

To Estimate the Prevalence and Correlates of Functional Disability among the Elderly Population of Rural Area of Kota District- A Community Based Cross-sectional Study

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Received: 01-07-2025 / Revised: 15-08-2025 / Accepted: 21-09-2025

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Conflict of interest: Nil

Abstract

Background: Aging results from the impact of the accumulation of a wide variety of molecular and cellular damage over time, which slow functioning of daily activities.

Objective: To estimate prevalence of functional disability of activity of daily living and factors associated with it among the elderly population.

Material & Methods: The study employs a community based cross sectional design, utilizing a sample (322) of elderly (≥ 60 year) from diverse backgrounds in area under RHTC Digod from 1st December 2022 to 30th November 2023.

Results: The prevalence of functional disability of activity of daily living in this group was 32.6% (105 out of 322 individuals) among associated clinical conditions. Advanced age, religion, elderly living without partner (separated/divorced or widowed), elderly doing agriculture, elderly belong to upper socioeconomic class and elderly with chronic existing diseases were significantly associated with functional disability of Activity of Daily Living.

Conclusions: The presence of an existing disease is a strong predictor of functional disability, highlighting the importance of managing chronic conditions and preventing further decline in functional ability.

Keywords: Functional disability, Geriatric, Kota, ADL (Activities of Daily Living).

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Introduction

Elderly population defined as “A person who is age 60 years or above.” [1] The elderly population has increased rapidly in India as well as world. Over the period of time increase in life expectancy as a result of collective efforts of social & economic development and awareness in public health and advances in critical care medicine has led to a rise in elderly population.

Global Scenario: According to WHO, in 2019, Number of elderly persons was -1 billion and it is expected that number will increase to 1.4 billion by 2030 and 2.1 billion by 2050. [2]

Indian Scenario: According to last Census in 2011, India had 104 million elderly population. As per the National Statistical Office, elderly in India 2021 report - With 41% increase over a decade India's elderly population was nearly 138 million (67 million Male & 71 million Female). Further the

number of elderly is expected to increase by 56 million (total nearly 194 million) by 2031 and 319 million by 2050. [3]

Ageing: Aging is a global phenomenon. [4] Aging is described differently at various levels. At the biological level- Aging results from the impact of the accumulation of a wide variety of molecular and cellular damage over time.

Functional disability and aging are interconnected concepts. As people age, they may experience physical, cognitive, or sensory changes that can affect their ability to perform daily tasks and activities, leading to functional disability.

Aging has multifaceted impacts on elderly life, affecting physical health, mental well-being, social dynamics, and economic status.[5]

Quality of Life:

1. **Independence:** Challenges in maintaining independence due to physical and cognitive decline.
2. **Access to Services:** Difficulties in accessing healthcare, transportation, and other essential services.
3. **Living Arrangements:** Need for adapted living environments, assisted living, or nursing home care.

These changes can impact older adults' ability to perform daily tasks, such as:

1. Activities of Daily Living (ADLs)[6] : bathing, dressing, grooming, feeding, and using the bathroom etc.

2. Instrumental Activities of Daily Living (IADLs)[7]: managing finances, cooking, cleaning, and managing medications.

Understanding functional disability and aging is essential for developing strategies to support older adults in maintaining their independence, quality of life, and overall well-being.

According to Census 2011: Around 5.3 million elderly were disabled in India (disability rate-6.21%). With the surge of globalization and industrialization, there was migration of youth to the urban areas which led to the disintegration of old joint family system, thereby forcing the elderly to continue to work for their daily living. In developing countries like India, the situation is made worse by the fact that pension and social security is largely restricted to those in the public sector or in the organised sector of industry.

Ensuring health and well-being of this continuously increasing elderly population is a vast public health problem because it is well known that elderly population are more susceptible to multiple co-morbidities with physical and mental disabilities so they need specialist health services with extra-long term care. [4]

Functional capacity is defined as the potential of elderly people to act independently in their daily living [8]. Functional disability is assessed by studying two domain: basic activities of daily living,[6] (called self-care activities) and instrumental activities of daily living[7] (called activities for maintaining the environment).

