

ACTIVITY DAILY LIVING AND SOME RELATED FACTORS AMONG OLDER PATIENTS WITH OSTEOPOROSIS

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DOI: 10.47122/VJDE.2023.64.3

SUMMARY

Objectives: To assess activities in daily living and some related factors among older people with osteoporosis examined and treated at National Geriatric Hospital. **Subjects and Methods:** A cross-sectional study on 141 older patients with osteoporosis examined and treated at National Geriatric Hospital from June to October 2022. Activities in daily living were assessed using Activities of Daily Living (ADL) and Instrument Activities of Daily Living (IADL). General information, characteristics of osteoporosis, and geriatric syndromes were collected. **Results:** Of the total 141 participants, the proportion of participants with functional impairment in ADLs and IADLs was the same, accounting for 34.8%. There were significant associations between impaired ADL and group aged ≥ 80 with OR=4.5; BMI <18.5 (kg/m²) with OR=9.7; those who had diabetes with OR=2.9. There were significant associations between impaired ADL and geriatric syndromes: frailty syndromes (OR=20.8), low levels of physical activity (OR=10.8), cognitive impairment (OR=6.4), malnutrition (OR=4.5), risk of falls (OR=4.5), depression (OR=4.4), sleep disturbances (OR=2.9) and polypharmacy (OR=2.6). There was no statistically significant difference in the decline in daily functioning and some characteristics of osteoporosis. **Conclusion:** One in three elderly osteoporosis patients has impaired ADL or IADL. Our results highlighted that advanced age, BMI, diabetes, and geriatric syndrome were significantly associated with ADL in older patients with osteoporosis.

Keywords: *activity daily living, elderly, osteoporosis.*

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Submission date:August 2023

Revised date: 12th August 2023

Acceptance date: 30th September 2023

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1. INTRODUCTION

Osteoporosis is a systemic skeletal disease marked by decreased bone mass and micro-architectural degeneration of bone tissue, resulting in increased bone fragility and fracture risk. Impaired physical function, disability, depression, social isolation, pain, and loss of independence are common effects associated with osteoporotic-related fractures [1]. In addition, inactivity among older people due to a reduction in physical function can lower the total loading on bones. In other words, a decline in physical function can raise the risk of fracture by reducing the total loading on bones. According to the International Osteoporosis Foundation (IOF), hip fractures have reported mortality rates as high as 20 - 24% in the first year post a hip fracture. It also causes profoundly impaired function and independence, with 40% unable to walk independently and 60% requiring assistance one year later [2].

The utilization of patient self-reporting of functional limitations is a subjective measure, which reflexes patients' perceptions of their capacities to accomplish certain activity daily living (ADL) by applying standardized questionnaires [3].

Although many previous studies have been performed on this topic, most of them have been performed in other countries, with relatively little study performed in Vietnam. Moreover, those studies used different assessment tools to evaluate ADL. Exploring the limitations and factors that affect physical function among older patients with osteoporosis can develop interventions to promote independence in daily living as much as possible. However, data about ADL are lacking regarding the older population with osteoporosis. Thus, the aims of this study were to assess activity in daily living and some related factors among older people with osteoporosis examined and treated at National Geriatric Hospital.

2. SUBJECTS AND METHODS

2.1. Subjects

Patients aged 60 years old and older were diagnosed with osteoporosis according to WHO criteria, who were examined and treated at National Geriatric Hospital from June to October 2022, and have the physical and cognitive abilities to do a face-to-face interview.

Exclusion criteria: patients with severe acute conditions such as ketoacidosis coma, hyperosmolar coma, coma due to cerebrovascular accident, exacerbation of heart failure decompensation, liver failure, exacerbation of chronic obstructive pulmonary disease.

2.2. Study design

- A cross-sectional descriptive study
- The sample was selected according to the convenience sampling method
- The sample size is calculated using the formula:

$$n = \frac{(z_{1-\alpha/2})^2}{d^2} p(1-p)$$

$p=0.34$ (The prevalence of ADL impairment in older osteoporosis people in Vietnam in 2022 [4].

According to the formula, the smallest

sample size is $n = 135$ patients. In fact, 141 patients participated in this study.

2.3. Variables

- General information: age, gender, educational level, weight, height, body mass index (BMI).

