



## Functional Status Among Elderly Patients with Diabetes

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### Abstract

**Background:** Functional capacity represents an important indicator of the health condition of the individual with diabetes mellitus, especially in the elderly **Aim:** This study aimed to assess functional status among elderly patients with diabetes **Methods:** A descriptive design used to accomplish this study, carried on 200 diabetic patients at outpatient clinic and diabetic unit At Al-Ahrar Educational Hospital at Zagazig City in Sharkia Governorate. Researcher used a structured interview questionnaire included demographic data, medical history, knowledge, and attitude scale for data collection. **Results:** mean score of transportation functional ability was the highest between all functional ability categories  $.98 \pm .14$  while the mean score of laundry functional ability was the lowest  $.41 \pm .49$ . Additionally, the table explains that the total mean score for elderly women functional ability was  $7.02 \pm 1.52$  and the total mean score for elderly men functional ability was  $4.71 \pm .66$ . multivariate analysis identified that female gender and income was statistically significant independent positive predictors of functional ability score. Conversely, age, diseases number, diagnosis history of DM, and sleep score were negative predictors. **Conclusion:** most of the studied elderly were independent in responsibility for own medication, transportation, using telephone, shopping, and handling finances. More than half of the elderly women were having high functional ability, while more than three quarters of the elderly men were having high functional ability. **Recommendation:** Development of comprehensive simple Arabic printed educational materials such as pamphlets, books for increasing knowledge of the elderly patients about diabetes. Designing awareness programs and counseling sessions for diabetic elderly aimed at updating their knowledge and guiding them to better control of diabetes mellitus.

**Keywords;** Functional status, Elderly, Patients, Diabetes

### Introduction:

The functional status of elderly patients with diabetes is a critical aspect of their overall health and well-being. Diabetes, a chronic metabolic disorder characterized by high blood sugar levels, can have a profound impact on an individual's functional abilities and independence. As the global population continues to age and the prevalence of diabetes rises, understanding the relationship between diabetes and functional status becomes increasingly

important in healthcare (Mirzayeva et al., 2023).

Functional status refers to an individual's ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs) independently and efficiently. ADLs encompass essential self-care tasks, including bathing, dressing, toileting, transferring, and eating. IADLs, on the other hand, involve more complex activities such as cooking, managing

medications, shopping, and using transportation. The ability to carry out these activities is crucial for maintaining independence, quality of life, and overall functional well-being among elderly individuals (Morros-González et al., 2023).

Elderly patients with diabetes face unique challenges that can impact their functional status. Diabetes-related complications, such as peripheral neuropathy, retinopathy, cardiovascular disease, and musculoskeletal disorders, can impair physical functioning and mobility. Moreover, the presence of comorbidities commonly associated with diabetes, such as hypertension, obesity, and chronic kidney disease, further complicates the functional status of these individuals (Longo et al., 2019).

Moreover, the management of diabetes itself can influence functional status. Complex treatment regimens, including medication administration, glucose monitoring, and dietary restrictions, can be demanding for elderly patients, potentially affecting their ability to independently manage their diabetes and perform self-care activities (Bekmuratov, 2023). The physical and cognitive demands of diabetes self-management can lead to fatigue, decreased motivation, and difficulties in adhering to recommended treatment plans, thus affecting functional abilities (LeRoith et al., 2019).

Psychosocial factors also play a significant role in the functional status of elderly patients with diabetes (Kalmykova & Kalmykov, 2023). The burden of managing a chronic condition, the fear of complications, and the presence of depression or anxiety can impact an individual's motivation, self-efficacy, and overall engagement in activities of daily

living. These psychological factors can contribute to functional limitations and reduced participation in social, recreational, and occupational activities (ElSayed et al., 2023).

Understanding the multifaceted factors influencing functional status among elderly patients with diabetes is essential for healthcare professionals to develop targeted interventions. Addressing modifiable risk factors, such as glycemic control, cardiovascular health, foot care, and psychological well-being, can potentially mitigate functional decline and enhance overall functional status (Cheng et al., 2023). By adopting a holistic and person-centered approach, healthcare providers can optimize the functional well-being of elderly patients with diabetes, promoting successful aging and improving their quality of life (de Rooij et al., 2022).