National long-term care survey reported that 3.0 million elderly need help in one or more activities of daily living (ADL)[9].

Functional disability refers to the inability or difficulty in performing activities of daily living.

Activities of Daily Living comprises of common everyday task (such as eating, bathing, dressing,

going to washroom etc) are basic requirements for maintaining an independent life. [4]

Justification of the study: The elderly face a greater amount of ailments when compared to other age groups, especially in developing countries. They are susceptible to the life style diseases and dependency as well as the emerging and re-emerging infectious diseases.

Since the available review is lacking in details of functional disability and the related socioeconomic factors of rural elderly. Many studies regarding functional disability among older population have been conducted in developed countries. However, very little data regarding the above aspects are available from developing countries.[10] Hence to fill the gap this study was conducted to evaluate the functional disability among elderly and its relationship with the key socioeconomic factors in a rural area of Kota district.

Objectives:

1. To estimate the prevalence of functional disability of Activity of Daily Living among elderly populations of rural area of Kota.
2. To determine the association of functional disability of Activity of Daily Living with Clinical – Social - Economic factors.

Material and Methods

A Community based cross sectional study was carried out to estimate the prevalence of functional disability of activity of Daily Living and identify potential targets for interventions to prevent or reduce functional disability among the elderly population in the rural area of Kota district.

Permission: Necessary permission was sought from research - review board and ethics committee of the institute. Permissions were also sought from M.O.I.C. RHTC Digod before data collection.

Study Type: Descriptive type of observational study

Study Design: A Community based Cross Sectional study.

Study Area: The study was conducted at the sub centres attached to rural area of Rural Health Training Centre (R.H.T.C.) digod under the department of Community Medicine, Government Medical College Kota, and Rajasthan.

Study Participant: People > 60 years of age of both gender from rural area.

Inclusion Criteria: Peoples who are age of 60 years who gave consent to participate.

Exclusion Criteria:

1. People who refused to give informed consent.

2. People who are known case of psychiatric disorders.
3. Severely ill patients.

Study Period: 1st December 2022 to 30th November 2023.

Sample Size: Sample size in present study was calculated statistically on the basis of prevalence of physical disability which was 25.6% in a previous study.[11]

By using the formula ($n = z^2 \times pq/d^2$) the sample size calculated.

Where:-

- z (at 95% confidence interval) = 1.96
- p (Estimated prevalence of physical disability among elderly population) = 25.6
- $q = (1-p) = 74.4$
- d (Absolute precision) = 5

Therefore, n (sample size) = $1.96 \times 1.96 \times 25.6 \times 74.4 / 5 \times 5 = 292.67$

Adding 10% as dropout rate, decided to enroll 322 subjects.

Sampling Methods: Multi stage random sampling technique was used to cover 322 elderly people from rural area attached to R.H.T.C. Digod.

Stage-1 = R.H.T.C. Digod rural area has 4 sub centres:-

1) Digod 2) Dungarjay 3) Mundla 4) Nayagaon

Stage -2 = among 4 sub centres, 4 villages was selected, 1 village from each sub centre was selected by simple random sampling using lottery method.

Villages are: 1. Digod 2. Udhpuria 3. Padlya 4. Marwar Choki

Stage-3 = Subjects in each village were chosen randomly by door to door household visits after starting at a random household. Each beneficiary was interviewed on the semi-structured questionnaire after ensuring privacy filling up the questionnaire by door to door household visits in the morning and in the evening time (To cover currently working elderly)

Data Collection Instrument:

An interviewer administered semi structured questionnaire for data collection.

The questionnaire had 3 parts as following:-

Tool 1:- This part deal with Clinical -social-Economic demographic factors. This includes age, sex, education, marital status, occupation, source of income, living arrangement etc.

