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Prevalence of activity limitation and its associated predictor among the elderly in Tamil Nadu, India: A community-based cross-sectional study

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Abstract:

BACKGROUND: Functional disability develops in a dynamic and progressive manner. As people age, their health problems worsen and they lose the ability to perform activities of daily living (ADLs) such as dressing, using the toilet, bathing, and eating. With a better understanding of the underlying risk factors and the related mechanisms of the disablement process, it is possible to make more effective and more efficient programs to prevent or delay the onset of disability in older people.

MATERIALS AND METHODS: A community-based, descriptive, cross-sectional study was carried out among 453 elderly from Tamil Nadu, India. A door-to-door interview was used to administer the Katz Index of Independence on ADL. Simple random selection was employed to select the study individuals. To determine the association for particular risk factors, Chi-squared test and binary logistic regression were used.

RESULTS: First, our study findings show the prevalence of activity limitation among the elderly using the The Katz Index of Independence. This study shows that the prevalence of activity limitation was 23% among the elderly. Seventy-seven percent had no significant limitations: they are independent. There is a statistically significant association between activity limitation as opposed to gender, visual impairment, depression, urinary incontinence, unintentional injury in the past year, and alcohol consumption.

CONCLUSION: The study found that the self-reported prevalence of activity limitation was 23% among the elderly and 77% had no significant limitations. The Katz Index of Independence in activities of daily living may be used as a handy tool to identify the activity limitation in community-based checkups.

Keywords:

Activity limitation, cross-sectional, elderly, epidemiology, prevalence

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Introduction

Increase in life expectancy and an increasing population of elderly people around the world raise the importance of health during additional years of life.^[1] Although aging partly reflects the longer and usually healthier lives of people, it is simultaneously related to chronic and degenerative diseases that become

more common at older age. Disability can jeopardize the quality of life in the elderly and is an important health indicator that can have heavy social impact with long-term institutionalization and increased use of medical care.^[2] Likewise, as people age, their chances of becoming disabled increase, and once disabled, their chances of deterioration increase, with a lower likelihood of recovering from disability. Health is the fundamental right of every

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human being.^[3] “Disability and elderly” encompass a large spectrum of conditions with unique requirements. In the present review, we discuss the current status of disability patterns in the elderly population from India.^[4] According to a worldwide report on disability, approximately one billion people experience disability worldwide. Over 45% of older adults aged 60 and over have difficulty performing everyday activities, and over 250 million people experience disabilities to a moderate or significant degree.^[5] According to Census of India, the absolute number of the elderly increased from 32.7 million in 1971 to 103.8 million in 2011 and shares nearly 9% of the overall population (MOSPI 2016). India is expected to see some of the dramatic rise by 2050; the total 60+ population is estimated to increase to 300 million, contributing to 20% of the total population (UNDESA 2017).

Study novelty

Functional disability develops in a dynamic and progressive manner. As people age, their health problems worsen and they lose the ability to perform activities of daily living (ADLs) such as dressing, using the toilet, bathing, and eating. Previous research has shown that the pattern of ADL disability in geriatric populations follows a clear progression.^[6] With a better understanding of the underlying risk factors and the related mechanisms of the disablement process, it is possible to make more effective and more efficient programs to prevent or delay the onset of disability in older people.^[7] Recent infectious disease control, combined with improved water and sanitation and improved nutritional security, has resulted in higher life expectancy among the Indian elderly, and such trends, combined with declining fertility rates, are attributed to India’s rapid increase in aged population.^[8]

Objectives

In the existing literature, studies on functional status and activity limitation among the elderly were found to be limited.^[9] This study was conducted to assess the prevalence of activity limitation and the association between activity limitation and sociodemographic and comorbidity variables among the elderly from selected areas of Tamil Nadu, India.

Null Hypothesis: There is no statistically significant association between activity limitation and sociodemographic and co-morbidity variables among the elderly from the selected areas of Tamil Nadu, India.

Alternative Hypothesis: There is a statistically significant association between activity limitation and sociodemographic and comorbidity variables among the elderly from the selected areas of Tamil Nadu, India.

Materials and Methods

Study design and setting

A descriptive cross-sectional study was conducted among the elderly aged 60 years of age and above in Chengalpattu district of Tamil Nadu.

