

# Assessment of physical disability using Barthel index among elderly of rural areas of district Jhansi (U.P), India

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## ABSTRACT

**Introduction:** The health of the elderly will be an important issue defining the health status of a population. With the rise in aged population, there is a greater need to look into their physical disability aspects, which is otherwise neglected. The rationale behind the study is to assess the physical disability of the elderly living in rural area of Jhansi. The aims of the study were to study the prevalence of physical disability among the elderly of rural area, and to find out the factors and association affecting the physical disability. **Methods:** A community-based cross-sectional study was carried out in a Baragaon block of rural area of Jhansi, Uttar Pradesh, India, from July 2015 to October 2015. Multistage random sampling was performed. A total of 265 participants of age 60 years and above were selected. Physical disability was assessed using Barthel index. Appropriate data entry and statistical analysis were done in EpiInfo. Frequency tables were used to calculate the prevalence, and Chi-square test was used to find out the association. **Results:** The overall prevalence of physical disability was 23.4%. 70% belongs to the age group from 60 to 69 years. Physical disability was significantly higher among age group >80 years. Similarly, women were more affected with physical disability than men. **Conclusions:** High prevalence of physical disability is the major area of concern. More extensive postdischarge health facilities to be provided to elderly.

**Keywords:** Barthel index, elderly, physical disability, prevalence

## Introduction

In India, it is estimated that the elderly in the age group 60 and above is expected to increase from 71 million in 2001 to 179 million in 2031 and in the case of those 70 years and older, the projected increase is from 27 million in 2001 to 132 million in 2051.<sup>[1]</sup> The health of the elderly will be an important issue defining the health status of a population.<sup>[2]</sup> With the rise in aged population, there is a greater need to look into their physical disability aspects, which is otherwise neglected. The population of the aged across the world will be 15% of the total population by 2025<sup>[3]</sup> with Asia witnessing doubling of old age dependency ratio by 2050.<sup>[4]</sup> India's "National Policy on older persons"

classifies 60 years and above as aged<sup>[5]</sup> who will constitute 10% of the total population by 2021 putting pressure on government as the demand for financial and social support increase due to health and related issues whose prevalence vary between 2% and 37%<sup>[3,6]</sup> as per various hospitalized or institutionalized studies. The majority of the elderly population lives in rural India.<sup>[7]</sup> Data available from India suggest that almost 50% of the elderly suffer from chronic diseases with the prevalence of diseases increasing with rising age from 39% in 60–64 years to 55% in those older than 70 years.<sup>[8]</sup> A National survey noted that 5% of the elderly have difficulty in physical mobility with women (7%) experiencing more difficulty than men (4%).<sup>[8]</sup> With national health policy focusing on maternal health, child health and communicable diseases, the health status of the elderly has not been given due consideration. Since functional ability, it is an important component of elderly care that warrants further

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10.4103/2249-4863.201178

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**How to cite this article:** Gupta S, Yadav R, Malhotra AK. 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.

attention. Keeping the above background in mind, the present study was conducted among elderly, especially of the rural area of Jhansi to determine the prevalence of physical disability and to find out the factors affecting the physical disability among them.

## Subjects and Methods

This community-based cross-sectional study was conducted in selected rural areas of district Jhansi in Uttar Pradesh. The study was carried out from July 2015 to October 2015. People who were aged 60 years and above in one of the blocks of Jhansi were included in the study. Sample size in the present study was calculated statistically on the basis of prevalence of physical disability 21%<sup>[9]</sup> and considering 95% confidence interval, absolute precision of 5%. The formula used for calculation of sample size (*n*) was

$$n = \frac{z^2 pq}{d^2}$$

Where in, *z* (at 95% confidence levels) = 1.96~2

*P* (Estimated prevalence of population) = 21

*q* (1 - *p*) = 79

*d* (Absolute precision) = 5%

Therefore,  $n = 2 \times 2 \times 21 \times 79 / 25 = 265$ . Hence, a total of 265 elderly were studied.

A multistage random sampling technique was used to cover the required sample size for the present study.

Stage 1 - District Jhansi has eight blocks. Among all, Baragaon block was selected randomly using lottery method.

Stage 2 - In Baragaon block, five villages were selected randomly using random number tables. The total population of Baragaon block is 100,000.

