Functional disability among elderly: A community-based cross-sectional study

Kriti Vaish¹, Somdatta Patra², Pragti Chhabra²

¹Department of Community Health, St. Stephen's Hospital, Tis Hazari, New Delhi, ²Department of Community Medicine, University College of Medical Sciences, Delhi, India

ABSTRACT

Background: Old age is often associated with functional decline and physical dependence, thus compromising the ability to carry out basic tasks required for daily living. There are very few community-based studies on functional disability among elderly, especially in India. This study was done to find out the prevalence of functional disability and associated risk factors among the elderly in urbanized villages of Delhi. **Methods:** A cross-sectional study was conducted in two urbanized villages of East Delhi. A semi-structured interview schedule was used to record the socio-demographic and relevant personal details of the elderly (>60 years). Functional disability was defined as a disability in activities of daily living (ADL) or blindness or bilateral hearing impairment or a combination of these. Statistical analysis included simple descriptive analysis and tests of significance like Chi-square test. The multiple logistic regression was used to identify predictors of functional disability. **Results:** Data were collected from 360 study participants. Around one-fourth (25.6%) of the study participants were having a functional disability. Older age, presence of chronic disease, and having possible malnutrition were found to be significant predictors of functional disability among the elderly by applying the multiple logistic regression. **Conclusions:** Functional disability needs to be identified at an early stage using appropriate tools so that proper interventions can be directed to those who need it to ensure healthy aging.

Keywords: Community-based, elderly, functional disability

Introduction

The magnitude of disability is an important indicator in measuring disease burden along with morbidity and mortality rates.[1] Old age is often associated with functional decline and physical dependence. Functional disability has been defined as acquired difficulty in performing basic everyday tasks or more complex tasks needed for independent living.[2] Disabilities in old age are common occurrences affecting the functionality and thus compromising the ability to carry out the activities of daily living (ADL).[3] Vision impairment is accompanied with not only having difficulty in performing day's basic activities but

also associated with a significantly higher incidence of fall, social isolation, and dependency.[1] Hearing impairment interferes with participation in talking and hearing and thus affecting socialization.

Information on the health and functional ability of the elderly in India is limited. National program of or the health care of the elderly suggests provision of rehabilitation unit at community health centers.[4] However, the functional disability of the elderly needs to be comprehensive with the involvement of community members and primary care services as if recognized early, functional disabilities can often be improved greatly.[5]

This study was planned to find out the prevalence of functional disability in an urban area of Delhi. We also tried to find out if there is any association of functional disability with selected socio-demographic factors, presence of chronic disease, and nutritional status.

Address for correspondence: Dr. Somdatta Patra, Department of Community Medicine, University College of Medical Sciences, Delhi - 110 095, India. E-mail: somdattap@gmail.com

Access this article online	
Quick Response Code:	**Website:** www.jfmpc.com
	DOI: 10.4103/jfmpc.jfmpc_728_19

How to cite this article: Vaish K, Patra S, Chhabra P. Functional disability among elderly: A community-based cross-sectional study. J Family Med Prim Care 2020;9:253-8.

Methodology

A community-based, cross-sectional study was conducted in 2 urbanized villages of East district of Delhi, which are the field practice areas of the Department of Community Medicine of a medical college of Delhi. Elderly residents ≥60 years, both male and female, residing in study villages for more than 6 months were included. The elderly who could not be contacted in spite 2 consecutive visits or were not willing to give consent or not able to comprehend the questionnaire or too ill to participate were excluded from the study.

The prevalence of functional disability among the elderly was reported to be 37%[1] in a previous study from India. The sample size was calculated at 95% confidence level taking absolute error as 5% in "Epi info" software. The calculated sample size was 358.

Data were collected by systematic random sampling from November 2015 to December 2016. One-hundred eighty study participants from each of the study villages were included. Both villages had approximately 30, 000 population distributed in 6000 families (assuming average family size as 5). Hence, the study participants were recruited from every 33rd family. The first family (n) to be included in the study was selected using a computer-generated random number. If the study participant was not found in that particular family (n), then the next family between (n) and (n + 33) family with an eligible study participant present in it was selected for the study. If there was more than one elderly present in a family, then one of them was included by random selection. A map was used to ensure that the whole village is covered. Those who were not available on the day of visit were revisited after 1 week and if could not be contacted in spite 2 consecutive visits were excluded from the study. The age of the participants was ascertained from their birth certificates (if available) or from identity cards issued by the Election Commission of India. If both of these records were not available, age was calculated using some past significant national/local event and cross-questioning the participants regarding their major life events.