Study participant and sampling

A sample of 453 elderly were included in the study. A study conducted by Peter, *et al.*,^[10] in 2014, stated that the prevalence of activities of daily living (ADL) was 4%. With the ADL prevalence of 4%, 95% confidence interval (CI), a margin of error of 0.06, and 427 were calculated as the ideal sample size. Finally, $n = 453$ was obtained as the size of the sample. Sample random technique was used to obtain the sampled elderly from the selected area.

$$n = \frac{z^2 pq}{e^2} \text{ [11]}$$

Inclusion criteria

Individuals residing in the area who were ≥ 60 years. These individuals should have been mobile, independent, and without any serious illness.

Exclusion criteria

The elderly who were not willing to participate were excluded from the study. On an average, 8–10 samples were collected per day for two months.

Variables

Data such as sociodemographic profile, previous medical history, activity limitation, depression, personal history, and health history were captured by using a semi-structured questionnaire. The current study measured the of dependency level with the help of the Katz Index of Independence in activities of daily living (indirectly it measure the activity limitation among the elderly persons). The data collection procedure was carried out for a period of two months.

Data collection and techniques

Data cleaning was done in Excel and data analysis was done by using IBM SPSS Software trial version 22. Descriptive statistics, mean, frequency, and percentage were calculated and Chi-squared analysis and binary logistic regression was performed to find out the association.

Raw data were cleaned in Excel and imported to IBM SPSS Statistics for Windows, version 20.0., IBM Corp., Chicago, IL for further analysis. Both univariate and multivariate analysis has been performed. Under descriptive statistics, frequency percentages, SD was done for categorical variables, Chi-square (Z^2) to find the association and binary logistic regression was done

with 5 percent as a level of significance. The covariates included in the model were selected based on the literature that these variables are already proven in related to the outcome variable. And these covariates are considered the cause of the exposure, and the outcome. And based on the Chi-squared test results, nearing to significance and significance (*P* value) variables were added to the binary logistic regression model. The Activity Limitation (AL) is considered as an outcome and the covariates includes gender, depression, visual impairments, alcohol, and incontinence.

Ethical considerations

This study was approved by the independent review committee of SRM MCH and RC, SRMIST, Kattankulathur, and Tamil Nadu. All investigations have been conducted according to the Declaration of Helsinki, and oral and written consent was obtained from the selected subjects.

Results

The primary sampling unit was elderly from the community. Table 1 shows that among the 453 elderly, majority of the sample were females 295 (65.1%), and most of the respondents 307 (67.8%) were between the ages of 60 and 69 years and followed by 111 (24.5%) in the age group 70 years and above.

Most of them were following Hinduism and 321 (70.9%) of them were married. The majority of the sample belonged to the nuclear family (288, 63.5%), followed by the joint family (49, 32.9%), and extended family (4%).

The study found the prevalence of activity limitation to be 23% as shown in Figure 1. The 23% of the elderly were dependent on performing activities of daily living and 77% reported no significant limitations in activities, they were independent.

Table 2 shows a statistically significant association between gender, visual impairment, depression, urinary incontinence, unintentional injury in the past one year, alcohol consumption, for activity limitation. Men were at higher risk (2.55 times) than women and the elderly with visual impairment had 2.41 times higher risk. Elders with depression was 2.27 times at higher risk, urinary incontinence increased the risk of activity limitation 8.3 times. Elderly with injuries were found to 1.75 times at risk, activity limitation, and alcohol consumption were also found to be 3.3 times at risk of activity limitation compared to the elders who do not consume alcohol.

Binary logistic regression was done to establish the individual effects of gender, visual impairment, depression, urinary incontinence, and alcohol on the

Table 1: Demographic profile of the respondents (n=453). (Source: Original Research Data)

Demographic profile of the respondents (n=453)	
Age	
60-69 Years	307 (67.8%)
70-79 Years	111 (24.5%)
80 and above	35 (7.7%)
Gender	
Male	158 (34.9%)
Female	295 (65.1%)
Religion	
Hinduism	433 (95.6%)
Christianity	15 (3.3%)
Islam	2 (0.4%)
Others	1 (0.2%)
Not interested	2 (0.4%)
Marital status	
Married	321 (70.9%)
Unmarried	9 (2%)
Widow and widower	123 (27.1%)
Type of house	
Kutcha	125 (27.6%)
Pucca	194 (42.8%)
Mixed/semi pucca	131 (28.9%)
Nil	3 (0.7%)
Education	
Illiterate	281 (62.0%)
Primary	13 (2.9%)
SSLC	56 (12.4%)
Able to read and write	94 (20.8%)
Able to read	7 (1.5%)
Higher Secondary School	1 (0.2%)
Graduate	1 (0.2%)
Type of family	
Nuclear family	288 (63.5%)
Joint family	149 (32.9%)
Extended family	16 (3.5%)