Stage 3 - Subjects in each village were chosen by door-to-door visits after starting at a random household.

Subjects aged 60 years or more, who had lived in the village for the past 6 months, were included in the study. Elderly with any previously diagnosed malignancy or those who could not stand unsupported due to debility were excluded from the study. Hence, a total of 265 elderly were selected, and there division from each village is as follows: Village 1-50 elderly, village 2-47 elderly, village 3-51 elderly, village 4-57 elderly, and village 5-60 elderly. A semi-structured interviewer administered questionnaire was used as a study tool. Responses were accepted from close family members of the same household if subjects could not respond accurately as a result of cognitive impairment. The questionnaire had two main sections.

## Section-1

Sociodemographic details included age, sex, marital status, family type, living arrangements, and educational qualification, occupation. Socioeconomic status (SES) was assessed using the modified B. G. Prasad Classification.

## Section 2

Barthel index is used [Figure 1]. The Barthel index is a 10-item instrument measuring functional independence in personal activities of daily living (ADL). The total score of Barthel index was 100. In this, we considered anyone with a score <100 as having some disability. Barthel index is a very simple tool and can be easily administered by health-care professional.<sup>[10]</sup> An informed consent was taken from all the participants.

Data were entered into a Microsoft Excel spreadsheet and then transferred to Epi info version 7.1.3.0. centre for disease control and prevention, Atlanta, Georgia, USA, 2013 and were analyzed statistically by simple proportions. Chi-square was used to find out the association.  $P \leq 0.05$  is considered as statistically significant. This study has been approved by the Institutional Ethical Board of MLB Medical College, Jhansi (UP), India.

## Results

Table 1 shows the sociodemographic profile of the study participants. 65% of the study participants belong to the age group of 60–69 years. Fifty-seven percent were males while 43% were females elderly. Eighty-four percent of the study participants were illiterate, and many of them belong to the joint family. Around 82% of the study participants belong to lower SES.

Table 2 shows the ADL among the study participants. In this, we considered that if the Barthel score is <100 then it is disability.

**Barthel Index Scoring Form**

Patient Name: \_\_\_\_\_ Rater Name: \_\_\_\_\_ Date: \_\_\_\_\_

<p><b>FEEDING</b> 0 = unable 5 = needs help cutting, spreading butter, etc., or requires modified diet 10 = independent</p> <p><b>BATHING</b> 0 = dependent 5 = independent (or in shower)</p> <p><b>GROOMING</b> 0 = needs to help with personal care 5 = independent face/hair/teeth/shaving (implements provided)</p> <p><b>DRESSING</b> 0 = dependent 5 = needs help but can do about half unaided 10 = independent (including buttons, zips, laces, etc.)</p> <p><b>BOWELS</b> 0 = incontinent (or needs to be given enemas) 5 = occasional accident 10 = continent</p> <p><b>BLADDER</b> 0 = incontinent, or catheterized and unable to manage alone 5 = occasional accident 10 = continent</p>	<p><b>TOILET USE</b> 0 = dependent 5 = needs some help, but can do something alone 10 = independent (on and off, dressing, wiping)</p> <p><b>TRANSFERS (BED TO CHAIR AND BACK)</b> 0 = unable, no sitting balance 5 = major help (one or two people, physical), can sit 10 = minor help (verbal or physical) 15 = independent</p> <p><b>MOBILITY (ON LEVEL SURFACES)</b> 0 = immobile or &lt; 50 yards 5 = wheelchair independent, including corners, &gt; 50 yards 10 = walks with help of one person (verbal or physical) &gt; 50 yards 15 = independent (but may use any aid; for example, stick) &gt; 50 yards</p> <p><b>STAIRS</b> 0 = unable 5 = needs help (verbal, physical, carrying aid) 10 = independent</p>
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**TOTAL SCORE=** \_\_\_\_\_