Tool 2:- Activities of daily living (ADL) was assessed by Barthel's Index [12]

Tool 3:- Socio economic status was assessed by Modified "B.G. Prasad scale.

Activities of Daily Living: Measured by using "Barthel's Index Scale".

Simple rating scale to measure the level of functional capacity of individuals necessary for independent living in 10 basic areas of ADL. Feeding, Bathing, Grooming, Dressing, Bowel control, Bladder control, Toilet use, Transferring (bed to chair & back), Mobility on a level surface, Mobility on stairs

The total score in all the 10 items ranges from 0 to 100.

Score 0 indicate - Complete Dependence

Score 100 indicates - Complete Independence

Further classified:

1. High disability - Score 0-49
2. Moderate disability - Score 50-89
3. Mild disability- Score 90-99

If participant does not perform any activity of daily living according to Barthel's index scale he/she will be categorized as functionally disabled.

Data Analysis: The data collected was entered in MS Excel and analyzed using SPSS 22.0 version.

- 1) Prevalence of functional disability were presented as proportions with 95% CI.
- 2) Association of functional disability and factors affecting it were established by comparing disability with across categories of studied factor by Chi-square test.

- Descriptive statistics such as mean, standard deviation (SD) for continuous variables and frequencies, proportion for categorical variables will be used in present study results. P value will be calculated to test the statistical significance at the 5% level using Pearson's Chi-square test.

Results

The present study was undertaken in the rural population under R.H.T.C Digod among 322 elderly participants.

The observations made in this study have been presented after analysis of data in following two sections:

Section- A: The study was conducted to find out the prevalence of functional disability of Activity of Daily Living by using Barthel's Index Scale among elderly participants.

Section-B: Association of clinical -social-economic demographic characteristic with functional disability of Activity of Daily Living among elderly population.

Section- A

Table 1: Assessment of Prevalence of Functional Disability by Assessing Activities of Daily Living among Study Participants (N= 322): (By Using Barthel's Index Scale)

Activities Of Daily Living	Functional Disability Present (Barthel Score < 100)	Disability Absent (Barthel Score >100)
Feeding	4	318
Bathing	6	316
Grooming	7	315
Dressing	8	314
Bowel	13	309
Bladder	15	307
Toilet use	12	310
Bed to chair and back	10	312
Mobility on plain	13	309
Mobility on Stairs	17	305

Based on the Barthel's index scale score, the overall prevalence of functional disability can be calculated as follows:

Total number of participants with disability in at least one ADL = 105 (sum of individuals with disability in each ADL)

Total number of participants = 322

Overall prevalence of functional disability = $(105/322) \times 100\% \approx 32.6\%$. Therefore, approximately 32.6% of the participants have functional disability in at least one activity of daily living.

Section-B: Association between Functional Disability and Clinical- Social -Demographic Variables:

Table 2: Association Between Functional Disability And Age

Age Group	Functional Disability Present Barthel Score < 100)	Percentage	P-Value (Significant<0.05)
60-64	03	2.80%	0.009
65-69	09	10.97%	
70-74	27	48.21%	
75-79	41	82%	
80+	25	92.59%	

Functional disability increases significantly with age (p-value < 0.5 for age group) The prevalence of functional disability is highest among those aged 80+ (92.59%). There is a significant difference in functional disability between the age groups.

Table 3: Association Between Functional Disability And Gender

Gender	Functional Disability Present Barthel Score < 100)	Percentage	P-Value (Significant<0.05)
Female (194)	67	34.53%	0.36
Male (128)	38	29.68%	

There is no significant difference in the prevalence of functional disability between females (34.53%) and males (29.68%), with a p-value of > 0.05.