likelihood that participants have an activity limitation. Binary logistic regression presented in Table 3 found men (OR = 2.34), visual impairment (OR = 2.73), depression (OR = 2.76), urinary incontinence (OR = 8.77), and alcohol (OR = 2.66) as significant independent risk factors for activity limitation among the elderly. Regression model was found to be statistically significant with $\chi^2(6) = 107.8$, with *P* value less than 0.05. The model explained 25.0% Nagelkerke *R*² value of the variance of an activity limitation and the prediction success was overall 81.7% of the cases.

Discussion

The current study measured the of dependency level indirectly measure the activity limitation with the help of the KATZ dependency scale, among the elderly persons in a rural area of Tamil Nadu. The current study aimed to study the association of dependent variables (activity limitation)

Table 2: Association of demographic variables, comorbidities, personal behavior, and other selected risk factors for activity limitation (AL) among the elderly (n=453). (Source: Original Research Data)

Variable	Activity Limitation		χ^2	OR	P	95% CI
	Dependent	Independent				
Gender						
Male	55 (51.9%)	103 (29.7%)	17.6	2.55	0.001*	(1.637-3.987)
Female*	51 (48.1%)	244 (70.3%)				
Education						
Illiterate	39 (36.8%)	133 (38.3%)	0.08	0.93	0.820	(0.597-1.469)
Primary Schooling/SSLC/HSS/UG	67 (63.2%)	214 (61.7%)				
Marital status						
Married	82 (77.4%)	253 (72.9%)	0.83	1.26	0.380	(0.760-2.120)
Widowed and separated	24 (22.6%)	94 (27.1%)				
Type of House						
Kutcha	31 (26.2%)	94 (27.1%)	1.99	NA	0.369	NA
Pucca	40 (37.7%)	157 (45.2%)				
Mixed/Semi-Pucca	35 (33%)	96 (27.7%)				
DM						
Yes	23 (21.7%)	73 (21%)	0.02	1.04	0.884	(0.613-1.765)
No	83 (78.3%)	274 (79%)				
HTN						
Yes	25 (23.6%)	80 (23.1%)	0.01	1.03	0.910	(0.617-1.721)
No	81 (76.4%)	267 (76.9%)				
Arthritis						
Yes	40 (37.7%)	128 (36.9%)	0.02	1.03	0.874	(0.662-1.625)
No	66 (62.3%)	219 (63.1%)				
Visual impairment						
Yes	66 (62.3%)	141 (40.6%)	15.3	2.41	0.001*	(1.541-3.771)
No	40 (37.7%)	206 (59.4%)				
Hearing impairment						
Yes	81 (76.4%)	251 (72.3%)	0.69	1.23	0.406	(0.747-2.056)
No	25 (23.6%)	96 (27.7%)				
Depression						
Yes	36 (34%)	64 (18.4%)	11.3	2.27	0.001*	(1.400-3.693)
No	70 (66%)	283 (8.6%)				
Bladder (urinary incontinence)						
Yes	21 (19.8%)	10 (2.9%)	36.5	8.3	0.001*	(3.780-18.340)
No	85 (80.2%)	337 (97.1%)				
Unintentional injuries						
Yes	28 (26.4%)	59 (17%)	4.63	1.75	0.031*	(1.047-2.932)
No	78 (73.6%)	288 (83%)				
Alcohol						
Yes	35 (33%)	45 (13%)	22.4	3.3	0.001*	(1.983-5.519)
No	71 (67%)	302 (87%)				

with independent factors (sociodemographic variables and self-reported comorbidities). The study population consisted of elderly people who were aged 60 years and above and resided in a rural area of Tamil Nadu.

A cross-sectional study conducted in Chandigarh, India, among the elderly showed that activity limitation was significantly more prevalent in the elderly aged above 70 years.^[12] A community-based cross-sectional study conducted among persons aged 60 years and above in rural area of Haryana showed that the prevalence rate of functional disability was 37.4% and increased with age.

