International Journal of Community Medicine and Public Health
Devi I et al. Int J Community Med Public Health. 2024 Jan;11(1):307-312
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20234143

Original Research Article

Functional dependency among elderly population in a rural area of Ernakulam district, Kerala, India

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Received: 16 November 2023
Revised: 12 December 2023
Accepted: 22 December 2023

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ABSTRACT

Background: Elderly populations with co-morbidities and sensory impairments are more likely to be functionally dependent on their activities of daily living. Objectives of the study were to determine functional dependency among the elderly population residing in a rural area of Ernakulam district, and also to determine the factors associated with functional dependency in the study population.
Methods: A community-based cross-sectional study was conducted among 200 elderly people from rural area of Ernakulam district, Kerala. A non-probability convenient sampling method was used for the study participants. A semi-structured questionnaire was used to collect information about the socio-demographic questions, medical history and history of comorbidities. Barthel's scale assessed activities of daily living and independent activities of daily living were assessed by Lawton's scale. The statistical test was done using statistical package for the social sciences (SPSS) version 21 and a chi-square test of significance was used to find the association of various factors with functional dependency.
Results: In Barthel's scale using ADL score, fully dependent was found to be 2.5%. In the IADL score using Lawton's scale fully dependent was found to be 0.5% among the study participants. Among the study participants, 57.9% of females and 42.1% of males have a visual impairment, 60% of females and 40% of males have a hearing impairment, 45.5% of females and 54.5% of males have a cognitive impairment.
Conclusions: Comorbidities such as diabetes mellitus, cardiovascular diseases, osteoporosis, osteoarthritis, and cognitive impairment contribute to a decline in functional abilities among older adults.

Keywords: Geriatric age, Activity of daily living, Barthel's scale, Lawton's scale, Co-morbidities, Functional

INTRODUCTION

The geriatric population, comprising individuals aged 60 years and older, is growing at an unpredicted rate worldwide. In 2019, the number of people aged 60 years and older was 1 billion, which is expected to increase by 1.4 billion in 2030 and 2.1 billion in 2050. The rate of this increase is unpredicted and is expected to further escalate in the coming decades, especially in developing nations.[1] The old-age dependency in India has increased from 14.2% in 2011 to 15.7% in 2021. Whereas in Kerala, the old age dependency had risen to 26.1% in 2021 from 19.6% in 2021.[2]

Functional dependency refers to the loss or decline in the ability of older adults to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs) independently. The geriatric age group being more vulnerable to health risks and morbidities are at higher risk for being functionally dependent. Age related changes, such as reduced muscle strength, joint flexibility, and sensory impairments, can contribute to difficulties in

maintaining functional status. Chronic health conditions like diabetes mellitus, hypertension, cardiovascular disease, osteoporosis, chronic renal disease, osteoarthritis, obesity, asthma etc add to the challenges older adults face. The main aim of this study is to assess the functional dependency among the elderly population in rural areas of Ernakulam district and also identify the factors associated with functional dependency among them.

Objectives

Primary objective was to determine the functional dependency among the elderly population residing in rural areas of Ernakulam district.

Secondary objective was to determine the factors associated with functional dependency among the study population.

METHODS

Study design

This was a community based cross sectional study.

Study setting

Njarackal is one of the rural gram panchayats located in Vypin area of Ernakulam district, in the state of Kerala, India. The study was conducted in a rural field practice area of Amrita Institute of Medical Sciences.

Study population

The participants were chosen by a non-probability convenient sampling method. Elderly population aged 60 years and above were included in the study.

Inclusion criteria

Permanent residents among the elderly population living more than six months in Njarackal area were included in the study.

Exclusion criteria

Elderly persons who are bed ridden, physically disabled or mentally retarded were excluded from the study.

Study duration

The study duration was from April till September 2022. Data collection was carried out in May month of 2022.

Ethical consideration

The study protocol was approved and reviewed by the dissertation review committee and Institutional Ethical Committee of Amrita School of Medicine. Written informed consent was obtained from the study participants.

Sample size

The sample size was calculated based on a study done by Usha et al where the total dependency rate was 28% was 81 with a 10% absolute error.[3] However, 200 participants were included in the study.

Study instruments

A semi-structured questionnaire consisting of sociodemographic details, medical history, history of comorbidities and questions on activities of daily living (ADL) was used to collect data from the study participants. Barthel's scale was used to assess the activities of daily living (ADL) and Lawton's scale was used to assess independent activity of daily living (IADL). ADLs include essential self-care tasks such as bathing, dressing, eating, toileting, and transferring, while IADLs encompass more complex activities like managing finances, cooking, shopping, and using transportation.[4,5] The questionnaire was prepared in English and was translated to the local language during the interview. Information was collected after obtaining written informed consent from the study participants.