- Comorbidities characteristics

- Osteoporosis characteristics: T-score, diagnosed duration, symptoms of osteoporosis, treatment

- **Activities of Daily Living (ADLs):** the ADLs include 6 self-care tasks: bathing, dressing, toileting, grooming, feeding, and transferring [5]. The total score ranges from 0 (patient very dependent) to 6 (patient independent). In each category, only the highest level of function receives a 1 point. Proposed guideline for interpreting ADLs scores:

6 points: normal ADL

< 6 points: impaired ADL

- **Instrument Activities of Daily Living (IADLs):** The Lawton IADL scale assesses 8 complex tasks to live independently in the community, including the ability to use the phone, shopping, food preparation, do housekeeping, do laundry, travel, take medications and handle finances [6]. A summary score ranges from 0 (low function, dependent) to 8 (high function, independent).

8 points: normal IADL

< 8 points: impaired IADL

- **Characteristics of some geriatric syndromes:**

Physical activity level was assessed according to the International Physical Activity Questionnaire- Short Form (IPAQ-SF). Polypharmacy was assessed by asking patients and families/ caregivers, viewing prescriptions, and referring to medical records. Nutrition status was evaluated using the Mini Nutritional Assessment - Short Form (MNA-SF). Depression was performed using the Geriatric Depression Scale (GDS-15). Sleep disturbance was screened by the Pittsburgh Sleep Quality Index (PSQI). Cognitive impairment was assessed by the

Mini-Mental State examination (MMSE). Risk of fall was assessed by asking the 21-item fall risk index. Frailty syndromes was assessed by clinical Frailty Scale (CFS).

2.4. Tools and data collection method

Data were collected by using a research questionnaire through interviews, diagnosis tests, and medical records at National Geriatric Hospital.

2.5. Data processing and data analysis

The process of data coding, entry into REDCap, and analysis was done by using Statistical Package for Social Science (SPSS) software (version 22.0). Descriptive statistics were adopted to examine characteristic data: frequency, percentage, and mean with standard deviation. T-test, Chi-square, and Binary logistic regression were performed to evaluate the factors affecting physical

function in osteoporosis patients. Statistical significance was accepted at the 95% of confidence level ($p < 0.05$).

3. RESULTS

3.1. General characteristics

In the total 141 older patients with osteoporosis, the mean age of the patient was 73.1 ± 8.6 years with a minimum of 60 and a maximum of 97. Participants were divided into 3 groups: 60 – 69 years old (35.5%), 70 – 79 years old (39.9%), and 80 years old and over (25.5%). The majority of study participants were females, accounting for 94.3%. The mean BMI was 21.9 ± 3.0 kg/m². The percentage of underweight and overweight were 13.5% and 37.6%, respectively.

3.2. Activity Daily Living in older patients with osteoporosis

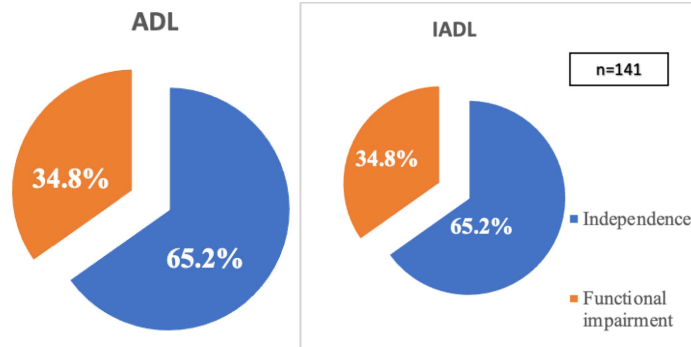


Figure 1. Assessment activities of daily living by ADL and IADL scale

The proportion of participants with functional impairment in ADLs and IADLs was the same, accounting for 34.8%. Mean ADL and IADL scores were 5.2 ± 1.4 and 7.0 ± 1.7 , respectively

3.3. Association between Activity Daily Living and general characteristics

Table 1. Association between ADL and general characteristics (n=141)

Characteristics		Normal ADL (n=92)		Impaired ADL (n=49)		p-value
		n	%	n	%	
Age group	60 – 69	40	43.5	10	20.4	< 0.05
	70 – 79	38	41.3	17	34.7	
	≥ 80	14	15.2	22	44.9	
Gender	Male	4	4.3	4	8.2	> 0.05
	Female	88	95.7	45	91.8	