Figure 1: Barthel index scoring form

**Table 1: Sociodemographic profile of study participants (n=265)**

Characteristics	Frequency (%)
Age (years)	
60-69	172 (65)
70-79	46 (17)
≥80	47 (18)
Gender	
Male	150 (57)
Female	115 (43)
Marital status	
Married	159 (60)
Widow	37 (14)
Widower	45 (17)
Unmarried	24 (9)
Education	
Illiterate	222 (84)
Literate	43 (14)
Currently employed	
Yes	57 (22)
No	208 (78)
Annual income	
<1000	162 (61)
>1000	103 (39)
Sources of income	
Salary	49 (18)
Pension	17 (6)
Dependent on others	200 (76)
Family type	
Joint	234 (88)
Nuclear	31 (12)
Place of living	
Kutch house	130 (49)
Pakka house	122 (46)
Hut	13 (5)
Socioeconomic status	
Lower	217 (82)
Middle/high	48 (18)

Among the daily living activities, most of the study participants finding disability in bladder and bowels control, followed by mobility, and stairs. Those having bladder disability also finds to have bowels disability with few unable to climb stairs as a result multiple responses were given.

Table 3 shows the factors and its association with the physical disability among the study participants. It was found that the prevalence of the physical disability was 23.4%. The factors which affect the physical disability are mostly sociodemographic factors. There is a significant association between gender, age, SES with the physical disability. While no significant association is found between type of house and past 1-year hospitalization with physical disability.

Further subgroup analysis done for the age category 60–69 years, 70–79 years and 80 years and above showed a decreasing trend in mean Barthel score, 98.04, 96.67, and 93.47, respectively, and this difference was statistically significant ( $P = 0.002$ ).

**Table 2: Activities of daily living among study participants (n=265)**

ADL*	Disability present (%), Barthel score <100	Disability absent (%), Barthel score=100
Feeding	9	256
Bathing	6	259
Grooming	6	259
Dressing	4	261
Bowels	13	252
Bladder	17	248
Toilet use	11	254
Bed to chair and back	9	256
Mobility	12	253
Stairs	12	253

\*Multiple responses. ADL: Activities of daily living

## Discussion

A community-based cross-sectional study was conducted in the selected rural areas of district Jhansi in which 150 male and 115 female elderly were included in the study. The study population was selected through multistage random sampling from geographically defined rural communities. All statistics show that the sex ratio in the age group 60 years and above is 105 per 100 males.<sup>[11]</sup> Among our participants, this ratio was less maintained. This is in consistent with the general trend seen in India where, due to mortality and marriage pattern, a number of men entering into the age group 60 years and above are more as compared to women in the same age group. Most of the participants in our study fall into the age group of 60–69 years. In India, being mostly patriarchal, it is the male child who provided the social security for the aged since antiquity.<sup>[12]</sup> The prevalence rate of functional disability was 23.4% and increased with age which is moderately higher as compared to similar study.<sup>[9]</sup> Similar to our study, many studies related to disability among the elderly have confirmed that increasing age tend to be associated with increased risk of disability.<sup>[13,14,15]</sup> While most studies confirmed that disability tends to be more among women, our inability to find such an association may be linked to a generally lower prevalence of limitations in ADLs in our study population.<sup>[16]</sup> It has been suggested that while ADLs may reflect pure disability in performing a task by either men or women, limitations in instrumental ADL may be influenced more by gender-specific tasks.<sup>[16]</sup> The prevalence of functional disability was higher among elderly men than women, which is significantly associated ( $P = 0.04$ ). Functional disability was also found to be significantly associated with as age and SES as compared to similar study conducted in Haryana,<sup>[17]</sup> where Functional disability was found to be positively and significantly associated with increasing age, marital status other than married, diabetes, and chronic obstructive airway disease. In the present study, a participant was said to be functionally disabled, if the Barthel ADL scale score was <100. This index has a score ranging from 0 to 100 and it primarily measures ADL. Anybody with a score <100 was taken as having some disability. Majority of them need help in climbing stairs and maintaining bowels and bladders. Otherwise, the participants were functionally

**Table 3: Factors affecting physical disability and its association with them (n=265)**

Factors	Barthel score <100 (62)	Barthel score=100 (203)	$\chi^2$	OR (95%CI)	P*
Gender					
Male	42	108	4.08	1.84 (1.01-3.36)	0.04
Female	20	95			
Age (years)					
$\geq 70$	32	61	9.6	2.4 (1.38-4.44)	0.001
60-69	30	142			
Type of house					
Pakka	23	99	2.6	0.6 (0.3-1.11)	0.1
Kuttcha	39	104			
SES					
Lower	56	161	3.8	2.4 (0.9-6.03)	0.04
Middle/high	6	42			
Hospitalized during past 1 year					
Yes	27	63	3.3	1.7 (0.95-3)	0.06
No	35	140			