Statistical analysis

The data was analysed using IBM statistical package for the social sciences (SPSS) statistics for Windows, software version 21. Categorical variables are expressed in frequency and percentage. Continuous variables are expressed as mean and SD. The chi-square test for significance was used to determine the factors associated with functional dependency. A p value <0.05 was considered statistically significant.

RESULTS

Among the 200 participants, where half of the population were females (52.2%). A majority of them belong to youngest old adult (46.7%) criteria. The mean age (SD) of the population was 68 years ±10.04 SD. Most of them (54%) belongs to APL category and half of the study population are living in joint families (50.8%). Other sociodemographic details are given in Table 1.

Among the study participants, 57.9% of females and 42.1% of males have a visual impairment, 60% of females and 40% of males have a hearing impairment, 45.5% of females and 54.5% of males have cognitive impairment (Table 2).

According to the responses obtained from study participants, scoring was done and categorized. On assessing the ADL using the Barthel's scale, 70.1% belonged to fully independent category (90-100) and 2.5% was fully dependent (0-19).

Table 1: Distribution of study participants based on sociodemographic characteristics (N=200).

Variables	Frequency (n=200)	Percentage
Age in years		
Late middle age	75	41
Youngest old adults	94	46.7
Middle old adults	23	10.7
Oldest old adults	8	1.8
Gender		
Male	95	47.8
Female	105	52.2
Marital status		
Married	162	81.1
Widower	34	16.9
Unmarried	4	2
Religion		
Hindu	152	76.1
Christian	45	22.4
Muslim	3	1.5
Residence		
Rural	199	99.5
Urban	1	0.5
Financial support		
Pension or any other scheme	123	61.2
With own saving	37	18.4
Support from family	41	20.4
Socio economic status		
APL	108	54
BPL	92	46
Type of family		
Joint family	101	50.8
Nuclear family	98	49.2
Residential type		
Own house being bought by you or someone in the family	171	85.5
Being rented for money	29	14.5
Highest level of education		
Primary school or illiterate	113	56.8
High school	46	23.1
Bachelor's degree	34	17.1
Master degree	6	3
Occupation before retirement		
Government job	56	28
Private sector	24	12
Business	10	5
Daily wages	15	7.5
Skilled worker	18	9
Unskilled worker	5	2.5
Homemaker	72	36

According to the IADL assessment using Lawton's scale, 75.1% belong to the fully independent (90-100) category and 0.5% was fully dependent (0-19). Other scoring details and categories were given in Table 3.

Table 2: Distribution of study participants based on gender and types of impairment (N=200).

Type of impairment	Female	Male
	N (%)	N (%)
Visual impairment	11 (10.5)	8 (8.4)
Hearing impairment	9 (8.6)	6 (6.3)
Cognitive impairment	5 (4.8)	6 (6.3)
No impairment	80 (76.2)	75 (78.9)

Table 3: Distribution of study participants based on physical dependency using ADL score and IADL score (N=200).

Physical dependency	Frequency (n)	Percentage
ADL score using Barthel's scale		
Fully independent (100-90)	141	70.1
Moderately dependent (60-89)	38	18.9
Severely dependent (59- 20)	17	8.5
Totally dependent (0-19)	6	2.5
IADL score using Lawton's scale		
Fully independent (100-90)	151	75.1
Moderately dependent (60-89)	17	8.5
Severely dependent (59- 20)	32	15.9
Totally dependent (0-19)	1	0.5

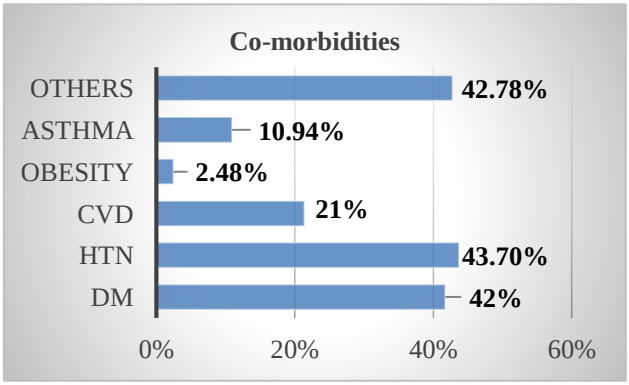

Figure 1: Bar graph representing the distribution of study participants based on co-morbidities.

