

# Functional Disability Among Elderly in Rural Area of Tribal Region in Gondia District of Maharashtra, India: A Community Based Cross Sectional Study

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## ABSTRACT

### Background

Population ageing is a global phenomenon. Along with this aging population, an increase in functional disability, which causes dependency, is a serious social, medical, and economic concern. This functional decline is compromising the ability to carry out basic tasks required for daily living. Therefore, the present study was planned with the aim to evaluate functional impairment among rural elderly using Everyday Abilities Scale for India (EASI) scale.

### Methods

A community based cross sectional study was conducted among 184 elderly aged  $\geq 60$  years in rural area of eastern Maharashtra, India. Data was collected upon household visits using a predesigned pretested questionnaire. Data was analysed using SPSS version 20. Descriptive statistics such as percentages, mean and standard deviation were used to summarize the data. Multivariable logistic regression was used to examine the associations of covariates over disability among elderly.

### Results

Of the total 184 participants, 19% (95% CI: 13.84-25.18) had functional impairment with mean EASI score  $1.57 \pm 2.28$ . The prevalence of functional disability was significantly high with illiteracy, unemployed/nonworking, separated/widow, economic dependence, presence of cognitive impairment and chronic musculoskeletal pain. However, in multivariate analysis only illiteracy (aOR 4.83, 95% CI 1.24-18.19) and chronic musculoskeletal pain (aOR 0.20, 95% CI 0.06-0.63) were found to be significant predictors of functional disability.

### Conclusion

Present study showed 19% prevalence rate of functional impairment. Illiteracy and chronic musculoskeletal pain were found to be associated with functional disability even after controlling for other factors. Measures to reduce chronic musculoskeletal ailment like musculoskeletal pain would be the useful approach for the prevention of disability.

**Key Words:** Rural, Elderly, Functional disability, Everyday abilities scale for India (EASI) scale.

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## INTRODUCTION

The world is aging rapidly through “demographic transition.”<sup>[1]</sup> India, the second largest country in the world is currently undergoing such a demographic transition with 72 million elderly people above 60 years of age which is expected to increase to 179 million in 2031 and further to 301 million in 2051.<sup>[2]</sup> This increase in the number of elderly will have direct impact on the demand for health care service and social security.<sup>[2]</sup>

Elderly persons, being one of the most vulnerable groups of the society have greater risk of developing chronic diseases and disabilities as a result of gradual degeneration.<sup>[3]</sup> An increase in functional disability, which causes dependency and institutionalization, is a serious social, medical, and economic concern.<sup>[4]</sup> The International Classification of Functioning, Disability and Health (ICF) defines disability as a restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being.<sup>[5]</sup> Early finding from a pilot phase of the Longitudinal Aging Study in India showed that 13% of Indians elder population have some form of disability that affects at least one daily activity.<sup>[6]</sup>

As there is multiplicity of morbidities and functional disabilities in old age, geriatric care places a significant burden on the health care system and family members.<sup>[7]</sup> Disability can jeopardize the quality of life in late life of elderly and is an important health indicator that can have heavy social impact with long-term institutionalization and increased use of medical care.<sup>[8]</sup> The functional status is one of the main determinants of the quality of life of older subjects. One of the approaches to study the well-being of the elderly is to study their competence in activities of daily living (ADLs) or a self-care activity that an individual has to perform on regular basis.<sup>[9]</sup> Hence under these circumstances, assessment of the functional status of the geriatric population is of prime importance and basic entity of the health system.

Scales are available for evaluating activities of daily living (ADL), but in our context, not many can be employed. Everyday abilities scale for India (EASI) is a 12-item scale which can be utilized to overcome this barrier. This scale has been validated (Cronbach's  $\alpha=0.82$ ) for use even in illiterate elderly in rural India.<sup>[10]</sup>

With this background, present study was planned to estimate the prevalence of functional disability and study its association with various socio-demographic variables, behavioural factors and self-reported chronic condition among rural elderly.

## MATERIALS AND METHOD

### Study design and study setting

A community-based, cross-sectional study was conducted in the rural service area of the tertiary care centre in the tribal region of eastern Maharashtra, India, over a two months period from May to June 2019. The study area, “Dhakni” is a rural field practice area under department of community medicine, Government Medical College, Gondia, Maharashtra, India. The study area has a total population of 2,753 people.

