

ASSESSMENT OF FUNCTIONAL DECLINE AND ASSOCIATED FACTORS IN ELDERLY PATIENTS WITH TYPE 2 DIABETES AT THANH HOA PROVINCIAL ENDOCRINOLOGY HOSPITAL IN 2024.

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ABSTRACT

Objective: To describe the decline in activities of daily living (ADLs) and instrumental activities of daily living (IADLs) among elderly individuals with type 2 diabetes at Thanh Hoa Provincial Endocrinology Hospital, and to investigate associated factors. **Methodology:** A cross-sectional study was conducted among 201 patients aged 60 years or older with type 2 diabetes at Thanh Hoa Provincial Endocrinology Hospital over a 2.5-month period. ADLs and IADLs were assessed using standardized scales. Associated factors including demographic, geriatric, and diabetes-related characteristics were analyzed. **Results:** The mean age of the participants was 70.71 ± 6.40 years. The prevalence of ADL impairment was 18.41%, and IADL impairment was 59.7%. Age and fall risk were significantly associated with ADL dependence. History of hypertension and fall risk were associated with IADL impairment. **Conclusion:** Elderly individuals with type 2 diabetes experienced significant difficulties in performing ADLs and IADLs. Age, fall risk, and hypertension were identified as major risk factors. Comprehensive assessment and interventions are needed to mitigate the decline in functional capacity among this population.

Keywords: type 2 diabetes, activities of daily living, elderly

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1. INTRODUCTION

Type 2 diabetes (T2DM) is a common chronic disease in the elderly, often associated with obesity, a sedentary lifestyle, or an unhealthy diet. According to data from the IDF (International Diabetes Federation) in 2021, there are approximately 537 million people worldwide aged 20-79 with T2DM[1]. According to a report by the Ministry of Health of Vietnam, in 2015, the diabetes rate among adults in Vietnam (aged 20 and above) was 5.4%[2]. By 2021, this rate had increased to approximately 7.3%[3]. This shows that the rate of T2DM in Vietnam has increased dramatically over the past 6 years.

Elderly individuals with T2DM often have a higher risk of impaired activities of daily living (ADL) compared to those with normal blood glucose levels. The main causes are complications such as peripheral neuropathy, cardiovascular issues, and vision impairment. Daily functional decline not only affects the ability to self-care but also increases the risk of dependence, hospitalization, and loss of financial independence, especially in rural areas. Some studies have also shown that diabetes in the elderly can significantly impair

functional activity in this group[4],[5].

Assessing ADL in elderly patients with T2DM is essential for identifying risk factors and implementing timely interventions, thereby improving quality of life and enhancing patient independence. This need is particularly urgent in the context of an aging population and the increasing burden of diabetes. To address this issue, we conducted the study “**Assessment of Functional Decline and Associated Factors in Elderly Patients with Type 2 Diabetes at Thanh Hoa Provincial Endocrinology Hospital in 2024**”, with two main objectives:

To describe the functional impairment in activities of daily living (ADL) and instrumental activities of daily living (IADL) in elderly patients with T2DM at Thanh Hoa Provincial Endocrinology Hospital.

To examine factors associated with ADL and IADL limitations in elderly patients with T2DM at Thanh Hoa Provincial Endocrinology Hospital.

2. OBJECTS AND METHODS

2.1. Study subjects:

A cross-sectional descriptive study on patients with T2DM receiving inpatient treatment at Thanh Hoa Provincial Endocrinology Hospital from April to June 2024.

• *Inclusion criteria:*

- Patients aged 60 years and older who are receiving inpatient treatment at Thanh Hoa Provincial Endocrinology Hospital have been diagnosed with T2DM according to Decision 5481/QĐ-BYT issued by the Ministry of Health in 2020[2].

• *Exclusion criteria:*

- Patients with severe acute complications, such as ketoacidosis coma, hyperosmolar coma, coma due to cerebrovascular accident, acute decompensated heart failure, severe liver failure, severe kidney failure, acute cerebrovascular accident, ...

- Patients who do not agree to participate in the study.

2.2. Sample size and sampling:

Apply the sample size formula to estimate a mean value:

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

n represents the minimum sample size.

Z₁₋₂₂: The result is 1.96 (the Z-score corresponding to the desired significance level (α). For $\alpha = 0.05$).

d is the allowable error $d=0.07$

The rate of activities of daily living without assistance (ADL) is 15.1%; the rate of activities of daily living with assistance (IADL) is 23.5% (according to the study by Nguyễn Trung Anh, at Thanh Nhân Hospital, 2020)[6].

Applying the sample size calculation formula, the rate for instrumental activities of daily living (IADL) is for a larger sample size. The sample size to be collected is 156 (including a 10% adjustment).