*Others include osteoporosis, osteoarthritis, spine derangement and renal impairments, CVD- cardiovascular disease, DM-diabetes mellitus, HTN- hypertension

In bivariate analysis, ADL is found to be significant for age ($p<0.001$), marital status ($p<0.001$) and gender ($p=0.044$), whereas IADL is found to be significant for marital status ($p=0.023$) (Table 4).

In this study, physical dependency for activities of daily living induced by comorbidities like diabetes mellitus (unadjusted OR 1.076), asthma (unadjusted OR 2.603), obesity (unadjusted OR 2.778), cardiovascular diseases (unadjusted OR 1.121) and other comorbidities (unadjusted OR 2.603) that include osteoporosis, osteoarthritis, spine derangement and chronic kidney diseases was more likely to occur as the predictor increases, whereas physical dependency induced by hypertension (unadjusted OR 0.822) is less likely to occur among the study population (Table 5).

Meanwhile, physical dependency for independent activities of daily living induced by comorbidities like diabetes mellitus (unadjusted OR 1.751), asthma (unadjusted OR 3.667), cardiovascular diseases (unadjusted OR 1.267) and other comorbidities (unadjusted OR 3.667) that include osteoporosis, osteoarthritis, spine derangement and chronic kidney diseases is more likely to occur as the predictor increases, whereas physical dependency induced by hypertension (unadjusted OR 0.877) and obesity (unadjusted OR 0.959) was less likely to occur among the study population (Table 6).

Table 4: Association of functional dependency with various factors.

Variables	ADL			IADL		
	Independent N (%)	Dependent N (%)	P value	Independent n (%)	Dependent n (%)	P value
Age in years						
Equal to or less than 68	115 (95.5)	5 (4.2)	<0.001	117 (97.5)	3 (2.5)	0.251
Greater than 68	63 (78.8)	17 (21.3)		75 (93.8)	5 (6.3)	
Gender						
Female	89 (84.8)	16 (15.2)	0.044	101 (96.2)	4 (3.8)	0.885
Male	89 (93.7)	6 (6.3)		91 (95.8)	4 (4.2)	
Marital status						
Married	152 (93.8)	10 (6.2)	<0.001	158 (97.5)	4 (2.5)	0.023
Others	26 (68.4)	12 (31.6)		34 (89.5)	4 (10.5)	
Financial support						
Pension	106 (86.9)	16 (13.1)	0.232	117 (95.9)	5 (4.1)	1.002
Savings	72 (92.3)	6 (7.7)		75 (96.2)	3 (3.8)	
Past history of illness						
Present	110 (86.6)	17 (13.4)	0.155	122 (96.1)	5 (3.9)	0.952
Absent	68 (93.2)	5 (6.8)		70 (95.6)	3 (4.1)	
Mode of treatment						
Allopathy	139 (88.5)	18 (11.5)	0.688	151 (96.2)	6 (3.8)	0.806
Others	39 (90.7)	4 (9.3)		41 (95.3)	2 (4.7)	

Table 5: Association of functional dependency with comorbidities risk perception using ADL scale.

Comorbidities	Independent N (%)	Dependent N (%)	Unadjusted OR (95% CI)	P value
Obesity				
Present	3 (75)	1 (25)	2.778 (0.276-27.928)	0.375
Absent	175 (89.3)	21 (10.7)		
Cardiovascular disease				
Present	37 (88.1)	5 (11.9)	1.121 (0.388-3.238)	0.786
Absent	141 (89.2)	17 (10.2)		
Hypertension				
Present	73 (90.1)	8 (9.9)	0.822 (0.328-2.059)	0.675
Absent	105 (88.2)	14 (11.8)		
Diabetes mellitus				
Present	46 (88.5)	6 (11.5)	1.079 (0.397-2.915)	0.885
Absent	132 (89.2)	16 (10.8)		
Asthma				
Present	14 (77.8)	4 (22.2)	2.603 (0.774-8.757)	0.118
Absent	164 (90.1)	18 (9.9)		

Continued.

Comorbidities	Independent N (%)	Dependent N (%)	Unadjusted OR (95% CI)	P value
Others				
Present	73 (84.9)	13 (15.1)	2.078 (0.844-5.114)	0.106
Absent	105 (92.1)	9 (7.9)		

Table 6: Association of functional dependency with comorbidities risk perception using the IADL scale.