BMI (kg/m ²)	< 18.5	4	4.3	15	30.6	< 0.05
	18.5 – 22.9	47	51.1	22	44.9	
	≥ 23	41	44.6	12	24.5	
Diabetes	Yes	11	12.0	14	28.6	< 0.05
	No	81	88.0	35	71.4	
Mean ± SD						
Age (year)	70.8 ± 7.7		77.5 ± 8.6		< 0.05	
BMI (kg/m ²)	22.6 ± 2.5		20.5 ± 3.2		< 0.05	
		OR		95%CI		
Age ≥ 80	4.5		2.0 – 10.1		< 0.05	
BMI < 18.5	9.7		3.0 – 31.3		< 0.05	
Diabetes	2.9		1.2 – 7.1		< 0.05	

The mean age in the group of people with impaired ADL was higher than those with normal ADL (77.5 versus 70.8 years), statistically significant ($p < 0.05$). The age of 80 and over increased the risk of decline in ADL by 4.5 times ($p < 0.05$). On the contrary, the mean BMI in those with impaired ADL was lower than those with normal ADL (20.5 versus 22.6 kg/m²), statistically significant ($p < 0.05$). Individuals with BMI less than 18.5 kg/m² raised the possibility of impaired ADL by up to 9.7 times ($p < 0.05$).

The prevalence of impaired ADL was significantly greater among those who had diabetes ($p < 0.05$). Diabetes increased the risk of impaired ADL by 2.9 times, 95%CI 1.2 – 7.1 ($p < 0.05$).

3.4. Association between ADL and characteristics of osteoporosis

Table 2. The association between ADL and characteristics of osteoporosis

Characteristics		Normal ADL (n=92)		Impaired ADL (n=49)		p-value
		n	%	n	%	
Diagnosed duration (year)	Newly diagnosed	48	52.2	22	44.9	> 0.05
	< 5	32	34.8	17	34.7	
	5 – 10	12	13.0	10	20.4	
Symptoms	Pain (back, long bone)	82	89.1	46	93.9	> 0.05
	Loss of height	44	47.8	18	36.7	> 0.05
	Spine malformations	21	22.8	9	18.4	> 0.05
	Bone fractures after minor injuries	4	4.3	2	4.1	> 0.05
	No symptoms	5	5.4	1	2.0	> 0.05
Treatment	Yes	45	48.9	27	55.1	> 0.05
	No	47	51.1	22	44.9	
Mean ± SD						
T-score	Hip	-1.4 ± 1.2		-1.8 ± 1.0		> 0.05
	Spine	-3.3 ± 0.7		-3.5 ± 0.8		> 0.05

There was no statistically significant difference in the decline in daily functioning and some characteristics of osteoporosis (diagnosed duration, symptoms, treatment or not, number site of pain and site of osteoporosis) with $p > 0.05$.

3.5. Association between ADL and geriatric syndromes

Table 3. The association between ADLs and geriatric syndromes (n=141)

Geriatric syndromes	Impaired ADL	
	OR	95%CI
Frailty syndrome	20.8	7.6 – 56.8
Low physical activity level	10.8	3.6 – 32.4
Cognitive impairment	6.4	2.8 – 14.6
Risk of fall	4.5	2.1 – 9.7
Malnutrition	4.5	2.1 – 9.4
Depression	4.4	2.1 – 9.1
Sleep disturbance	2.9	1.2 – 7.2
Polypharmacy	2.6	1.2 – 5.3

All mentioned geriatric syndromes had statistically significant association with ADL ($p < 0.05$). Activities of daily living can decrease by 20.8 times in people with frailty syndromes, 10.8 times in people with low levels of physical activity, 6.4 times in people with cognitive impairment, 4.5 times in people with malnutrition and risk of falls, 4.4 times in people with depression, 2.9 times in people with sleep disturbances and 2.6 times if taking more than 5 drugs a day.

4. DISCUSSION

Our results highlighted characteristics of ADL, IADL, and some related factors with ADL impairment among older patients with osteoporosis at the National Geriatric Hospital.