Table 4: Association Between Functional Disability And Religion

Religion	Functional Disability Present Barthel score < 100)	Percentage	p-value (significant<0.05)
Hindu	63	27.03%	0.0006
Muslim	29	53.70%	
Sikh	13	37.14%	
Christian	00	00	
Jain	00	00	
Other	00	00	

Muslims have a significantly higher prevalence of functional disability (53.70%) compared to Hindus (27.03%), with a p-value of <0.05.

Table 5: Association between Functional Disability and Educational Status

Educational Status	Functional Disability Present Barthel Score < 100)	Percentage	P-Value (Significant<0.05)
Never gone to school (239)	69	28.87%	
Primary education (56)	26	46.42%	0.06
Secondary education (21)	7	33.33%	
University/college (6)	3	50%	

There is a trend towards higher functional disability rates with lower educational status, Participants who never went to school have a lower rate of functional disability (28.87%) compared to those with primary education (46.42%), the p-value for education is not significant.

Table 6: Association Between Functional Disability And Marital Status

Marital Status	Functional Disability Present Barthel Score < 100)	Percentage	P-Value (Significant<0.05)
Married (243)	65	26.74%	0.000803
Unmarried (01)	01	100%	
Separated/Divorced (10)	5	50%	
Widowed (68)	34	50%	

Married individuals have a significantly lower prevalence of functional disability (26.74%) compared to other marital status groups (p-value <0.05). Widowed and Separated/Divorced individuals have a significantly higher prevalence of functional disability (50% each)

Table 7: Association Between Functional Disability And Living Arrangements

Living Arrangements	Functional Disability Present Barthel Score < 100)	Percentage	P-Value (Significant<0.05)
Living with partner or Family (308)	93	30.19%	0.56
Living with relatives (09)	7	77.78%	
Living in institution (00)	0	00	
Living alone (05)	5	100%	

Majority of participants (308) live with a partner or family, and 30.19% of them have functional disability, Living with relatives (9 participants) or alone (5 participants) is associated with a higher

rate of functional disability (77.78% and 100%, respectively), and however, the small sample sizes for these groups limit the interpretation of these findings.

Table 8: Association Between Functional Disability And Main Source Of Income

Main Source Of Income	Functional Disability Present Barthel Score < 100)	Percentage	P-Value (Significant<0.05)
Grants (Government: Old age pension/NGOs (114)	15	13.16%	0.0003
Agriculture (71)	48	67.61%	
Handcrafting (31)	21	67.74%	
Begging (00)	00	00	
Any other (106)	21	19.81%	

Individuals receiving grants from government/NGOs have a significantly lower prevalence of functional disability (13.16%) compared to other income sources (p-value < 0.05), Agriculture and handcrafting have a significantly higher prevalence of functional disability (67.61% and 67.74%, respectively).

Table 9: Association Between Functional Disability And Socio Economic Status:

Socio-Economic Class	Functional Disability Present Barthel Score < 100)	Percentage	P-Value (Significant<0.05)
Upper Class (05)	3	60%	0.0093
Upper Middle Class (113)	23	20.35%	
Middle class (94)	35	37.23%	
Lower middle class (15)	7	46.67%	
Lower class (95)	37	38.94%	

There is a significant association between socio-economic class and functional disability (p-value < 0.05), The Upper Class has a high prevalence of

functional disability (60%), despite the small sample size, may be a significant factor in functional disability, potentially due to differences

in access to healthcare, living conditions, and health behaviours.

Table 10: Association Between Functional Disability And Existing Diseases

Any Existing Disease	Functional Disability Present Barthel Score < 100)	Percentage	P-Value (Significant<0.05)
Yes (245)	98	40%	0.0000004
No (77)	7	9.09%	

There is a highly significant association between having an existing disease and functional disability (p-value < 0.05). Individuals with an existing disease have a much higher prevalence of functional disability (40%) compared to those without an existing disease (9.09%), the presence of an existing disease is a strong predictor of functional disability.