Understanding the impact of diabetes on functional status is crucial for healthcare professionals in order to provide appropriate care and interventions. By assessing and addressing the functional limitations faced by elderly patients with diabetes, healthcare providers can develop comprehensive management plans that optimize their independence and quality of life. Furthermore, recognizing the factors that contribute to functional decline can guide the development of preventive strategies and early interventions aimed at preserving functional abilities and delaying disability (Chen et al., 2022).

#### **Methods:**

##### **Aim:**

The current study aimed to assess functional status among elderly patients with diabetes.

##### **Research Question:**

What is the level of functional status among elderly patients with diabetes?

**Research design:**

The descriptive design was used to conduct this study.

**Setting:**

The existing study was conducted at two settings: outpatient clinic and diabetic unit At Al-Ahrar Educational Hospital at Zagazig City in Sharkia Governorate. The whole ward provides services throughout the day for all age group and for both sexes. The ward is located on the fifth floor in the hospital containing the clinic which consists of awaiting room, nursing staff room, a doctor's room and one bathroom. In addition to the unit which divided to 5 rooms with 10 beds, every room containing 2 beds where the researcher collected data.

**Sampling:**

A purposive sample consist of (200) elderly patients with diabetes who fulfilled the following criteria:

**Inclusion criteria:**

- 1-60 years old and more.
- 2-Able to communicate.
- 3-Agree to participate in the study.

**Exclusion criteria:**

1. Elderly who has communication problems as (speech & hearing problems).
2. Elderly who has psychiatric problems.

**Sample size calculation:**

The sample size was calculated by using open EPI. Assuming the target elderly for 1 year was 650 .and the estimated prevalence of poor sleep quality (Elsayed et al., 2020) was 71.6%. At 95% CI and effect size=1, the estimated sample will be 200 subjects admitted to the previous hospital and suffering diabetes.

**Tools for data collection:**

Three tools will be utilized to collect the required data include:

**Tool I: Structured interview questionnaire sheet:**

It was developed by the researcher to collect the necessary data for the study. It will be composed of two parts:

**Part one: Entails data about demographic characteristics of the elderly diabetics (Questions 1-11):**

This part was used to assess demographic characteristics of the studied diabetic elderly which included age, marital status, educational level, current working, monthly income, living condition, Source & sufficiency of income and living with whom.

**Part two: Health profile of the studied elderly patients (Questions 12-18):**

This part was intended for collecting information about the medical history of the studied elderly. It involved questions about chronic diseases (e.g., hypertension, renal diseases, respiratory system diseases, heart diseases, liver diseases and digestive system diseases. In addition to medication, and family history.

**Tool II: functional status assessment:**

Functional ability by (badrasawi, Shahar & Singh, 2017), The well-established version of Lawton Instrumental Activities of Daily Living (IADL) questionnaire used to assess the respondent's ability to perform eight daily activities (ability to use telephone, shopping, preparing meals, housekeeping, doing laundry, using public transport, taking medications and handling finances).

**Scoring system:** for each category, the item description that most closely resembles the client's highest functional level will take (either 0 or 1). A summary score ranges from 0 (low function, dependent) to 8 (high function, independent) for women, and 0 through 5 for men because the areas of food preparation, housekeeping, laundering are excluded to avoid potential gender bias.

**Content validity:**

Once prepared, the tools were presented to a panel of 3 experts from community health nursing, Obstetrics and Gynecological and medical surgical Nursing at the faculty of nursing in Zagazig University. They assessed the tools for clarity, relevance, application, and comprehensiveness. This constituted the content validation of tools. All recommended modifications were applied.

**Reliability:**

The reliability of tools was tested by measuring their internal consistency. It demonstrated a good level of reliability with Cronbach's Alpha as follow.

Scales	N of Items	Cronbach's Alpha
Functional ability scale	8	.77

**Pilot study:**

Before performing the main study, a pilot study was carried out on 20 elderly from the study setting, constituting about 10% of the calculated sample for the main study. The purposes of the pilot were to test the questions for any obscurity and to assess the practicability and feasibility of using the structured interview questionnaire sheet for the elderly. It also helped the researcher to determine the time needed for filling out the forms, which turned to be 20 to 30 minutes. All of them received a clear explanation for the study purpose. According to the results of pilot study no modification made to the tools. Elderly who shared in the pilot study were involved in the studied sample.