Socio-demographic details were collected through a pretested, semi-structured interview schedule. The revised Kuppuswamy scale[6] was used to assess the socio-economic status of study participants. For nutritional status assessment, mini-nutritional assessment (MNA) questionnaire, a validated screening tool for rapid assessment was used. Nutritional status was classified as possible malnutrition and normal nutritional status.

Functional disability was defined in this study as having a disability in (ADL) or blindness or bilateral hearing impairment or a combination of these.[2] ADL was measured using Barthel's Index.[7,8] It uses 10 variables dressing, grooming, toileting, bladder control, bowel control, transferring from bed to chair, walking, and stair climbing. The participant was considered as having a disability in ADL, if he/she had at least one of these ten ADL disabilities.

Table 1: Characteristics of the study participants (*n*=360)

Characteristics	Number (%)
Socio-Demographic Characteristics	
Age Group (years)	
60-64	180 (50.0)
65-69	100 (27.8)
70-74	41 (11.4)
≥75	39 (10.8)
Gender	
Male	119 (33.1)
Female	241 (66.9)
Religion	
Hindu	349 (96.9)
Muslim	9 (2.5)
Sikh	1 (0.3)
Christian	1 (0.3)
Occupation	
Housewife	235 (65.3)
Employed	54 (15.0)
Unemployed	36 (10.0)
Retired	35 (9.7)
Education status	
Illiterate	194 (53.8)
Primary school	58 (16.1)
Middle school	38 (10.6)
High school	38 (10.6)
Diploma	24 (6.7)
Graduate/Post graduate	8 (2.2)
Marital Status	
Married	241 (66.9)
Widowed/Widower	114 (31.7)
Separated/Divorced	5 (1.4)
Residential Status	
Owner	188 (52.2)
Tenant	172 (47.8)
Migration Status	
Yes	192 (53.3)
No	168 (46.7)
Socio-Economic Characteristics	
Per Capita Income per month (Rupees)	
<2000	108 (30.0)
2000-4000	113 (31.4)
4000-6000	38 (10.6)
>6000	101 (28.0)
Poverty Status	
BPL	53 (14.7)
APL	307 (85.3)
Socio-economic Status	
Upper and upper middle	128 (35.6)
Lower middle	100 (27.8)
Upper lower and lower	132 (36.7)
Financial dependence	
Dependent	278 (77.2)
Independent	82 (22.8)
Family structure	
Family type	
Joint	281 (78.1)
Nuclear	79 (21.9)
Family size	
1-5	134 (37.2)
6-7	118 (32.8)
≥8	108 (30.0)

Contd...

Table 1: Contd...	
Characteristics	**Number (%)**
Any existing disease*	
Yes	220 (61.1)
No	140 (38.9)
Type of diseases	
Cataract	104 (28.9)
Hypertension	100 (27.8)
Diabetes Mellitus	58 (16.1)
Osteoarthritis	58 (16.1)
Respiratory diseases	22 (6.1)
Heart disease	18 (5.0)
Gastritis	18 (5.0)
Others	43 (12.0)

BPL=Below poverty line; APL=Above poverty line

Visual acuity was assessed using Snellen's distance vision chart at a distance of 6 meters separately for each eye, with distant glasses (if the participant has a distant vision). The vision was categorized as <6/60 or ≥6/60. Blindness was defined as presenting visual acuity of <6/60 in the better eye.[9]

For hearing assessment, the first whisper test was administered. Those who failed the whisper test were subjected to Rinne's and Weber's test using a tuning fork of 512 Hz to assess hearing status. A person with bilateral hearing loss was classified as having hearing impairment.[1]

Ethical clearance was obtained from the Institutional Ethics Committee prior to conducting the survey (the date of approval was 21st October, 2015). The participation was purely voluntary. The elderly selected for the study were contacted by the researcher personally at their respective houses. Informed consent was taken from the elderly prior to conducting the study. Sufficient time was spent with the elderly to obtain the desired information. The information collected was kept confidential. If a study participant was found to have any health problem, he or she was managed and if necessary was referred to urban health training centre (UHTC) or associated Hospital for further management.