The actual sample size obtained is 201 patients.

2.3. Location and time of the research

- Location: Thanh Hoa Provincial Endocrinology Hospital
- Data collection period: from April 15, 2024, to June 30, 2024

2.4. Variables and data collection:

- The data was collected through a self-administered questionnaire. The questionnaire comprises 4 parts:

- Part I: Information on the research subjects (age, gender, education level, living area)

- Part II: Scale for assessing activities of daily living (ADL, IADL)

- Part III: Geriatric characteristics (fall history, fall risk, depression level)

- Part IV: Characteristics related to diabetes (blood glucose levels, HbA1c, history of hypertension).

- Evaluation criteria:
 - Daily activities (Activities Daily Living/ADL): include 6 questions about activities: eating, using the toilet, dressing, personal care, mobility, and bathing. There is a functional impairment when the score is < 6 points.
 - Daily activities using tools and instruments (Instrumental Activities of Daily Living/IADL): include 8 questions about activities: using the phone, shopping, cooking, cleaning the house, doing laundry, using transportation, taking medication, and managing expenses. Functional impairment when < 8 points.
 - Fall risk: Use the FRQ (Fall Risk Questionnaire) from STEADI-CDC–2017 USA, which consists of 13 questions. Add the score for each “Yes” answer. If the total score is 4 points or higher, there is a risk of falling. The questionnaire was translated and the reliability was tested with a Cronbach’s Alpha of 0.783[7].
 - Depression: using the GDS questionnaire consisting of 15 questions, the questionnaire is licensed for development by author Pham Quang Trung and is classified as follows:

3. RESULTS

3.1. Socio-demographic characteristics of the research subjects

Table 1: Socio-demographic characteristics of the research subjects (N=201)

		n	%
SOCIO-DEMOGRAPHIC CHARACTERISTICS			
Age	Age group 60-69	89	44,28
	Age group 70-79	91	45,27
	Age group ≥ 80	21	10,45
	Mean ± SD: 70,71 ± 6,40		
Gender	Male	80	39,80
	Female	121	60,20
Residential Area	Mountainous	28	13,93
	Rural	115	57,21
	Urban	58	28,86
GERIATRIC FACTORS			
Hypertension	Yes	70	34,83
	No	131	65,17

high likelihood of depression: 10-15 points, possible depression: 6-9 points, low likelihood of depression: 0-5 points[8].

2.5. Data Analysis

- The information is cleaned and coded. The data from the respondents’ surveys were entered into Microsoft Excel 2016 and analyzed using SPSS 20.0 software.
- The data were processed and analyzed using the SPSS 20 medical statistics software with algorithms: frequency, percentage, mean values, and standard deviation (SD).
- Use the Binary Logistic Regression model to test the relationship between two qualitative variables. A value <0.05 is considered statistically significant.

2.6. Ethical considerations

The research does not intervene or cause any harm to the participants. Participants are clearly explained the purpose and content of the study and have the right to refuse, agree to participate, or withdraw from the study at any time. Information about research participants is kept confidential and encrypted and is only used for research purposes.

History of Falls in the Past 12 Months	Yes	51	25,37
	No	150	74,63
Fall Risk Factors	Yes	142	70,65
	No	59	29,35
Depression Factors	Likely depressed	19	9,45
	Unlikely depressed	78	38,81
	Possibly depressed	104	51,74
CLINICAL INDICES		X ± SD	
Glucose (mmol/L)		10,77 ± 5,8	
HbA1c (%)		8,93 ± 2,07	

Among the 201 patients, the average age was 70.71 ± 6.40 , with the age group ≥ 80 having the lowest proportion at 10.45%. The two age groups 60-69 and 70-79 were equivalent, at 44.28% and 45.27%, respectively. Women (60.20%) accounted for a higher percentage than men (39.80%). In terms of living areas, rural areas accounted for the highest percentage at 57.21%, while mountainous areas had the lowest percentage at 13.93%. With geriatric factors, hypertension accounted for 64.68%, higher than the number of patients without hypertension, which accounted for 34.83%. With the risk of falling, patients with a fall risk accounted for 70.65%, higher than the group without fall risk factors at 29.35%. The rate of depressed patients is 51.74%, with the lowest being the group with a high likelihood of depression at 9.45%. The average blood glucose and HbA1c levels were 10.77 ± 5.88 and 8.93 ± 2.07 , respectively.

