study conducted by Herrera[19] assessed elderly who lived in Catanduva, the present study assessed individuals that attended the Reference Center for Assistance of the Elderly of the state of Minas Gerais. It is possible that many other individuals diagnosed with mild and moderate dementia, in the capital and in other cities of the state, were attending health services in the basic health units of their regions. It is also possible that many individuals were living in the community without the diagnosis of dementia and therefore they were not attending in the Reference Center.

Regarding functional performance, results of this study demonstrated that the elderly with more severe dementia had poorer functional performance of BADL and IADL. These results supported the strong association between cognitive levels and functional abilities[3]. A study conducted by Teunisse et al.[20] demonstrated a strong association between cognitive deficits and disability in ADL, with greater deficits resulting in greater functional dependence. Additionally, Sauvaget et al.[12] demonstrated that dementia is the strongest predictor of physical incapacity and decreased ability in basic and instrumental activities of daily living. It is important to remark that dementia has been identified as a determining factor for

the development of functional disability and decreased functioning regardless of the presence of other chronic diseases[5].

These results demonstrated deficits in approximately 50% of the IADL, as assessed by the LBI and PI, in elderly people classified in the initial stages of progression of dementia. In the same group, the median value of KI was 0, indicating that in general, the BADL was not affected in the milder cases of dementia in the studied sample. These results suggested that IADL was affected early in the progression of dementia, while the BADL remained unaffected. With the progression of dementia, deficits in all functional activities increased significantly. In general, for the elderly with severe dementia, performance deficits were observed for practically all IADL items, while only one third of the basic activities were altered.

These findings are supported by the literature. Other studies suggest a hierarchy of motor impairments in patients with dementia. The ability to execute complex tasks as IADL is first lost. Progression of the disease leads to impaired ability to perform tasks related to BADL[23]. Njegovan et al.[3] studied a cohort of 5,874 elderly people living in the community for 5 years. They found a natural hierarchy of functional losses associated with cognitive decline: instrumental activities were lost in individuals with milder cognitive alterations while basic activities were lost only when the individuals progressed to more severe dementia. The strong correlation between cognitive levels and functional ability was maintained after adjustments for the functional level of the initial assessments.

Despite the evidence for a hierarchy in the progression of functional deficits[3,23], one study refuted this assumption. Thomas et al.[7] examined the psychometric properties of a questionnaire with combined items of BADL and IADL with a sample of 8,900 elderly living in the community. The authors reported that the hierarchical relation presupposed for the functional activities was not observed in the studied sample, contradicting the results of most available studies. One possible explanation for the results reported by Thomas et al.[7] would be the variability in the health conditions (arthritis, diabetes, fractures, Parkinson's disease and others) of the participants[7].

Considering that different diseases and dysfunctions can lead to different levels of disability, results of the aforementioned study may have been influenced by these characteristics of the sample. Another explanation for the results of Thomas et al.[7] may be related to the perception of each individual of the level of task difficulty and also to the method used to collect data. Although the individuals considered a basic activity such as taking a shower to be more difficult than an instrumental activity such as using the phone, the hierarchy of functional losses is not related to the individual classification of difficulty, but to the order of functional losses as part of the natural process of aging[10]. As was demonstrated in several investigations[3,23], results of the present study point to a hierarchy of motor impairments in elderly people with cognitive deficits.

A significant and inverse correlation was found between the two instruments used to assess IADL in this study, the PI and the LBI, when the whole sample was considered. Higher scores in the PI indicate better functional performance and higher scores in the LBI indicate worse functional performance. These results indicated that both instruments measured the same construct (performance in IADL), although there are important item differences regarding the assessed activities. The PI is composed of items related to relatively complex household abilities and cognitive/occupational functions[11], while the ILB does not include more complex behaviors.

In the comparison of the two IADL questionnaires, the aforementioned differences may explain results of the three different severity groups. As previously mentioned, the correlations between the two instruments was not significant in elderly people with moderate dementia. It is possible that the differences in activities assessed by these two instruments may have contributed to the results found for the elderly with moderate dementia. Additionally, functional dependence assessed by the three instruments increased significantly for more the severe dementia groups. Performance scores of the group of elderly people with moderate dementia were intermediate between the mild and severe group's extreme scores. Therefore, the specific group of moderately compromised individuals may have a more diversified performance in instrumental activities of daily living, which may produce different patterns of scores in the two IADL instruments. It is important to mention that the percentage of elderly with moderate dementia was lower, which may have influenced the results for this group.

It is important to remark that the PI and LBI were both designed to measure performance of IADL. Thus, although activities included in each instrument are different, the two indexes are complimentary. The use of both instruments allows the researcher to identify particularities of elderly individuals with distinct levels of dementia. Ideally, both instruments should be used so that important information would not be lost. Considering the results of this study, the assessment of elderly people with moderate dementia should be considered more cautiously, with varied instruments, so that conclusions can be elaborated based on a greater quantity of relevant information.

The definition of functional status is the basis of gerontological assessment[9], especially for the elderly diagnosed with dementia, a disease regarded as the main contributor to the development of functional dependence[5]. Despite the important results found in this study, some limitations must be considered. The instruments analyzed in the study are largely utilized in clinical practice and research with the elderly, with validity, inter- and intra-examiner reliability described in the literature[5,6,9,11,13,15,19]. However, no studies regarding

adaptation of these instruments to the Brazilian population were found. There are few functional instruments adapted in Brazilian Portuguese [9], which indicates the lack of systematic utilization of these questionnaires Brazil [9]. However, some factors justify the applicability of the instruments used in the present study. First, it is important to consider that all items in the three questionnaires are clear, and the way each activity is described is not influenced by cultural differences. All activities are potentially common and familiar to the Brazilian elderly. In addition, the instruments were developed more than twenty years ago and fulfill the basic purposes of the tests used in clinical practice[24]. The instruments can discriminate individuals on a continuum of health conditions, diseases or disabilities, can predict outcomes or prognosis, and can detect individual changes over time[5,6,9,10,11,13,14,15,19]. Finally, they provide a general, objective and brief functional assessment and its application is easy and simple, with no need for any specific resources, and can be completed at home, which is fundamental for multidisciplinary gerontological assessments.

CONCLUSIONS

Results of this study demonstrated the applicability of the three instruments used to assess BADL and IADL in this study. The instruments were sensitive to detect alterations in the functional performance of elderly people with different levels of severity of dementia. Despite the specificities of each IADL instrument, the scores were, in general, significantly correlated in the studied sample.

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