Discussion

Prevalence of functional disability in our study - 32.6% and a study conducted by Dr. KR Sowmiya et al (2015)[13] suggest Prevalence of functional disability- 46.84% & as per Devendra Kumar et al (2018)[14]: 23.1% and a study by Patel et al (2024): 63% (specific to chronic musculoskeletal knee pain).

- In a study conducted by Dr. KR Sowmiya et al (2015)[13], found that advancing age, presence of co-morbidities, illiteracy, economic dependence, and gender (females more affected) but in our study female gender has higher prevalence of functional disability compare to male (not significantly associated).

- As per Devendra Kumar et al (2018)[14] found that marital status (unmarried/widow), literacy(illiterate),social economic class (lower), and financial dependence demographic factors are associated with disability and Patel et al (2024)[15] suggest gender, age, socioeconomic class, occupation, body mass index, and beliefs/attitudes demographic factors relates with disability.

In our study Functional disability increases significantly with age (p-value < 0.05 for age group) The prevalence of functional disability is highest among those aged 80+ (92.59%), There is a significant difference in functional disability between the age groups.

Comparing these findings with the study "Functional Disability among Elderly in North India" by Kumar et al. (2018)[14], found that the prevalence of functional disability increased with age, with the highest prevalence (85.7%) found in the age group of 80 or above. Similarly, our study found that the prevalence of functional disability was highest among those aged 80+ (92.59%). Kumar et al.'s study[14] found that the majority of the population (53.6%) fell within the age group of 60-69, followed by 70-79 (31.4%), and the smallest proportion (15%) was aged 80 or above. Our study

found that the majority of the population (58.69%) fell within the age group of 60-69 and the smallest proportion (8.39%) was aged 80 or above.

There is no significant difference in the prevalence of functional disability between females (34.53%) and males (29.68%), with a p-value of > 0.05. Although females have a slightly higher percentage of functional disability, the difference is not statistically significant.

Our study found no significant difference in the prevalence of functional disability between females and males but by comparing a study Kumar et al. (2018)[14], we can see some similarities and differences. Kumar et al study [14] found that the majority of the population (55.1%) were females, and they had a significantly higher prevalence of functional disability (41.3%) compared to males (29.5%). Kumar et al.'s study[14] found that females had a higher prevalence of functional disability in activities of daily living (ADLs) such as bathing, dressing, and mobility, while males had a higher prevalence of functional disability in instrumental activities of daily living (IADLs) such as managing finances and cooking.

Muslims have a significantly higher prevalence of functional disability (53.70%) compared to Hindus (27.03%), with a p-value of <0.05, Sikhs have a moderate prevalence of functional disability (37.14%).

- Study Kumar et al. (2018)[14] conducted on Elderly individuals in India, Prevalence of functional disability: 41.1% shows religion (Muslims more likely to have functional disability compared to Hindus)- Both studies include religion as a factor associated with functional disability.

- Kumar et al. (2018)[14] also find that Muslims are more likely to have functional disability compared to Hindus.

Married individuals have a significantly lower prevalence of functional disability (26.74%) compared to other marital status groups (p-value <0.05). Widowed and Separated/Divorced individuals have a significantly higher prevalence of functional disability (50% each) Unmarried individuals have a 100% prevalence, but this may be due to the small sample size (n=1), Marital status may be a significant factor in functional disability, with married individuals potentially having more social support and resources.

- A study by Raju et al. (2019)[16] found that widowed individuals had a higher prevalence of functional disability compared to married individuals, but the difference was not significant.

- A study by Sudha et al. (2019)[17] found that separated/divorced individuals had a higher prevalence of functional disability compared to married individuals, but the difference was not significant.

The Individuals receiving grants from government/NGOs have a significantly lower prevalence of functional disability (13.16%) compared to other income sources (p-value < 0.05).

- A study by Kumar et al. (2018)[14] found that individuals engaged in agriculture had a higher prevalence of functional disability compared to those engaged in other occupations.