**Fieldwork:**

Once the permission was granted to proceed with the study, the researcher started to prepare a schedule for collecting the data. Each elderly was interviewed individually by the researcher who

introduced herself and explained the aim of the study briefly and reassured them that information obtained is strictly confidential and would not be used for any purposes other than research. After that, the oral approval was obtained to collect the necessary data. The researcher used to go to study setting for interviewing the elderly who fulfills the criteria. The study tools were answered by each elderly during the interview, and the time needed ranged from 15 to 20 minutes, according to understanding and cooperation of the elderly. The fieldwork was executed over six months from June 2022 up to the end of January 2023; three days per week (Sunday, Tuesday, and Thursday) from 10.00 Am to 1.00 pm.

**Ethical considerations:**

Firstly, the study proposal was approved by the Research Ethics Committee (REC) and Postgraduate Committee of the Faculty of Nursing at Zagazig University. Then, oral informed consent for participation was obtained from each subject after full explanation of the aim of the study. Participants were given the opportunity to refuse participation, and they were notified that they could withdraw at any stage of filling the questionnaire. They were assured that the information would be confidential and used for research purpose only.

**Statistical design:**

Data entry and statistical analysis were done using SPSS 22.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and means and standard deviations and medians for quantitative variables. The Cronbach alpha coefficient was calculated to assess the reliability of the developed tools through their internal consistency.

Qualitative categorical variables were compared using a chi-square test ( $X^2$ ). Whenever the expected values in one or more of the cells in a 2x2 tables was less than 5, Fisher exact test was used instead. The Spearman rank correlation was used for assessment of the interrelationships among quantitative variables and ranked ones. In order to identify the independent

predictors of the knowledge, sleep quality and functional ability scores multiple linear regression analysis was used after testing for normality, and homoscedasticity, and analysis of variance for the full regression models were done. Statistical significance was considered at p-value <0.05.

### Results:

**Table (1):** demographic characteristics of participants in the study sample (n=200)

Demographic characteristics	Frequency	Percent
<b>Age:</b>		
60-69	146	73.0
70-79	54	27.0
<b>Mean ± SD</b>	<b>66.23 ± 5.29</b>	
<b>Rang</b>	<b>(60-79)</b>	
<b>Gender :</b>		
Male	87	43.5
Female	113	56.5
<b>Marital status</b>		
Married	121	60.5
Divorced	17	8.5
Widow	60	30.0
Single	2	1.0
<b>Previous work before retiree:</b>		
House wife	83	41.5
Employee	56	28.0
Farmer	26	13.0
tradesmen	14	7.0
Crafts	21	10.5
<b>Current work:</b>		
Work [bakery, carpenter, tradesmen & farmer]	12	6.0
Not work	188	94.0
<b>With whom you live:</b>		
With family	151	75.5
Alone	49	24.5
<b>Source of income :@</b>		
Pension	113	56.5
Sons assistants	46	23.0
Properties revenue	24	12.0
Still work	12	6.0
Others [ social assistants]	5	2.5
<b>Treated on state expenses:</b>		
Yes	175	87.5
No	25	12.5

**Table 1** reveals that, the studied elderly's age ranged between 60 and 79 years, with mean  $66.23 \pm 5.29$  years, 73.0 % of them were aged between 60 and 69 years old, with slightly more female (56.5%) who were married (60.5%). In addition, 94%, 75.5%, and 41.5% of the studied elderly weren't currently worked and were live with their family respectively. Concerning income, 56.5% of the studied elderly were depending on the retirement pension.