### Study Population, sample size and sampling

Study population consists of all elderly individuals who were registered resident of village and age  $\geq 60$  years. Study area constitutes total 192 (7%) elderly population. Details of socio-demographic characteristics like age, sex, occupation, household etc were taken from “enumeration register” available at Gram Panchayat which is basic unit of local administration under Panchayati Raj system of governance in India. Though sampling was not done, the sample size was estimated only to find out the minimum number of elderly individuals requiring to be studied in the absence of epidemiological information on functional disability among the elderly in this area. The sample size was calculated using the formula,  $n = 4p(1 - p)/d^2$ , where  $p$  stood as the prevalence and  $d$  as the absolute precision. Assuming prevalence of 13.9% functional disability,<sup>[11]</sup> 95% confidence interval with 5% absolute precision, minimum sample size required to be 184. However, we decided to include all 192 elderly people residing in village.

### Data collection procedure, instrument used, and quality control

To assess functional impairment, all the elderly were contacted through 'Sarpanch,' a village-level decision-maker and intimated about the interview schedule. The list of households having individuals aged 60 and above was prepared from an initial list of all households. Home visits were made for data collection in the selected



households. A pre-tested interview schedule was used to collect information from the study participants. The interview schedule was administered by the principal investigator and trained field team including medical social worker. In the event the eligible participant was not available on the first visit, three house visits were made. Participants who declined to participate or who could not be contacted despite three house visits were deemed non-responders. The house-to-house survey was conducted in the selected households by the principal investigator and trained field team including medical social worker. The interview schedule was developed in English, translated into Marathi and then re-translated into English to check the correctness of translation. It consists of two parts; first part includes socio demographic variables, information about behavioural factors like addictions, sleep problems and self-reported chronic morbidity. Second part provides information about disability in activities of daily living of the study subjects using a validated tool called "Everyday Abilities Scale for India" (EASI).<sup>[10]</sup> A 2-point EASI scale was used. EASI consisted of a 12-item questionnaire that addressed personal care, mobility, social interaction, and cognitive functioning. Respondents were asked whether the subject could (coded as 0) or could not (coded as 1) generally perform the activity. Study subjects with EASI score above three were classified as "disabled in activities of daily living".

The following abilities were included: to remember that one has just eaten and not immediately ask for food again, to use the toilet area appropriately, to keep clothing from being soiled with excreta, to button the upper garment appropriately, to wrap or tie the lower garment appropriately, to participate appropriately in group/ team activities, to express opinions on important family matters, to follow tasks through to completion, to remember important local holidays and festivals, to remember to deliver messages, and to discuss local/regional events and issues appropriately.

The Geriatric Depression Scale (GDS)<sup>12</sup>, a 15-item self-report assessment used as a fundamental screening measure of depression in the elderly, was used to assess depression. Depressed people were those with a GDS score of greater than 5. The Mini-Mental State Examination (MMSE)<sup>13</sup> was used to assess cognitive impairment, and responders with a score of <25 were deemed to have cognitive impairment.

A questionnaire addressing these items was administered to a reliable household member, who was asked whether or not the subject had difficulty in performing the activities listed. Information was confirmed by at least one close family member, usually the spouse, adult son, or daughter, or a credible source who had close knowledge of the subject. Subjects were asked whether they are current smokers or had ever smoked in the past. Participants were also asked whether they were current alcoholics or had consumed alcohol in the past. Similarly, history of co-morbid conditions like hypertension, diabetes, heart disease, chronic obstructive pulmonary disease, musculoskeletal pain, hearing and visual problems were collected from the participant or the relative.

### Statistical analysis

Data entry was done in Microsoft Excel 2010 and analysed using SPSS software version 20.0 (SPSS Inc., Chicago). Descriptive statistics such as percentages, mean and standard deviation were used to summarize the data. The association between functional disability and independent variables was explored by bivariate analysis. Only those variables that were statistically significant ( $P < 0.05$ ) in bivariate analysis were considered for multivariate analysis. All socio-demographic variables, behavioural characteristics and self-reported chronic conditions, *i.e.*, hypertension, diabetes, chronic obstructive airway disease (COPD) and joint pains were taken as predictor variables for functional disability.

### Ethical consideration

Written informed consent in the local language was obtained from all study participants before enrolment into the study. The study was approved by the Institute Ethics committee. The reference number of the ethical clearance was No 03 EC/Pharmac/GMC/Gondia/2019.

### RESULTS

Out of the total 192 elderly, 2 were not traceable after three consecutive home visits. Two participants had gross hearing impairment and one was found seriously ill and they were excluded from the study. Two participants declined to participate and one participant expired during study period. Final assessment was done on 184 patients.