Statistical analysis

The data collected were entered into MS Excel and cleaned. The cleaned data were analyzed using SPSS software 20.0. Simple bivariate analysis was used to compute the association between various socio-demographic factors and nutritional status of the elderly. To control for confounding factors, multiple logistic regression analysis was used.

Characteristics of study participants

The mean age of the study participants was 65.6 years. Two-thirds (66.9%) of the participants were female and housewives (66.3%). Fifteen percent of the participants were currently working. Almost half (53.9%) of the elderly were illiterate. Almost one-third (33.1%) were single. Around one-third (36.7%) of them belonged to the upper lower and lower socio-economic status. The majority (78.1%) of them lived in a joint family. Hundred

Table 2: Prevalence of disability among study participants (=360)	
Characteristics	**Number (%)**
Visual impairment	41 (11.4)
Hearing impairment	12 (3.3)
ADL score (<100)	59 (16.4)
Functional disability*	92 (25.6)

*Visual or hearing impairment or ADL score <100 or a combination of all three

and three (28.6%) study participants had suffered from some acute disease in the past 3 months, whereas two-third (61.1%) of them were suffering from at one chronic health problem, Around three-fourth (77.2%) of the elderly were financially dependent on family members for financial support, whereas the others were either earning or were receiving pension [Table 1].

Prevalence of functional disability and associated risk factors for functional disability (N = 360)

Table 2 shows the prevalence of disability among the study participants. Eleven percent of the study participants had visual (visual acuity <6/60) and 3.3% had hearing impairment. Sixteen percent of the participants had some impairment in activities of their daily life as measured by Barthel's index. One-fourth (25.6%) of the study population were functionally disabled.

To find out factors associated with functional disability and different parameters like age, gender, religion, and occupation, education status, marital status, residential status, migration status, and nutritional status were studied. For this analysis age, education and socioeconomic status were re-categorized [Table 3].

A statistically significant association (*P* < 0.05) of functional disability was found with age, marital status, financial status, presence of chronic disease, and having possible malnutrition. There was no significant association (*P* > 0.05) was observed with gender, religion, occupation, education, residential, and migration status.

The multiple logistic regression was used to find the risk factors of functional disability among elderly. The criteria for entering and removing the independent variables from the backward stepwise model were *P* < 0.05 and *P* > 0.10, respectively. The odds of having functional disability were 1.7 times (95% CI 1.040–2.906, *P* = 0.035) more in those subjects who had possible malnutrition than those who had normal nutritional status. Elderly who had any chronic disease had 2.1 times (95% CI 1.200–3.635, *P* = 0.009) more odds of being functionally disabled than those who did not suffer from any chronic disease. Age was a significant risk factor for functional disability, as it was found that those ≥70 years of age had 2.6 times odds of being functionally disabled than those who belonged to younger age groups [Table 4].

Discussion

In our study, the prevalence of functional disability was found to be 25.6%.; Gupta *et al.*[1] reported a prevalence of functional disability 37.4% in an elderly residing in Haryana. The prevalence