3.2. Characteristics of ADL/IADL limitations for elderly people with T2DM

Table 2: Characteristics of ADL/IADL limitations of the research subjects

		n	%
ADL	ADL limitations	37	18,41
	ADL unlimitations	164	81,59
IADL	IADL limitations	120	59,70
	IADL unlimitations	81	40,30

With ADL, 18.41% of patients with ADL limitations. With IADL, 59.70% of patients with IADL limitations

3.3. Factors related to ADL/IADL limitations

With ADL

Table 3: The results of the binary logistic regression between ADL and related factors

Independent variable		B	p	OR	95% C.I (Lower - Upper)
Age group	Age group 60-69		0,008	1	
	Age group 70-79	1,26	0.052	3,51	0,99 - 12,5
	Age group ≥ 80	2,96	0,002	19,37	2,90 - 129,26
Gender	Male	1,51	0,019	4,50	1,28 - 15,9

Educational level	Primary school and under	1,82	0,215	6,14	0,35 - 108,23
	Secondary school	1,76	0,228	5,82	0,33 - 102,32
	High school	2,32	0,130	10,21	0,51 - 206,21
	College and higher		0,505	1	
Residential area	Rural	-0,33	0,732	0,72	0,11 - 4,7
	Urban	0,07	0,936	1,07	0,20 - 5,68
	Mountainous		0,848	1	
Hypertension	Yes	0,83	0,178	2,28	0,69 - 7,6
Fall Risk Factors	Yes	3,23	0,010	25,16	2,14 - 296,37
Depression Factors	Likely depressed		0,415	1	
	Unlikely depressed	1,25	0,185	3,48	0,55 - 22,01
	Possibly depressed	0,42	0,519	1,52	0,43 - 5,43
Glucose	$\leq 7,2$ mmol/L	0,89	0,165	2,45	0,69 - 8,64
HbA1c	$\geq 7\%$	2,47	0,038	11,86	1.15 - 121,83

The results show that the age group 60-69 and the age group ≥ 80 , with a risk of falling and HbA1c $\geq 7\%$, are related to patients with ADL limitations. Among them, the age group ≥ 80 has a functional impairment 19.37 times higher than the age group 60-69 (95% C.I: 2.90 - 129.26). The group at risk of falling has function impairment 25.16 times greater than the group not at risk of falling (95 %CI: 2.14 - 296.37). For HbA1c, HbA1c $\geq 7\%$ has a functional impairment 11.86 times greater than HbA1c $< 7\%$ (95% CI: 1.15 - 121.83). Factors: age group 70-79; education level; residential area; hypertension; depression factors; glucose; HbA1c $< 7\%$ is not related to ADL limitations.

With IADL

Table 4: The results of the binary logistic regression between IADL and related factors

Independent factors		B	p	OR	95% C.I (Lower - Upper)
Age group	Age group 60-69		0,002	1	
	Age group 70-79	1,319	0.001	3,74	1,66 - 8,42
	Age group ≥ 80	1,938	0,016	6,95	1,43 - 33,80
Gender	Male	0,260	0,523	1,3	0,58 - 2,89
Educational level	Primary school and under		0,103	1	
	Secondary school	-1,154	0,040	0,315	0,105 - 0,946
	High school	-1,018	0,103	0,361	0,106 - 1,230
	College and higher	-1,799	0,022	0,165	0,036 - 0,768

Residential area	Rural		0,306	1	
	Urban	-0,228	0,609	0,61	0,33 - 1,91
	Mountainous	0,782	0,187	0,19	0,68 - 6,98
Hypertension	Yes	0,316	0,430	1,37	0,63 - 3,00
Fall Risk Factors	Yes	0,109	0,793	1,12	0,49 - 2,53
Depression Factors	Likely depressed	0,632	0,116	1,88	0,86 - 4,14
	Unlikely depressed	1,469	0,104	4,34	0,74 - 25,52
	Possibly depressed		0,131	1	
Glucose	$\leq 7,2$ mmol/L	0,414	0,338	1,51	0,65 - 3,53
HbA1c	$\geq 7\%$	1.171	0,023	3,23	1.18 - 8,86

The results show that age group, education level of high school, and HbA1c $\geq 7\%$ are related to patients with IADL limitations. Among them, the higher the age group, the greater the decline in IADL limitations. The age group 70-79 has an IADL limitations decline 3.74 times greater than the 60-69 age group (95% C.I: 1.66 - 8.42), and the age group ≥ 80 has an IADL limitations decline 6.95 times greater than the 60-69 age group (95% C.I: 1.43 - 33.80). Regarding educational level, individuals with a secondary education have a 0.315 times higher risk of IADL limitations compared to those with below primary and primary education (95% C.I: 0.105 - 0.946); individuals with college and higher have a 0.165 times higher risk of IADL limitations compared to those with below primary and under (95% C.I: 0.036 - 0.768). For HbA1c, HbA1c $\geq 7\%$ is 3.23 times more likely than HbA1c $< 7\%$ (95% C.I: 1.18 - 8.86). Factors of education level: primary school and under, high school; living area; hypertension; fall risk factors; depression factors; glucose; HbA1c $< 7\%$ are not related to IADL limitations.