A community-based cross-sectional study conducted among 167 elderly aged 60 years and above to assess the morbidities and its relation with the functional limitations in a rural area of Kerala, India, revealed that functional limitation was significantly more among >70-year age group. Age group was significantly associated with joint pain or backache and visual impairment was more common among those above 70 years of age.^[13] This study found a comparable pattern regarding age.

A study done by Cuperus *et al.*^[14] found activities related to mobility and domestic life, especially walking to be the

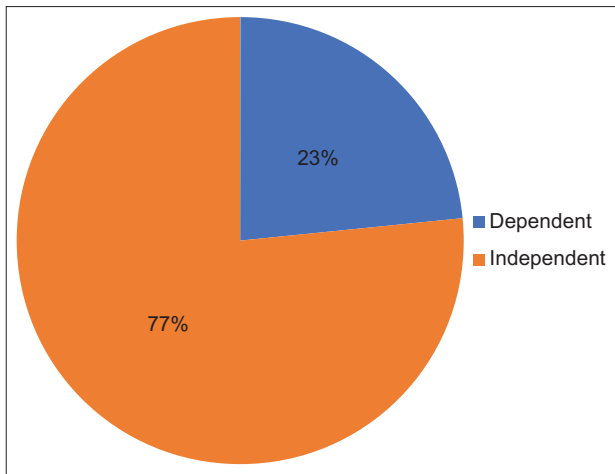


Figure 1: Prevalence of ADL among selected subjects (n = 453). (Source: Original Research Data)

Table 3: Binary logistic regression model on association of selected risk factors and activity limitation among the elderly (n=453). (Source: Original Research Data)

Variables in the Model	OR	Sig.	AOR	95.0% CI for AOR	
				Lower	Upper
Gender	0.85	0.01	2.341	1.221	4.487
Visual impairments	1.007	0	2.738	1.664	4.504
Depression	1.017	0	2.764	1.567	4.877
Urinary incontinence	2.172	0	8.775	3.704	20.788
Alcohol	0.982	0.008	2.669	1.291	5.52
Constant	-2.726	0	0.065		

most significant activity limitations. The prevalence of functional disability was higher among elderly women than men;^[15] these findings were similar to the findings of Goswami *et al.*^[16] and is not agreed in the current study. A community-based cross-sectional study among elderly residents in rural Uttar Pradesh found 58% of the elderly people with at least one disability in their activities of daily living and instrumental activities of daily living. It was also observed that women were having more disability (66.8% vs. 42.0%) than men,^[17] which is not comparable with our current study findings. We found that male gender was 2.55 times at higher risk of dependency level than females.

Keshari *et al.*^[18] revealed that the prevalence of functional disability on the basis of restricted ADL, particularly diminished mobility, in elderly subjects was high. A community-based study conducted by Peter *et al.*^[10] among household members aged 60 and above in Tamil Nadu revealed that the burden of activity limitation or disability was high and there was a strong relation between chronic morbidity and disability in them. More specifically, diabetes is a crucial contributing factor to disability than heart diseases.^[19] The current study found no significant association between diabetes

and hypertension, but there was a statistically strong association between unintentional injuries and activity limitation.

Limitations

Our study was limited by involving only homebound elderly people in the selected community areas of rural Tamil Nadu, excluding elders from institutions (hospitals) and those residing in old age homes, so there may be an under-reporting of the activity limitation. Also, we used complete enumeration, so there may be the potential risk of interviewer bias since they were aware of study objectives.

Conclusion

First, our study findings show the prevalence of activity limitation among the elderly by using the Katz ADL scale. This study showed that the prevalence of activity limitation was 23% among the elderly and 77% had no significant limitations; they are independent. The Katz ADL scale may be used as a handy tool to identify activity limitation in community-based checkups. These results present great challenges to investigators who are striving to elucidate the causal pathways of disability, and to policymakers who are charged with planning for the health care needs of an aging society.^[20]

Acknowledgement

We would like to express our gratitude to all the study participants and the field investigators of the study.

List of abbreviations

ADL: Activities of daily living, AL: Activity limitation, AOR: Adjusted odds ratio, Z²: Chi-squared, DM: Diabetes mellitus, HTN: Hypertension, OR: Odds ratio, CI: Confidence interval, SD: Standard deviation, SPSS: Statistical package for the social sciences, SRM MCH and RC: SRM Medical College Hospital and Research Centre, SRM IST: Shri Ramasamy Memorial Institute of Science and Technology.