**Table (2):** Medical history of participants in the study sample (n=200)

Medical History	Frequency	Percent
<b>Having any chronic disease than DM:</b>		
Yes	155	77.5
No	45	22.5
<b>Diseases:@</b>		
Hypertension	105	52.5
Kidney & urology	21	10.5
Respiratory	16	8.0
Heart	32	16.0
Liver	22	11.0
GIT	28	14.0
Skin	2	1.0
<b>Others</b> [teeth loss, Parkinson's, rheumatoid]	3	1.5
<b>No. of diseases: n=155</b>		
<b>No disease</b>	45	22.5
≤ 2	144	72.0
> 2	11	5.5
<b>Range</b>	<b>0-5</b>	
<b>Mean±SD</b>	<b>1.13±.85</b>	

@ Responses are not mutually exclusive

**Table 2** explains the medical history of the studied elderly. Regarding to the table, 77.5 % of the studied elderly patients were having chronic diseases other than diabetes and the most commonly diseases were hypertension (52.5%), heart diseases (16.0%), and GIT diseases (14.0%). The table also reveals that the mean number of chronic diseases among the studied elderly was  $1.13 \pm .85$ .

**Table (3):** DM history of participants in the study sample (n=200)

DM History	Frequency	Percent
<b>History of DM disease / diagnosis:</b>		
< 1 year – 6 years	96	48.0
7 years – 15 years	67	33.5
16 years – 40 years	37	18.5
<b>Mean ± SD</b>	<b>9.31 ± 7.55</b>	
<b>Family history of DM:</b>		
Yes	111	55.5
No	89	44.5
<b>Degree of relation:@ n= 111</b>		
Father - mother	75	37.5
Brother - sister	35	17.5

Uncle – aunt	10	5.0
Grandma -pa	13	6.5
<b>Discovering DM / diagnosis:</b>		
Feel signs and symptoms	98	49.0
By Chance	45	22.5
During medical examination	57	28.5
<b>Know the medication:</b>		
Yes	78	39.0
No	122	61.0
<b>Medication name:@</b>		
Insulin	34	17.0
Cidophage	6	3.0
Amyral	19	9.5
Diamacron	2	1.0
Glibophen	1	0.5
Glimet	2	1.0
Insulin & tablet	2	1.0

@ Responses are not mutually exclusive

**Table 3** explains the diabetes mellitus history of the studied elderly. Regarding to the table, 48.0 % of the studied elderly patients were having DM from less than 1 year to 6 years with mean number of years  $9.31 \pm 7.55$  and 55.5% of them were having family history of DM especially father & mother (37.5%). Additionally, the table reveals that 61.0 % of the studied elderly patients weren't knowing their medication.

**Table (4):** Functional ability of studied elderly patients (n=200)

Instrumental activities of daily living scale (I.A.D.L.)		(n=200)	
		No	%
<b>Ability to Use Telephone</b>	<b>Low function / dependent 0</b>	22	11.0
	<b>High function / independent 1</b>	178	89.0
<b>Shopping</b>	<b>Low function / dependent 0</b>	26	13.0
	<b>High function / independent 1</b>	174	87.0
<b>Food Preparation</b> N=113 (87 elderly men not applicable)	<b>Low function / dependent 0</b>	12	6.0
	<b>High function / independent 1</b>	101	50.5
	<b>Not applicable</b>	87	43.5
<b>House keeping</b> N=113 (87 elderly men not applicable)	<b>Low function / dependent 0</b>	8	4.0
	<b>High function / independent 1</b>	105	52.5
	<b>Not applicable</b>	87	43.5
<b>Laundry</b> N=113 (87 elderly men not applicable)	<b>Low function / dependent 0</b>	32	16.0
	<b>High function / independent 1</b>	81	40.5
	<b>Not applicable</b>	87	43.5
<b>Mode of Transportation</b>	<b>Low function / dependent 0</b>	4	2.0
	<b>High function / independent 1</b>	196	98.0
<b>Responsibility for</b>	<b>Low function / dependent 0</b>	3	1.5

<b>Own Medications</b>	<b>High function / independent 1</b>	197	98.5
<b>Ability to Handle Finances</b>	<b>Low function / dependent 0</b>	29	14.5
	<b>High function / independent 1</b>	171	85.5

**Table 4** reveals that the studied elderly was independent in responsibility for own medication, transportation, using telephone, shopping, and handling finances (98.5%, 98.0%, 89.0%, 87.0%, and 85.5% respectively).