Table 1: Association of functional disability with various socio-demographic variables

Variables	Healthy elderly	Elderly with functional impairment (n=35)	Total (n=184)	Odds Ratio (95% CI)	P value
<b>A. Socio-demographic factors</b>					
<b>Age-group (Years)</b>					
60-64	64 (86.5)	10 (13.5)	74	Reference	
65-69	46 (75.4)	15 (24.6)	61	2.08 (0.86-5.05)	0.090
≥70	39 (79.6)	10 (20.4)	49	1.64 (0.62-4.29)	0.310
<b>Sex</b>					
Male	80 (84.2)	15 (15.8)	95	Reference	0.248
Female	69 (77.5)	20 (22.5)	89	1.54 (0.73-3.24)	
<b>Education</b>					
Literate	56 (94.9)	03 (5.1)	59	Reference	0.000
Illiterate	93 (74.4)	32 (25.6)	125	6.42(1.87-21.95)	
<b>Occupation</b>					
Working	79 (89.8)	09 (10.2)	88	Reference	0.004
Nonworking	70 (72.9)	26 (27.1)	96	3.26 (1.43-7.42)	
<b>Marital Status</b>					
Married	97 (85.8)	16 (14.2)	113	Reference	0.034
Widow/Separated	52 (73.2)	19 (26.8)	71	2.21 (1.05-4.66)	
<b>Living arrangement</b>					
With family and Children	120 ()	31 (46.4)	151	Reference	
With spouse only	17 (94.4)	01 (5.6)	18	0.22 (0.02-1.77)	0.125
Alone	12 (80.0)	03 (20.0)	15	0.96 (0.25-3.64)	0.961
<b>Monthly per capita income (Rupees)</b>					
>1000	125 (82.2)	27 (17.8)	152	Reference	0.343
≤1000	24 (75)	08 (25)	32	1.54 (0.62-3.80)	
<b>Economic dependency*</b>					
No	82 (90.1)	09 (9.9)	91	Reference	0.002
Yes	67 (72)	26 (28)	93	3.53 (1.55-8.05)	

\*A study participant was considered to be 'economic independent' if he/she is leading economically productive life/if he/she is getting any pension, and not dependent on any other for their livelihood

### Socio- demographic profile, behavioural factors and chronic morbid condition

A total of 192 study subjects, 184 responded giving a response rate of 95.8%. The median age of study subjects was 65.0 years (Male = 67.09 years, Female = 64.50 years), with age ranging from 60 to 92 years. The youngest age-group, viz., 60-64 years had the largest number of participants, viz., 40.2%. Two third of the participants were illiterates. Almost 92% of the elderly population were living either with their spouse or children and 50.5% of the elderly were economically independent (Table1). Among the study subjects, 11.4 % were currently consuming alcohol or ever use in past and 41.3% were current smoker or ever user.

Nearly half of the participants (45.7%) were not physically active (Table2). Majority of the participants (48.9%) had sleeping problem followed by hypertension (34.8%). About one third of the participants had chronic musculoskeletal pain (self-reported response) including chronic joint pain, low back pain, neck pain etc. Diabetes was also reported in 8.7% population. Mean duration of hypertension and musculoskeletal disorder among the study participants was found to be  $5.8 \pm 5.14$  years and  $4.9 \pm 3.32$  years, respectively. The prevalence of geriatric depression as assessed by GDS-15 was 13%. (Table2)

**Table 2: Association of functional disability with various lifestyle related factors and chronic co-morbidity**

Variables	Healthy elderly	Elderly with functional impairment (n=35)	Total (n=184)	Odds Ratio (95% CI)	P value
<b>A. Lifestyle related factors</b>					
<b>Alcohol user</b>					
Non user	134 (82.2)	29 (17.8)	163	Reference	0.236
Ever user	15 (71.4)	06 (28.6)	21	1.84 (0.66-5.16)	
<b>Tobacco user</b>					
Non user	89 (82.4)	19 (17.6)	108	Reference	0.556
Ever user	60 (78.9)	16 (21.1)	76	1.24 (0.59-2.62)	
<b>Physical activity*</b>					
Active	85 (85)	15 (15)	100	Reference	0.129
Inactive	64 (76.2)	20 (23.8)	84	1.77 (0.84-3.72)	
<b>B. Co-morbidity in elderly</b>					
Depression (evaluated based on GDS-15 scale)	16 (66.7)	08 (33.3)	24	2.45 (0.95-6.33)	0.055
Cognitive impairment (based on MMSE)	59 (72)	23 (28)	82	2.92 (1.35-6.32)	0.005
Diabetes Mellitus	14 (87.5)	02 (12.5)	16	0.58 (0.12-2.69)	0.487
Hypertension	51 (79.7)	13 (20.3)	64	1.13 (0.52-2.43)	0.745
Bronchial asthma	17 (81)	04 (19)	21	1.00 (0.31-3.18)	0.997
Chronic musculoskeletal pain**	56 (93.3)	04 (6.7)	60	0.21 (0.07-0.63)	0.003
Sleep problem	70 (77.8)	20 (22.2)	90	1.50 (0.71-3.16)	0.279

