# Association between health related quality of life (HRQOL) and activity of daily living (ADL) among elderly in an urban setting of Assam, India

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## Abstract

**Background:** Ensuring better quality of life to an increasing number of elderly people is emerging as a stiff public health challenge in India. There is paucity of data on impact of functional health on health-related quality of life (HRQOL) in India. **Objectives:** The aim of this study is to explore the functional status and its association with different dimensions of HRQOL among elderly individuals in an urban setting of Assam, India. **Materials and Methods:** A total of 300 elderly were recruited in a cross-sectional study from the city of Dibrugarh, Assam, India. Eight domains of HRQOL of participants were assessed using short form 36 (SF-36). Functional status was assessed by using Barthel activity of daily living (ADL) tool. ANOVA test and binary logistic regression analysis was performed to examine the relationship between ADL status and HRQOL. **Results:** In all, 34.7% ($n$ = 104) of participants had limitations in one or more ADL items. We also observed a strong graded relationship between ADL and HRQOL scores. Those who scored perfect 100 ADL score also scored highest in all eight HRQOL scales, whereas those with least ADL score scored lowest in all the HRQOL scales. In age- and sex-adjusted logistic regression analysis, the probability of poor health increased with decreasing level of ADL scores. **Conclusion:** Findings of the study suggest that decline in ADL can negatively impact different dimensions of HRQOL among elderly individuals. The findings indicate that there is need to pay proper attention for restoring functional health at later life in order to improve quality of life among elderly in India.

**Keywords:** ADL, functional status, HRQOL

## Introduction

The numbers and proportion of elderly population is growing fast in India due to demographic transition. The proportion of elderly persons in the population of India is continuously increasing in India from 5.6% in 1961 to 8.6% in 2011, which is further projected to increase to 12.5% in 2030 and then approximately to 20% in 2050.[1,2] To ensure better quality of life to rapidly increasing elderly population is becoming a stiff public health challenge in India as older people are known to be more susceptible to disease and disability.

Maintenance of good functional capacity is an important component of successful aging. Physical function is recognized as an important indicator of health and quality of life in older people.[3,4] Activity of daily living (ADL) is often used as an index for measuring the functional capacity among elderly.[4] ADLs can be defined as common everyday tasks that are required for maintaining an independent life or necessary for survival.[5] Aging

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is an inevitable natural phenomenon which is characterized by progressive decline of functional capacity.[6-8] There is growing body of evidence that older people are at risk of chronic diseases and multiple comorbidities;[9-11] and disabilities at old age can most commonly be attributed to chronic conditions.[12]

With the rise in numbers of older people in our population, the issue of health-related quality of life (HRQOL) is assuming greater relevance. HRQOL is a multidimensional concept and it refers to how health impacts on an individual's ability to function and his or her perceived well-being in physical, mental, and social domains of life.[13] Elderly people who have poor functional health are likely to enjoy poorer HRQOL.[8,14,15] There is paucity of data regarding relationship between functional status and HRQOL among elderly in India.[14] It is important to know impact of functional dependence of elderly people on different dimensions of HRQOL. The objective of the study is to explore the functional status of elderly in an urban setting of Assam, India, and to investigate the relationship between different grades of functional dependence and different dimensions of HRQOL.

## Materials and Methods

The study was a cross-sectional community-based study conducted in two randomly selected urban wards of Dibrugarh city, Assam, India during the period 2013--15 among the elderly individuals aged ≥60 years. Data were collected through house to house visit. The Institutional Ethical Committee of Guwahati Medical College, Gauhati, provided the ethical approval to conduct the study.

All the elderly participants were interviewed using a pretested questionnaire through face-to-face interview to collect data on sociodemographic variables, health habits, treatment seeking behaviors, and numbers of chronic morbidities.

### Activity of daily living (ADL)
The functional capacity of elderly was measured using Barthel activity of daily living (ADL) tool.[16] The tool was applied to assess the participants' current level of ability to perform following 10 ADL items, for example, feeding, bathing, grooming, dressing, bowel control, bladder control, toileting, transferring in and out of bed to chair and back, mobility on level surface, and mobility on stairs. The total score ranges from 0 to 100 in all 10 items, with higher score indicating greater independence. A total score of 0 stands for complete dependency in all 10 ADLs, whereas a score of 100 means complete independence in all ADLs.