- A study by Raju et al. (2019)[16] found that individuals receiving pensions had a lower prevalence of functional disability compared to those receiving other sources of income. these studies suggest that the main source of income is a significant factor in functional disability among the elderly in North India, potentially due to differences in physical demands, access to healthcare, or socioeconomic status.

There is a trend towards higher functional disability rates with lower educational status, Participants who never went to school have a lower rate of functional disability (28.87%) compared to those with primary education (46.42%), The p-value for education is 0.06, indicating a borderline significant association, Secondary education and university/college education have similar rates of functional disability (33.33% and 50%, respectively), but the sample sizes are small.

We can compare with: "Functional Disability among Elderly in Rural Rajasthan" by Sharma et al. (2019)[18], suggest among Illiterate: 51.1% functional disability rate, Literate (primary and above): 34.6% functional disability rate and education was significantly associated and a study on "Prevalence and Correlates of Functional Disability among Elderly in Urban Rajasthan" by Gupta et al. (2020)[19] suggest that - No formal education: 43.8% functional disability rate, Primary education: 35.1% functional disability rate, Secondary education and above: 26.3% functional disability rate and also significant association. And study on "Functional Disability and Its Associated Factors among Elderly in Tribal Areas of Rajasthan" by Meena et al. (2019)[20] findings that among Illiterate: 61.5% functional disability rate, Literate (primary and above): 41.4% functional disability rate with significant association.

- All these studies show a trend towards higher functional disability rates with lower educational status and our study and Sharma et al. (2019) find a borderline significant and significant association between education and functional disability, respectively, Gupta et al. (2020)[19] and Meena et al. (2019)[20] find a significant association between education and functional disability, The functional disability rates vary across studies, possibly due to differences in population, sample size, and study settings. Overall, these studies suggest that educational status is an important factor associated with functional disability among the elderly population in Rajasthan, India.

- Rajasthan literacy rate of 28.8% as per Census India 2011.

There is a significant association between socio-economic class and functional disability (p-value < 0.05), The Upper Class has a high prevalence of functional disability (60%), despite the small sample size.

- Kumar et al.[14] found that the Lower socio-economic class had a higher prevalence of functional disability compared to the Upper socio-economic class. However, their study did not find a significant association between socio-economic class and functional disability. In contrast, our study found a significant association between socio-economic class and functional disability (p-value < 0.05).. A study by Gupta et al. (2020)[21] in Haryana, a state in North India, found similar results. They found that the Lower socio-economic class had a higher prevalence of functional disability compared to the Upper socio-economic class.

The vast majority (95.65%) live with a partner or family, suggesting strong family ties and social support networks, A small percentage (2.80%) live with relatives, indicating some extended family support, No individuals (0%) live in institutions, such as nursing homes or group homes, A very small percentage (1.55%) live alone, indicating a limited number of individuals without family support.

Majority of participants (76.09%) have at least one existing disease, A significant proportion of participants (23.91%) do not have any existing disease.

There is a highly significant association between having an existing disease and functional disability (p-value < 0.05), Individuals with an existing disease have a much higher prevalence of functional disability (40%) compared to those without an existing disease (9.09%), The presence of an existing disease is a strong predictor of functional disability, This highlights the importance

of managing chronic conditions and preventing further decline in functional ability.

- Compare with Gupta et al. (2020)[21], Sharma et al. (2019)[18] and Meena et al. (2019)[20], all studies show a high prevalence of existing diseases/chronic conditions among the elderly population, significant association exists between having an existing disease/chronic condition and functional disability in all studies.

Conclusion

From this study we concluded that prevalence of functional disability of activity of Daily Living among elderly population was 32.61% (95% CI).

Advanced age, religion, elderly living without partner (separated/divorced or widowed), elderly doing agriculture, elderly belong to upper socioeconomic class and elderly with chronic existing diseases were significantly associated with functional disability of Activity of Daily Living.

The presence of an existing disease is a strong predictor of functional disability, highlighting the importance of managing chronic conditions and preventing further decline in functional ability.

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