\*Elderly were taken 'physically active' if they could do household work regularly or involved in agriculture/ labour or any other such occupation. \*\*Chronic musculoskeletal pain includes chronic joint pain, low backache, neck pain (self-reported response)

**Prevalence of functional disability and its correlation**

The mean EASI score for this population was  $1.57 \pm 2.28$ . The prevalence of functional disability among rural elderly was found to be 19% (95% CI 13.84-25.18). Bivariate analysis using Chi square test showed that as compared with those without disability, subjects with disability were more likely to be illiterate, unemployed or non-working, separated or leading widowed life, financially dependent on family members for financial support (p value <0.05). Subjects with cognitive

impairment (OR 2.92; 95% CI 1.35-6.32) and chronic musculoskeletal pain (OR 0.2; 95% CI 0.07-0.63) were found to be at risk for developing functional disability (p value <0.05). (Table 3) There was no significant association ( $P > 0.05$ ) observed with gender, living arrangement, alcohol and tobacco use and physical activity. Co-morbidity, *i.e.*, depression, diabetes, hypertension and sleep disorders have also not been found to be associated with functional impairment (p >0.05).

**Table 3: Independent predictors of functional disability among elderly- Multiple logistic regression**

Variables	Adjusted Odds Ratio (95 % CI)	P value
<b>Education (Years of schooling)</b>		
Literate	1.00 (Ref)	<b>0.023</b>
Illiterate	4.83(1.24-18.19)	
<b>Occupation</b>		
Working	1.00 (Ref)	0.785
Nonworking	0.77 (0.12-4.68)	
<b>Marital status</b>		
Married	1.00 (Ref)	0.295
Widow/Separated	1.55 (0.68-3.54)	
<b>Economic dependency</b>		
Independent	1.00 (Ref)	0.194
Dependent	3.28 (0.54-19.82)	
<b>Cognitive impairment</b>		
Absent	1.00 (Ref)	0.506
Present	1.35 (0.55-3.26)	
<b>Chronic musculoskeletal pain</b>		
No	1.00 (Ref)	<b>0.006</b>
Yes	0.20 (0.06-0.63)	



In present study, among functionally disabled, 65.7% participants were found to have cognitive impairment and 22.8% were depressed. Sleep disturbance was also reported by 57.1% functional disabled subjects. One third functionally disabled subjects were found to be hypertensive and only 5% were diabetic. Similarly, 17.1% were addicted to alcohol; either they were currently consuming alcohol or ever-used in the past, and 45.7% consume tobacco or ever-users in the past. (Table 3)

The multiple logistic regression was used to find the risk factors of functional disability among elderly. Logistic regression analysis revealed that illiteracy (aOR 4.83; 95% CI 1.24-18.19) and chronic musculo skeletal pain (aOR 0.20; 95% CI 0.06-0.63) emerged as predictors of disability in activities of daily living. Table(3).

## DISCUSSION

In present study, the prevalence of functional disability among the elderly aged 60 years and above was estimated to be 19%. World Health Survey showed that the prevalence of disability in lower income countries among people aged 60 years and above was 43.4%, compared with 29.5% in higher income countries.<sup>[15]</sup> World health organisation estimates that 15.6% of the world's adult population has some form of disability. According to India's most recent census, there are 26.8 million persons with disabilities (2.21%), of which 21% are elderly (60 years and above) people.<sup>[16]</sup> There is considerable divergence in the prevalence of disability reported in community-based international studies, with values ranging from 15% to 39.5%.<sup>[17-20]</sup> However, our results are consistent with the community-based study from rural West Bengal wherein the prevalence of functional disability was estimated to be 16.16% as per ADL scale.<sup>[21]</sup> Similarly, in a study by Anandraj R et al,<sup>[11]</sup> prevalence of functional disability in activities of daily living was 13.9% using EASI scale. A study in Tamil Nadu by Venkatorao T et al<sup>[22]</sup> observed that 22% of their study population has at least one disability in activities of daily living. Gupta S et al<sup>[23]</sup> reported 23.4% prevalence using Barthel Index in their community-based study in Jhansi. These studies, as also our study, point to a significant proportion of elderly with a functional disability; a cause for concern for health-care providers. Thus, disability prevention will require a change in organizational priorities and training for providers in elderly care. The variation of prevalence among different studies can be

explained with the fact that different studies have used various scales to determine functional disability, various forms of definitions defining functional disability and different setting to conduct study.