**Table (5):** Total mean score of Functional ability categories

Functional ability categories	Mean	SD
<b>Ability to Use Telephone</b>	.89	.31
<b>Shopping</b>	.87	.33
<b>Food Preparation</b> N=113 (87 elderly men not applicable)	.51	.50
<b>House keeping</b> N=113 (87 elderly men not applicable)	.53	.50
<b>Laundry</b> N=113 (87 elderly men not applicable)	.41	.49
<b>Mode of Transportation</b>	.98	.14
<b>Responsibility for Own Medications</b>	.98	.12
<b>Ability to Handle Finances</b>	.86	.35
<b>Total mean score for elderly women</b>	7.02	1.52
<b>Total mean score for elderly men</b>	4.71	.66

**Table 5** shows that the mean score of transportation functional ability was the highest between all functional ability categories  $.98 \pm .14$  while the mean score of laundry functional ability was the lowest  $.41 \pm .49$ . Additionally, the table explains that the total mean score for elderly women functional ability was  $7.02 \pm 1.52$  and the total mean score for elderly men functional ability was  $4.71 \pm .66$ .

**Table (6):** Total Functional ability of studied elderly women (n=113)

Functional ability	No	%
Totally dependent [low function]	0	0.0
Need assistance [minimal function]1-7	55	48.7
Totally independent [high function] 8	58	51.3

As regards the total functional ability of the studied elderly women, **Table 6** clarifies that 51.3% of them were totally independent, while 48.7% of them were needing assistant.

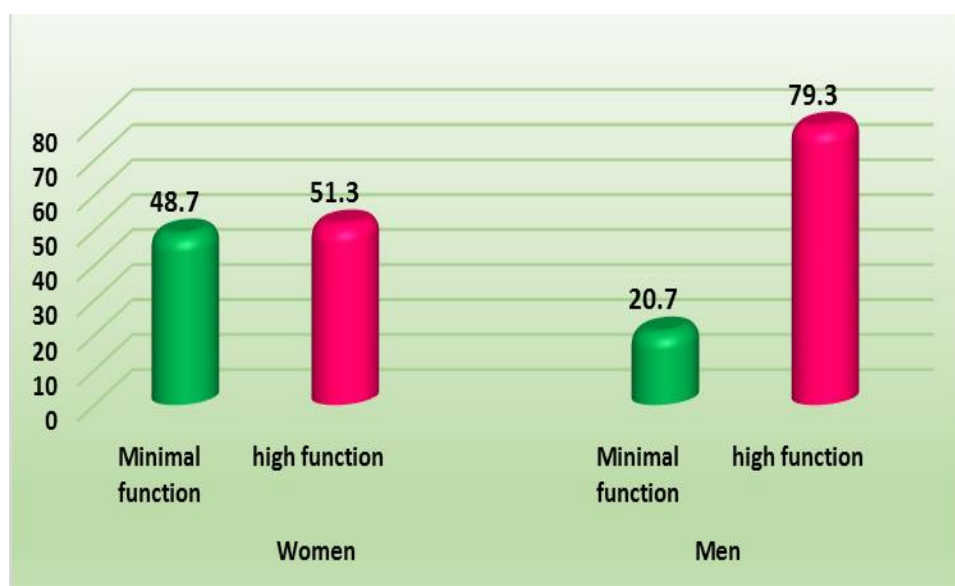
**Table (7):** Total Functional ability of studied elderly men (n=87)

Functional ability	No	%
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Totally dependent [low function]	0	0.0
Need assistance [minimal function]1-4	18	20.7
Totally independent [high function] 5	69	79.3

As regards the total functional ability of the studied elderly men, **Table 7** clarifies that 79.3% of them were totally independent, while 20.7% of them were needing assistant.



**Figure (1):** Total Functional ability of studied elderly [women & men] (n=200)

Concerning elderly functional ability, **Figure 1** Portrays that 51.3% of the elderly women were having high functional ability, while 48.7% were having minimal functional ability. Additionally, the figure shows that 79.3% of the elderly men were having high functional ability, while 20.7% were having minimal functional ability.