Characteristics	Functional disability		Total	χ^2 (P)	Unadjusted Odds Ratio (95% C.I.)
	Absent *n* (%)	Present *n* (%)			
Age					
60-64*	143 (79.4)	37 (20.6)	180	20.523	1.000
65-69	81 (81.0)	19 (19.0)	100	(0.000)	1.103 90.595-2.044)
≥70	44 (55.0)	36 (45.0)	80		3.488 (1.792-6.790)
Gender					
Male*	92 (77.3)	27 (22.7)	119	0.768	1.000
Female	176 (73.0)	65 (27.0)	241	(0.381)	1.258 (0.752-2.106)
Religion					
Hindu*	259 (74.2)	90 (25.8)	349	0.324	1.000
Others	9 (81.8)	2 (18.2)	11	(0.569)	1.564 (0.332-7.373)
Occupation of subject					
Housewife	171 (72.8)	64 (27.2)	235	4.901	2.152 (0.963-4.808)
Retired	27 (77.1)	8 (22.9)	35	(0.179)	1.704 (0.573-5.063)
Employed*	46 (85.2)	8 (14.8)	54		1.000
Unemployed	24 (66.7)	12 (33.3)	36		2.875 (1.035-7.987)
Education Status					
Illiterate	142 (73.2)	52 (26.8)	194	0.798	1.343 (0.699-2.581)
Primary and Middle School	71 (74.0)	25 (26.0)	96	(0.671)	1.291 (0.622-2.681)
High school and above*	55 (78.6)	15 (21.4)	70		1.000
Marital status					
Married*	188 (78.0)	53 (22.0)	241	4.867	1.000
Widow/Separated/Divorced	80 (67.2)	39 (32.8)	119	(0.027)	1.729 (1.060-2.821)
Residential status					
Owner*	147 (78.2)	41 (21.8)	188	2.904	1.000
Tenant	121 (70.3)	51 (29.7)	172	(0.088)	1.511 (0.939-2.433)
Migration status					
Yes	136 (70.8)	56 (29.2)	192	2.820	1.510 (0.932-2.446)
No*	132 (78.6)	36 (21.4)	168	(0.093)	1.000
Per capita income per month					
<2000	74 (68.5)	34 (31.5)	108	5.533	3.032 (1.089-8.447)
2000-4000	83 (73.5)	30 (26.5)	113	(0.137)	2.386 (0.852-6.676)
4000-6000*	33 (86.8)	5 (13.2)	38		1.000
>6000	78 (77.2)	23 (22.8)	101		1.946 (0.682-5.557)
Poverty status					
BPL	39 (73.6)	14 (26.4)	53	0.024	1.054 (0.543-2.044)
APL*	229 (74.6)	78 (25.4)	307	(0.877)	1.000
Financial Dependence					
Dependent	200 (71.9)	78 (28.1)	278	4.016	1.894 (1.007-3.564)
Independent*	68 (82.9)	14 (17.1)	82	(0.045)	1.000
SES					
Lower*	99 (77.3)	29 (22.7)	128	1.192	1.000
Middle	71 (71.0)	29 (29.0)	100	(0.551)	1.394 (0.767-2.536)
Upper	98 (74.2)	34 (25.8)	132		1.184 (0.671-2.092)
Family type					
Joint	207 (73.7)	74 (26.3)	281	0.408	1.211 (0.672-2.183)
Nuclear*	61 (77.2)	18 (22.8)	79	(0.523)	1.000
Family Size					
1-5	98 (73.1)	36 (26.9)	134	1.170	1.300 (0.728-2.320)
6-7*	92 (78.0)	26 (22.0)	118	(0.557)	1.000
≥8	78 (72.2)	30 (27.8)	108		1.746 (1.047-2.913)
History of Chronic Health problems					
Yes	152 (69.1)	68 (30.9)	220	8.522	2.162 (1.280-3.653)
No	116 (82.9)	24 (17.1)	140	(0.004)	1.000
Nutritional Status					
Normal Nutrition	146 (81.6)	33 (18.4)	179	6.923	1.000
Possible malnutrition	121 (69.5)	53 (30.5)	174	(0.009)	1.938 (1.179-3.185)

*Reference category

Table 3: Association of Functional disability and some selected factors (*n*=360)

of functional disability was reported to be 16.6% in West Bengal,[10] 24.2% in Bangalore,[11] 20.6% in Tamil Nadu,[12] and 23.4% in Jhansi.[13] In another community-based study in the rural Tamil Nadu,[14] the prevalence was found to be 46.8%.

Table 4: Multiple logistic regression analysis for significant predictors of functional disability in elderly (*n*=353)						
Predictor variable	Category	B	S.E.	df	*P*	Adjusted Odds ratio (95% C.I.)
Nutritional status	Normal nutrition[#]	0.553	0.262	1	0.035	1.739 (1.040-2.906)
	Possible malnutrition					
Chronic disease	Yes	0.737	0.283	1	0.009	2.089 (1.200-3.635)
	No[#]					
Age	60-64[#]			2	0.005	
	65-69	0.066	0.321	1	0.836	1.069 (0.570-2.004)
	≥70	0.969	0.357	1	0.007	2.635 (1.309-5.304)
Constant		-2.186	0.351	1	0.000	0.112

[#]Reference category

The lower prevalence of functional disability in our study could be because of the study setting being urbanized villages, which have better access to health care facilities than the studies done in Haryana and Tamil Nadu, which were done in rural setting. The variation of prevalence among different studies also can be explained with the fact that different studies have used various definitions to describe functional disability.