Comorbidities	Independent N (%)	Dependent N (%)	Unadjusted OR (95% CI)	P value
Obesity				
Present	4 (100)	0 (0)	0.959 (0.932-0.987)	1.00
Absent	118 (95.9)	8 (4.1)		
Cardiovascular disease				
Present	40 (95.2)	2 (4.8)	1.267 (0.246-6.515)	0.675
Absent	152 (96.2)	6 (3.8)		
Hypertension				
Present	78 (96.3)	3 (3.7)	0.877(0.204-3.776)	0.860
Absent	114 (95.8)	5 (4.2)		
Diabetes mellitus				
Present	49 (94.2)	3 (5.8)	1.751 (0.404-7.598)	0.431
Absent	143 (96.6)	5 (3.4)		
Asthma				
Present	16 (88.9)	2 (11.1)	3.667 (0.683-19.677)	0.107
Absent	176 (96.7)	6 (3.3)		
Others				
Present	82 (95.3)	4 (4.7)	1.341 (0.326-5.523)	0.727
Absent	110 (96.5)	4 (3.9)		

DISCUSSION

In our study, 2.5% of the elderly population were fully dependent whereas 8.5% are severely dependent for their routine activities. In a study done in Uttarakhand by Usha et al, 0.5% of the people in rural are totally dependent and 7.5% are severely dependent on their daily activities using the ADL score.[6] In a study done in West Bengal by Dolai et al, among the age group of 60–69% and 70–79% none of the individuals have functional dependency only the elderly aged 80+ years of age were found to have a dependency of 33.3%.[7]

In our study, using the Lawton scale 0.5% were found to be functionally dependent using the IADL scale. In a study done in Jharkhand by Soren et al, ADL was found to be 39.29% for the elderly with fully dependent and the IADL score was found to be higher for the elderly with fully dependent than the ADL score.[8] In a study done in Andhra Pradesh the prevalence of functional dependence for ADL was 21.8% and IADL was 51.7%.[9]

In this study persons with diabetes mellitus and functionally dependent was found to be 11.5% whereas in a study done in Varanasi, the elderly population in their study population with cataracts was 20.46%, COPD with 10.98%, diabetes 0.27% whereas in a study, done in Nigeria, functional dependency among diabetes patients was found to be 37.3%.[10,11] In this study, persons with cardiovascular disease and functionally dependent were found to be 11.9%.

It is observed that in our study population, 57.9% of females and 42.1% of males have a visual impairment, 60% of females and 40% of males have a hearing impairment, 45.5% of females and 54.5% of males have cognitive impairment. In a study done in Kottayam, Kerala by Bhaskar et al, functionally dependent- 30.2% depending upon the Barthel index scale, the Lawton index of the IADL scoring scale 15% of elderly people were found to be functionally dependent, the prevalence of diabetes was found to be 17.2%, 63.4% of females and 36.6% of males have a visual impairment, 65.8% of females and 34.2% of males have a hearing impairment, 64.1% of females and 35.9% of males have cognitive impairment.[11] The prevalence of coronary artery disease was found to be 6.6%.

Strength and limitations

The study population were mostly concerned about physical, physiological and psychological illness. Studies related to functional dependency are limited because most of the studies are focused on mental illness among the geriatric age. Limitations of this study, data collection was done around the health centre, so only a particular population was taken into consideration.

CONCLUSION

Comorbidities such as diabetes mellitus, cardiovascular diseases, osteoporosis, osteoarthritis, and cognitive impairment contribute to a decline in functional abilities among older adults. These conditions often interact and exacerbate one another, leading to a cascade of physical and cognitive impairments. The resulting functional dependency has far-reaching consequences, affecting not only the individuals themselves but also their families, caregivers and healthcare systems. Addressing functional dependency induced by comorbidities required a multifaceted approach. Prevention plays a crucial role, with emphasis on promoting healthy lifestyles, early detection and management of chronic conditions, and regular physical activity. Effective management of chronic conditions, and regular physical activity. Effective management of comorbidities through medication management, therapy and adaptive devices can help optimize functional abilities and reduce the impact on independence.

Recommendations

Strengthening geriatric healthcare services and increasing awareness for health-seeking behaviour, especially among women in the household, particularly in the rural areas will have a huge impact in decreasing the comorbidity-induced dependency among the elderly population.

ACKNOWLEDGEMENTS

The authors would like to acknowledge AMO and the Social Worker of Amrita Community Health Center, Njarackal for their full-fledged support. They thank the participants who were the great strength of this study. They also remain thankful to the authorities of Amrita Institute of Medical Sciences and special thanks to the Department of Community Medicine for their guidance throughout the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Devi I, Sasidharan N. Functional dependency among elderly population in a rural area of Ernakulam district, Kerala, India. Int J Community Med Public Health 2024;11:307-12.