Authors' contributors' statement

Concept, design, definition of intellectual content, literature search, and data acquisition of the study was done by Dr. Roshni Mary Peter. Dr. P. Kaveri performed the literature review and tool development. The Data cleaning, statistical analysis, manuscript preparation were done by Dr. Alex Joseph and Ms. Dhasarathi Kumar. The final manuscript review and editing was done by Dr. Alex Joseph.

Declaration of patient consent

The authors certify that all the appropriate patient consent forms have been obtained prior to the study enrollment. The participants were apprised that their

names and initials will not be published, and due efforts will be made to conceal their identity.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Weber D, Scherbov S. Prospects of activity limitations among older adults in 23 low- and middle-income countries. *Sci Rep* 2020;10:10442. doi: 10.1038/s41598-020-67166-4.
2. Poursadeqiyan M, Arefi MF, Pouya AB, Jafari M. Quality of life in health Iranian elderly population approach in health promotion: A systematic review. *J Educ Health Promot* 2021;10:449. doi: 10.4103/jehp.jehp_1546_20.
3. Aryankhesal A, Niknam N, Hasani M, Mengelizadeh N, Aghaei N, Ghaedchukamei Z, *et al.* Determining the relationship between health literacy level and quality of life among the elderly living in nursing homes. *J Educ Health Promot* 2019;8:225.
4. Agrawal A. Disability among the elder population of India: A public health concern. *Journal of Medical Society*. 2016 Jan 1;30 (1):15.
5. Ćwirlej-Sozańska A, Wiśniowska-Szurlej A, Wilmowska-Pietruszyńska A, Sozański B. Determinants of ADL and IADL disability in older adults in south-eastern Poland. *BMC Geriatr* 2019;19:297.
6. Bhandari P, Paswan B. Lifestyle behaviours and mental health outcomes of elderly: Modification of socio-economic and physical health effects. *Ageing Int* 2021;46:35-69.
7. Stuck AE, Walthert JM, Nikolaus T, Büla CJ, Hohmann C, Beck JC. Risk factors for functional status decline in community-living elderly people: A systematic literature review. *Soc Sci Med* 1999;48:445-69.
8. Fong JH. Disability incidence and functional decline among older adults with major chronic diseases. *BMC Geriatr* 2019;19:323.
9. Zhang Y, Niu J, Kelly-Hayes M, Chaisson CE, Aliabadi P, Felson DT. Prevalence of symptomatic hand osteoarthritis and its impact on functional status among the elderly: The Framingham study. *Am J Epidemiol* 2002;156:1021-7.
10. Peter RM, Logaraj M, Ramraj B. Association of comorbidities with activity of daily living (ADL) in a community-based sample of older adults in Tamil Nadu, India. *Clin Epidemiol Glob Health* 2022;15:101068.
11. Israel GD. Determining sample size. Gainesville: University of Florida; 1992. Report No.: Fact Sheet PEO-6.
12. Malhotra G, Sharma MK, Singh A, Dudeja P. Activity limitation and participation restriction to among the elderly in North India: Determinants and related management practices. *Int J Disabil Hum Dev* 2014;13:141-8.
13. Das RA, Kumar SG, Roy G. Morbidity pattern and its relation to functional limitations among old age rural population in Kerala, India. *J Family Med Prim Care* 2017;6:301-4.
14. Cuperus N, Vliet Vlieland TPM, Mahler EAM, Kersten CC, Hoogeboom TJ, van den Ende CHM. The clinical burden of generalized osteoarthritis represented by self-reported health-related quality of life and activity limitations: A cross-sectional study. *Rheumatol Int* 2015;35:871-7.
15. 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.
16. 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.
17. Singh A, Bairwa M, Goel S, Bypareddy R, Mithra P. Prevalence and predictors of unmet needs among the elderly residents of the rural field practice area of a tertiary care centre from northern India. *Malays J Med Sci* 2016;23:44-50.
18. Keshari P, Shankar H. Prevalence and spectrum of functional disability of urban elderly subjects: A community-based study from Central India. *J Family Community Med* 2017;24:86-90.
19. Parmar MC, Saikia N. Chronic morbidity and reported disability among older persons from the India Human Development Survey. *BMC Geriatr* 2018;18:299.
20. Gill TM, Kurland B. The Burden and patterns of disability in activities of daily living among community-living older persons. *J Gerontol Ser A Biol Sci Med* 2003;58:70-5.