The proportion of participants with functional impairment in ADLs and IADLs in our study was the same, accounting for 34.8%. Compared with another study in Vietnam with the same population aged 60 and over with osteoporosis, the percentage was consistent with a reduction in ADL (33.6%) and lower than a reduction in IADL (41.4%) [4]. However, a higher rate of ADL decline was estimated in the study by Zhang, with 43.1% [7], and in the study by Xu, with 64.1% [8]. It can be explained by the subjects in the study by Zhang were individuals aged 70 years and older, and functional deficiency was greater among the older people of more advanced age. The

prevalence of IADL disability in older adults with osteoporosis was much higher in the study in Brazil, with 67.4% [9]. In addition, this study indicated a relationship between functional disability for IADL and musculoskeletal disorders [9]. These differences are possibly due to the use of different instruments for assessing functional capacity; and different regions, some with greater social vulnerability, showing a higher prevalence of impaired ADL and IADL. Osteoporosis is recognized to have an impact on the ability to perform physical tasks and activities in both individuals with and without fracture. The study by Stamm et al. identified that all items of ADL (Intense ADLs, basic IADLs, basic ADLs, and hand-focused ADLs) were substantially more frequently impaired in individuals with osteoporosis compared to those without osteoporosis [10].

Many studies revealed that functional ability

tends to deteriorate with the aging process as older adults are vulnerable to a decline in physical functioning and find themselves unable to undertake the basic activity of daily living [11]. In our study, the average age in the group of people with impaired ADL function was higher than those with normal ADL. The findings of our study reported that individuals aged 80 or over had the risk of ADL impairment with OR=4.5.

The mean BMI in impaired ADL individuals was lower in comparison with normal ADL individuals (20.5 versus 22.6 kg/m²). In addition, underweight people raised the possibility of impaired ADL function by up to 9.7 times. It is agreed by the study that people with higher BMI had a lower risk of disability in ADL than those with lower BMI [12]. However, Connolly also revealed that obesity likely led to further increases in the level and frequency of ADL disability in the older [13].

Among individuals with osteoporosis, the presence of comorbidities, which can exaggerate the effects of osteoporosis, can impair the ability to complete daily activities requiring physical function [14]. In addition, the prevalence of poor ADL function was significantly greater among those who had diabetes and a history of falling within the previous 12 months. Diabetes has been reported as a condition most clearly related to disability [13]. Then someone with osteoporosis may choose to become inactive and deteriorate independence in daily living activities [14].

There was no statistically significant difference in the decline in daily functioning and some characteristics of osteoporosis (diagnosed duration, symptoms, treatment or not, and site of osteoporosis) with $p > 0.05$. On the other hand, previous studies reported that pain significantly affected ADL [13]. It may be due to a small subjective sample in our study.

Frailty is considered a state of high vulnerability for adverse health outcomes, such as disability, falls, hospitalization,

institutionalization, and mortality. It is strongly and independently associated with reduced ADL. Another study by Xu et al. showed the relationship between ADLs and frailty in older patients with osteoporosis [8]. In our study, clinical frailty is the most significant risk factor for difficulty in ADL (OR=20.8). A low level of physical activity has been reported to be independently associated with an increased risk of ADL decline [13]. Conforming to previous research, this study found that people with osteoporosis who engage in low levels of physical activity are 10.8 times more likely to have compromised ADLs. Therefore, it is critical to increase physical activity to prevent or delay the onset of ADL disability.

Cognitive impairment is not only an independent predictor but also an increased factor of ADL dependence [15]. Our results identified that the odds of ADL disability increased 6.4 times in people with cognitive impairment. Numerous studies have examined the connection between nutritional status and ADL, and it has been found that poor nutrition is linked to decreased ADL. Our study found that people with malnutrition were 4.5 times more likely to impair ADL. Depression can impair both one's physical strength and psychological motivation to perform daily physical tasks. As a result, it may inhibit people from enhancing their physical function [14]. The study showed that the odds of impaired ADL increased 4.4 times in people with depression. Older adults with osteoporosis having ADL decline were prone to poor sleep quality [8]. Our study identified that participants with sleep disturbance had higher odds of ADL disability compared to those with good sleep quality (OR=2.9). Taking 5 or more medications was a strong factor related to ADL disability (OR=1.6) as regarded to multi-morbidity [13]. It is close to our finding that taking polypharmacy increased the prevalence of ADL impairment with OR=2.6.

5. CONCLUSIONS

One in three elderly osteoporosis patients has impaired ADL or IADL. Our results highlighted that advanced age, BMI, diabetes, and geriatric syndrome were significantly associated with ADL in older patients with osteoporosis.

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