4. DISCUSSION

Elderly people with T2DM often face many health challenges related to physical function. In this study, 18.41% of patients had

ADL limitations. Our results are comparable to a study in France with an ADL limitations rate of 16.5%[9]. The similarity may be due to both France and Thanh Hoa focusing on community healthcare, community healthcare programs, and support for the elderly. However, this rate is lower than the study by Nguyễn Thị Hiền and Phạm Anh Thư, which were 41.1% and 57.5%, respectively[5],[10]. This discrepancy may be due to the difference in research locations between the National Geriatric Hospital, where the majority are elderly patients with severe illnesses transferred from local hospitals, resulting in a much higher rate of ADL limitations compared to Thanh Hoa Provincial Endocrinology Hospital.

In this study, 59.7% of patients had IADL limitations. This result is higher than the studies in France and research by Nguyễn Thị Hiền, which were 35% and 50.3% respectively[9],[10]. This discrepancy further clarifies the differences between research locations impacting the instrumental activities of daily living. In France, the elderly have access to many support services with developed infrastructure, numerous social benefits, and a professional care team. Nguyễn Thị Hiền's study conducted in 2018 at the National Geriatric Hospital found that the facility had good infrastructure,

and patients received support and in-depth guidance for themselves and their families on rehabilitation. However, in Thanh Hoa, the infrastructure is underdeveloped, and patients have limited access to support from technology and finances, primarily receiving help from family members and neighbors. In contrast, this result is lower than the study by Nguyễn Anh Thu, which reported a rate of 64.8% for the decline in daily activities with the use of instruments[5]. This discrepancy may be due to the development of technology in 2024, with greater application of technology in real life, leading to elderly T2DM patients being more limited in using life support tools.

In a study of 201 patients, we found a statistically significant correlation between age groups and the status of ADL and IADL limitations. The age group ≥ 80 years has a higher ADL limitations rate, 19.37 times greater than the 60-69 age group, and the rate of IADL limitations in patients ≥ 80 years is 6.95 times higher than in patients ≥ 60 years. The results show a marked impairment in ADL and IADL functions with age, with the group of patients aged ≥ 80 years having significantly higher rates of ADL and IADL limitations compared to younger groups. This is consistent with the study by author A. Akira, which also indicates that patients over 80 years old have a higher rate of functional impairment compared to the 60-69 and 70-79 age groups[11]. The natural aging process, accompanied by a decrease in muscle mass (sarcopenia), peripheral nerve function decline, and the onset of comorbidities, has contributed to a reduced ability to self-care and perform daily activities.

The research results show that male gender is associated with ADL limitations. Male patients have a 4.5 times higher reduction in ADL limitations compared to female patients. However, previous studies

have shown that the rate of female patients with ADL limitations is higher than that of male patients[12],[13]. This difference may be due to changes in healthcare, the increasing attention to women's lifestyles, and the lighter mental workload compared to men.

Our study shows that education level is related to IADL limitations ($p < 0.005$). The higher the educational level, the better the knowledge of self-care and the ability to use life support tools, leading to a reduced decline in functional status.

Patients at risk of falling experience an impairment in ADL in our study 25.16 times higher than patients without a fall risk. This is similar to the study by Larissa Barros Freire (OR 1.59; 95% CI [1.36 -1.87])[14]. The high risk of falls can lead to difficulties for patients in moving, walking, and self-care. In addition, falls can lead to fractures, and in patients with T2DM, the time for bone healing may be prolonged, reducing the quality of life and mobility of the patient, thereby increasing the risk of functional impairment in daily activities, which can lead to increased dependence on family members and social welfare.

Patients with high HbA1c ($> 7\%$) are associated with ADL and IADL limitations, with the decline rates being 11.86 times and 3.23 times higher, respectively, compared to the group with HbA1c $< 7\%$. This result is similar to the findings of author Nguyễn Trung Anh[15]. This similarity may indicate that high HbA1C levels often reflect poor blood sugar control, leading to nerve damage and reduced muscle mass. These complications lead to a decrease in sensory perception, coordination, and muscle strength, thereby directly contributing to ADL limitation.

Our study did not find a significant correlation between residential area, hypertension, blood glucose levels, and

depression factors with the condition of ADL and IADL limitations.

5. CONCLUSION

The rate of functional impairment in ADL and IADL among participants is high. Age, gender, education level, fall risk, and HbA1c index are risk factors that contribute to the ADL and IADL limitations of patients. Longitudinal studies need to be conducted to evaluate these relationships.

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