**Table (8):** Best fitting multiple linear regression model for participants' functional ability score

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	5.619	1.136		4.946	.000	3.378	7.860
Age	-.037	.016	-.119	-2.415	.017	-.068	-.007
Gender [female]	2.239	.161	.665	13.862	.000	1.920	2.557
Monthly income	.455	.153	.141	2.967	.003	.153	.758
Disease number	-.275	.095	-.140	-2.882	.004	-.463	-.087
Diagnosis history of DM	-.024	.011	-.108	-2.181	.030	-.046	-.002
Total knowledge score	.013	.016	.041	.840	.402	-.018	.045
Total sleep quality score	-.086	.021	-.201	-4.150	.000	-.127	-.045

R-square=0.59 Model ANOVA: F=41.02, p<0.05

**Table (8)** indicates that the multivariate analysis identified that female gender and income was statistically significant independent positive predictors of functional ability score. Conversely, age, diseases number, diagnosis history of DM, and sleep score were negative predictors.

### Discussion:

Regarding Instrumental activities of daily living scale among diabetic elderly patients, the present study revealed that most of the studied elderly were independent in responsibility for own medication, transportation, using telephone, shopping, and handling finances. This finding might be due to diabetes controlled by lifestyle and medication.

The previous findings were in the same line with those of other previous study carried out by **Maresova et al. (2019)** who concluded that diabetes mellitus patient able to different Instrumental activities of daily living e.g., shopping, responsibility for own medication, transportation.

As regards the total functional ability of the studied elderly women, the present study clarified that more than half of them were totally independent, while rest of them were needing assistant. The pervious study in same line with study by **Barua et al. (2021)** who showed that more than two thirds of the studied sample were totally independent, while rest of them were needing assistant. Moreover, this finding in same line with study in India by **Malik, (2022)** who revealed that females are dominating with a greater prevalence of functional disability than males.

On other hand, this finding was disagreed with study in Egypt by **Ali et al. (2022)** who reported that about half of the studied sample dependent on other.

Concerning to elderly's score of functional ability, this score had statistically significant negative correlation

with elderly age. Meanwhile, educational level had positive correlations with this score. Additionally, elderly men score of functional ability had statistically significant negative correlation with having chronic diseases and diagnosis of DM.

Likewise, this finding in same line with study by **Ivanović et al. (2021)** and found that elderly's score of functional ability, this score had statistically significant negative correlation with elderly age. Also, with a study in China carried out by **Li et al. (2023)** and reported that score of functional ability had statistically significant negative correlation with having chronic diseases. Additionally, **Nguyen et al. (2019)** found that functional ability had statistically significant negative correlation with having number of chronic diseases.

The current study indicated that the female gender and income was statistically significant independent positive predictors of functional ability score. Conversely, age, diseases number, diagnosis history of DM, and sleep score were negative predictors. This may be due to the severity of the disease is increased by aging due to physiological changes and noncompliance with treatment regimen.

In the same stream, a study conducted in **AL-Din et al. (2022)** and reported that duration of DM was negative effect on patient quality of life. Also, a study conducted by **Zimmer et al. (2017)** who showed that the female gender was statistically significant independent positive predictors of functional ability score. Conversely, age was negative predictors. Moreover, this finding was

consistent with a study conducted in Bangladesh by **Tareque et al. (2017)** who revealed that Age, suffering from at least one chronic condition was negative predictors.

### Conclusion:

On the light of results of the current study and answers to the research questions, it was concluded that most of the studied elderly were independent in responsibility for own medication, transportation, using telephone, shopping, and handling finances. More than half of the elderly women were having high functional ability, while more than three quarters of the elderly men were having high functional ability.

### Recommendations:

**In the light of the findings of the current study, the following recommendations are suggested:**

1. Development of comprehensive simple Arabic printed educational materials such as pamphlets, books for increasing knowledge of the elderly patients about diabetes.
2. Designing awareness programs and counseling sessions for diabetic elderly aimed at updating their knowledge and guiding them to better control of diabetes mellitus.
3. Educational sessions should be organized to improve functional status of diabetic elderly by giving instructions to adapt healthy lifestyle and prevent the negative impact on their life.
4. Educational consultation interventions for improving the quality of sleep and developing preventive and treatment strategies to relieve sleep disorders for diabetic elderly.
5. Future studies on larger sample studies at different hospitals in Egypt are

recommended to obtain more comprehensive data on functional status and sleep quality in diabetic elderly.

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