\*P $\leq$ 0.05 is considered statistically significant. OR: Odds ratio; CI: Confidence interval

independent. Functional disability computed as a sum score of restriction in participation in daily life activities was significantly associated with older age, cognitive, and sensory function impairment. However, published literature has used various definitions to describe functional disability. The Barthel scale has been used in a large number of studies. Using the 10 items Barthel scale, this study revealed that 23.4% of elderly persons aged 60 years and above were dependent in at least one ADL disability. The prevalence of ADL disability in the present study was more as compared to the studies carried out in developed countries such as the USA (15%) and Japan (20%).<sup>[18,19]</sup> The prevalence of ADL disability in the present study was less than the other countries such as Nigeria (28.3%), Brazil (40%), Malacca (24%).<sup>[20-22]</sup> In a community-based study from West Bengal using the ADL scale, 16.16% elderly persons were found to be functionally disabled.<sup>[23]</sup> Another community-based study from rural Tamil Nadu reported a prevalence of functional disability of 22% using the same scale.<sup>[24]</sup> In rural Bengaluru, 32.4% elderly persons were found to be facing problems completely or partially in at least one of the ADL activities.<sup>[25]</sup> Thus, as far as the ADL activities go, the results of the present study are somewhat less than those reported from other community-based studies from India. In a community-based study from rural Ballabgarh in 2002, among elderly persons aged 60 years and above, using Katz scale, blindness, hearing impairment and locomotor disability, the prevalence of functional disability was estimated to be 47.8%.<sup>[26]</sup> The difference in this result with the present study could be due to difference in scales used and the inclusion of locomotor disability. The present study included ADL score only, blindness, and hearing impairment are not included in the

definition of functional disability which is used by the similar study conducted at Haryana,<sup>[9]</sup> so one of the limitations of this present study is that in addition to the commonly used ADL scale, blindness, and hearing impairment should also be included as these have the potential to limit the functions of elderly persons in a large way. Further, any community-based intervention to address the issue of functional disability among this vulnerable group must necessarily target blindness and hearing impairment. An earlier study has reported that blindness and hearing impairment are associated with mortality in this age-group.<sup>[27]</sup> Hence, if appropriate curative or rehabilitative measures are instituted, not only will they alleviate the suffering due to the functional disability, they shall also add years to the life of our elderly persons. Locomotor disability was not included in the present study as it was felt that it would be reflected in the components of the ADL scale. The previous studies from India<sup>[28,29]</sup> have reported rural-urban differences in the prevalence of disability with a greater prevalence of severe disability among the rural elderly which is similar to our study findings. It has been suggested that residence in urban areas provides better access to health care, availability of logistic support in the form of transportation, less dependence on physical effort to complete certain tasks, and better financial support in the form of retirement benefits.<sup>[17]</sup>

## Conclusions

The prevalence of physical disability among elderly is 23.4%, which is in context of other studies is moderately high. As the elderly age group is vulnerable to physical disability proper care and effective interventions must be of prime importance. The problems related to aged are often overlooked, especially in developing countries. In that context, this study is very relevant to view into sociodemographic conditions and physical activity levels of the elderly. Further studies can be done focusing in depth each of these areas which will contribute to various policies and plans focusing on geriatric community Postdischarge from the hospital must be carefully looked. To prevent disability family members should learn their roles. Certain old age homes are functioning effectively for those elderly who are nuclear or neglected by family members. The primary care physicians plays a very important role as by using this scale they can easily determine the ADL of elderly individuals when they visit the outpatient department also they can rule out different systemic problems associated with them for example, orthopedic disorders, urinary system disorders. This can save lot of time and money of the patient and if diagnosed at the right time; there life expectancy will be increased and if there is a need of referring the case the physician can refer to them to community health center or district hospital. The need of an hour is to provide more old age homes and careful look after of elderly.

## Acknowledgment

The author presents a heartfelt gratitude to all the participants who gave their precious time to this research.



## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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