Risk factors of functional disability

With increasing age, disability increases and, among those who are elderly, the old elderly are more likely to experience disability than are young elderly. In our study, it was found that as age of the study participants increased the odds of being functionally disabled increased. Participants who were ≥70 years of age were 2.6 times more likely to be functionally disabled as compared to younger age groups. Similar findings were reported by Gupta *et al.*,[1] Paul *et al.*,[12] and Gupta *et al.*[13]. Gureje *et al.*[15] and Aguiar *et al.*[16] also found a significant association between increasing age and functional disability.

In our study, on bivariate analysis, we found that functional disability was significantly more in those study participants who were widowed or separated from their spouses. However, on the application of multiple logistic regression analysis, marital status was not observed to be significant. Similar findings were reported by Gupta *et al.*[1] in their study in Haryana that functional disability was significantly higher in those who were single/not married. Gureje *et al.*[15] also reported that Persons who were currently married had lower rates of disability than those who were separated, divorced, or widowed.

The health of the financially dependent elderly population is usually neglected as financial status often determines the social status. Elderly who are financially dependent is dependent on their family members for other needs too. On bivariate analysis in our study, we found that functional disability was significantly more in those study participants who were financially dependent. However, on the application of multiple logistic regression analysis, financial dependence was not observed to be significant.

Elderly persons have more chances of having a chronic disease. Functional disabilities often result from chronic diseases.[17] The higher number of diseases, medications, and other associated treatment modalities often lead to a decrease in quality of life and social isolation and thus resulting in functional disability.[18] The presence of chronic disease was found to be a significant predictor of functional disability. Elderly who had any chronic disease were 2.1 times more likely to be functionally disabled than those who did not suffer from any chronic disease.

Aging is a complex process with changes in physiological, psychological and social factors that may impact on nutritional status. The higher functional disability among malnourished individuals, in general, may be due to the smaller amount of muscle mass which contributes to lower muscle strength and reduced physical activity. In our study, we found that those participants who had possible malnutrition were 1.7 times more likely to have functional disabilities than those who had normal nutritional status. Similar results were corroborated by Agarwalla *et al.*,[19] Kavya *et al.*,[11] Kritika *et al.*,[20] Esmayel *et al.*,[21] Gureje *et al.*,[15] and Oliveira *et al.*[22] and Wei K *et al.*[23] in their respective studies. They reported that the ADL score was significantly more compromised among the malnourished elderly as compared to those who had normal nutritional status.

The present study has the following strengths: 1) It was a community-based study to find the prevalence of functional disability among the elderly, thus might be reflecting the true picture of the problem; 2) A scientifically strong methodology was followed in recruiting and selecting study participants; 3) Single interviewer collected data and thus chances of inter-observer bias were eliminated; and 4) Use of validated questionnaires like Barthel's Index to assess ADL and MNA for screening and detection of elderly malnutrition.

We cannot generalize results to all over Delhi as it was done in a particular part of the city. It is recommended that multi-centric community-based studies should be done to get a full picture of the problems of functional disability among the elderly.

Older elderly having poor nutritional status and chronic disease were found as risk factors for functional disabilities. Health services should be targeted for these particular sections of the elderly. The integration of targeted geriatric health services in the existing health care delivery frame needs to be done. Appropriate training of health care providers dealing with the geriatric population should be done to address their special needs.

Conclusion

As the elderly population is on the rise, it is important to address their health and social problems and contribute in improving their quality of life. Functional disability needs to be identified at an early stage using appropriate tools, so that proper interventions can be started at the primary care level to ensure healthy aging.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Gupta P, Mani K, Rai SK, Nongkynrih B, Gupta SK. Functional disability among elderly persons in a rural area of Haryana. Indian J Public Health 2014;58:11-6.

2. Rodrigues MA, Facchini LA, Thumé E, Maia F. Gender and incidence of functional disability in the elderly: A systematic review. Cad SaúdePública 2009;25:464-76.