In the present study the disability prevalence was higher among the females when compared to the males, though statistically not significant ( $p > 0.05$ ). This finding is consistent with the result from study conducted in Sweden<sup>[24]</sup> and Japan.<sup>[25]</sup>

In our study, on univariate analysis, we found that functional disability was significantly ( $p$  value 0.05) more in those study participants who were illiterate, nonworking, widowed or separated from their spouses and economically dependent ( $p$  value  $< 0.05$ ). However, on the application of multiple logistic regression analysis, marital status, unemployed or nonworking and economical dependency was not observed to be significant. Similar findings were reported in Haryana study by Gupta P et al.<sup>[3]</sup> that functional disability was significantly higher in those who were leading widowed life or separated from their spouses. Gureje O et al.<sup>[26]</sup> also reported that Persons who were currently married had lower rates of disability than those who were separated, divorced, or widowed. In contrast to our findings, community-based studies conducted at Ireland<sup>[27]</sup> and China<sup>[28]</sup> have shown a supportive role of family in elderly care. This signifies both physical and mental support is equally important to reduce loneliness in elderly and maintain quality of life. Illiteracy was found to be strong predictor of disability in this study.

The welfare of the elderly people who are financially dependent is typically ignored, as financial status also dictates the social status. Moreover, the elderly who are economically unproductive are often being neglected. In our study, financially dependent elderly on family were more likely to have functional impairment as compared to financially independent. However, on the application of multiple logistic regression analysis, financial dependence was not observed to be significant. There must be an attempt to strengthen the family system so that it can continue playing the role of primary caregiver and financial security to the elderly, which will enable them to manage their health care needs.



Elderly persons have more chances of having a chronic disease. Functional disabilities often result from chronic diseases. Present study was unable to establish association between various chronic conditions like diabetes, hypertension, asthma and functional disability. However, Joshi K et al.<sup>[29]</sup> in a cross-sectional study at rural and urban area of Chandigarh, India, found that morbidities like asthma, COPD, hypertension, osteoarthritis, eye and neurological problems were significantly associated with disability. There could be an issue of accuracy of self-reported medical conditions in present community-based study. Although we have not been able to examine physician-diagnosed conditions, self-reported diagnoses have shown to be reliable and are standard in epidemiologic research.

Cognitive impairment was the most prevalent morbidity among the disabled population. Subjects with cognitive impairment were almost three times at risk for being functionally disabled as compared to healthy individuals. Preventive measures may therefore be focused against the risk factors of cognitive impairment. Screening for early signs of cognitive decline would enable management strategies to be put in place that can reduce the related burden of disability. Chronic musculoskeletal pain was significant predictor of disability in our study. This result is in consistent with the study findings of Ettinger WHJ et al.<sup>[30]</sup> conducted in US. Government of India has launched the National Program for the Health Care for the Elderly with the objectives of providing an easy access to promotive, preventive, curative and rehabilitative services to the elderly through a community-based primary health care approach including domiciliary visits by trained health-care workers. This approach can be a step towards optimizing the health of the elderly population in rural areas and improving the quality of life.

### LIMITATIONS

Given that the EASI is a screening instrument, generalizability of prevalence of functional impairment has limitation over diagnostic criteria. Comorbidities were assessed based on self-reported history and medical records. As a result, it would be difficult to determine the true prevalence of chronic morbidities

### CONCLUSION

In our study, 19% of the rural elderly population suffered from functional disability. The prevalence of functional disability was found to be positively associated with educational status, occupation, separated or leading widowed life, marital status, economic dependency, cognitive impairment and chronic musculoskeletal pain. Multiple logistic regression analysis showed illiteracy and chronic musculoskeletal pain was found to be significant predictors of functional impairment. A chronic musculoskeletal pain was significant predictor of functional disability; hence, it can be managed in a primary care setting. High prevalence of functional disability demands public health priority in elderly care.

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