3. Lahiri S, Biswas A, Santra S, Lahiri S. Assessment of nutritional status among elderly population in a rural area of West Bengal, India. Int J Med Sci Public Health 2015;4:569-72.

4. National Programme for Health Care of the Elderly, Ministry of Health & Family Welfare, Government of India [Internet]. 2017 [Cited 2019 Sep 30]. Available from: https://mohfw.gov.in/major-programmes/other-national-health-programmes/national-programme-health-care-elderlynphce.

5. Goswami AK, S R, Kalaivani M, Nongkynrih B, Kant S, Gupta SK. Disability and its association with sociodemographic factors among elderly persons residing in an urban resettlement colony, New Delhi, India. PLoS One 2019;14:e0222992. doi: 10.1371/journal.pone.0222992.

6. Sharma R. Kuppuswamy's socioeconomic status scale-revision for 2011 and formula for real-time updating. Indian J Pediatr 2012;79:961-2.

7. Wade D, Collin C. The Barthel ADL index: A standard measure of physical disability. Int Disabil Stud 1988;10:64-7.

8. Collin C, Wade D, Davies S, Horne V. The Barthel ADL index: A reliability study. Int Disabil Stud 1988;10:61-3.

9. National Programme for Control of Blindness, Ministry of Health & Family Welfare, Government of India [Internet]. 2015 [Cited 2015 Sep 16]. Available from: http://npcb.nic.in/index1.asp?linkid=55 and langid=1.

10. Chakrabarty D, Nandal PK, Manna N, Mallik S, Ghosh P, Chatterjee C, *et al.* Functional disability and associated chronic conditions among geriatric populations in a rural community of India. Ghana Med J 2010;44:150-4.

11. Kavya C, Santosh A. Geriatric health: Assessment of nutritional status and functional ability of elderly living in rural area of Bangalore, Karnataka, India. Int J Community Med Public Health 2016;3:3460-4.

12. Paul SS, Abraham VJ. How healthy is our geriatric population? A community based cross sectional study. J Family Med Prim Care 2015;4:221-5.

13. Gupta S, Yadav R, Malhotra A. Assessment of physical disability using Barthel index among elderly of rural areas of district Jhansi (U.P.), India. J Family Med Prim Care 2016;5:853-7.

14. Sowmiya K, Kumar PG, Nagarani. A study on prevalence and correlates of functional disability among the elderly in rural Tamilnadu. Int J Med Res Rev 2015;3:430-5.

15. Gureje O, Kola L, Afolabi E. Functional disability among elderly Nigerians: Results from the Ibadan study of Ageing. J Am Geriatr Soc 2006;54:1784-9.

16. Aguiar BM, Silva PO, Vieira MA, Costa FM, Carneiro JA. Evaluation of functional disability and associated factors in the elderly. Rev Bras Geriatr Gerontol 2019;22:e180163.

17. Fong JH. Disability Incidence and Functional Decline among Older Adults with Major Chronic Diseases [dissertation]. Lee Kuan Yew School of Public Policy: National University of Singapore; 2019.

18. Puts MT, Deeg DJ, Hoeymans N, Nusselder WJ, Schellevis FG. Changes in the prevalence of chronic disease and the association with disability in the older Dutch population between 1987 and 2001. Age Ageing 2009;37:187-93.

19. Agarwalla R, Saikia AM, Baruah R. Assessment of the nutritional status of the elderly and its correlates. J Family Community Med 2015;22:39-43.

20. Kritika, DeepShikha, Semwal J, Vyas S, Juyal R, Sati HC. Nutritional status and associated comorbidities among the elderly in Doiwala block, Dehradun. Indian J Community Health 2014;26:197-203.

21. Esmayel EMM, Eldarawy MM, Hassan MMM, Hassanin HM, Reda Ashour WM, Mahmoud W. Nutritional and functional assessment of hospitalized elderly: Impact of sociodemographic variables. J Aging Res 2013;2013:101725.

22. Oliveira MR, Fogaça KC, Leandro-Merhi VA. Nutritional status and functional capacity of hospitalized elderly. Nutr J 2009;8:54.

23. Wei K, Nyunt MSZ, Gao Q, Wee SL, Ng TP. Long-term changes in nutritional status are associated with functional and mortality outcomes among community-living older adults. Nutrition 2019;66:180-6.