### Health-related quality of life (HRQOL)
We used the Assamese version of RAND-36 (SF-36) tool which was earlier used in a study conducted by Indian Council of Medical research.[17] RAND-36 assesses eight health domains with multi-item scales (35 items): physical functioning-10 items (PF), role limitations caused by physical health problems-4 items (RP), role limitations caused by emotional problems-3 items (RE), social functioning-2 items (SF), emotional or mental wellbeing-5 items (MH), energy/fatigue or vitality-4 items (VT), bodily pain-2 items (BP), and general health perceptions-5 items (GH). The scores of each SF-36 items range from 0 to 100 and then averaging all items in same domain together, with higher score indicating better HRQOL.[13]

### Statistical analysis
One-way analysis of variance (ANOVA) and binary logistic regression analysis tests were used to examine the associations between ADL scores and HRQOL using SPSS. Each SF-36 domains of HRQOL were dichotomized into two categories, that is, "poor HRQOL" and "optimal HRQOL" for logistic regression analysis. Those who obtained less than 50 score in a HRQOL domain of SF-36 was categorized as having poor HRQOL in that domain and all others as having optimal HRQOL. A *P* value less than 0.05 was considered as statistically significant for all the statistical procedures.

## Results

The sociodemographic characteristics of the participants are presented in Table 1. Out of total 300 elderly participants, there were 149 males and 151 females. The mean age of participants was $68.59 \pm 7.3$ with an age range from 60 to 95 years.

Table 2 presents the distribution of participants according to ADL status. In all, 34.7% ($n = 104$) of participants had limitations in one or more ADL items. Out of 104 participants who had ADL limitations in one or more items, 57 (19%) obtained less than 90, and 47 (15.7%) obtained an ADL score of 90--99.

Overall mean ADL score was found to be $95.5 \pm 10.4$ [Table 3]. There is a significantly inverse relationship between mean ADL score and age. The mean ADL score ($96.9 \pm 8.5$) was found to be highest in the youngest age group (i.e. in 60--69 years) and lowest ($87.7 \pm 18.6$) in the oldest age group, that is, 80 + age group. Similar adverse relationship was also noticed between ADL score and numbers of chronic morbidities.

The overall mean HRQOL scores ranged from 48 (SD = 16.93) for GH domain to 71.78 (SD = 22.25) for BP domain [Table 4]. We also observed strong graded relationship between ADL and HRQOL scores. Those who scored perfect 100 ADL score also scored highest in all eight HRQOL domains, whereas those with least ADL score (i.e. 0-89) scored lowest in all the HRQOL domains.

Age and sex-adjusted binary logistic regression analysis confirmed a significant relationship between ADL status and HRQOL [Table 5]. In the logistic regression analysis, the probability of poor health increased with decreasing level of ADL scores. Those with no ADL dependence (i.e. 100 ADL score) had least and those with ADL score 0--89 had maximum probability of having poor HRQOL in all domains of SF-36.

## Table 1: Distribution of the participants according to some important background characteristics

| Characteristics | Male=149 n (%) | Female=151 n (%) | Total (n=300) n (%) |
|---|---|---|---|
| Age (Years): | | | |
| 60--69 | 74 (49.7) | 105 (69.5) | 179 (59.7) |
| 70--79 | 51 (34.2) | 39 (25.8) | 90 (30) |
| 80+ | 24 (16.1) | 7 (4.6) | 31 (10.3) |
| Mean age±SD | 70.45 (7.7) | 66.75 (6.4) | 68.59 (7.3) |
| Education: | | | |
| Illiterate | 3 (2.0) | 26 (17.2) | 29 (9.7) |
| Primary | 3 (2.0) | 5 (3.3) | 8 (2.7) |
| High School | 19 (12.8) | 55 (36.4) | 74 (24.7) |
| Up to Collage | 75 (50.7) | 50 (33.1) | 125 (41.8) |
| Graduation Completed | 37 (25.0) | 11 (7.3) | 48 (16.1) |
| University/professional | 11 (7.4) | 4 (2.6) | 15 (5.0) |
| Marital Status: | | | |
| Married | 129 (86.6) | 89 (59.9) | 218 (72.7) |
| Widowed/Widower | 19 (12.8) | 59 (39.1) | 78 (26.0) |
| Divorced/Separated | 0 (0.0) | 1 (0.7) | 1 (0.3) |
| Unmarried | 1 (0.7) | 2 (1.3) | 3 (1.00) |
| Numbers of morbidities | | | |
| <3 | 60 (40.3) | 56 (37.1) | 116 (38.7) |
| 3--5 | 72 (48.3) | 73 (48.3) | 145 (48.3) |
| >5 | 17 (11.4) | 22 (14.6) | 39 (13) |

## Table 2: Distribution of participants according to ADL status

| ADL status | Male, n (%) | Female, n (%) | Total, n (%) |
|---|---|---|---|
| Independent in all ADLs (ADL score=100) | 96 (64.42) | 100 (66.22) | 196 (65.3) |
| Complete or partial limitations in one or more ADLs | 53 (35.57) | 51 (33.77) | 104 (34.7) |
| ADL Score | | | |
| 0--89 | 29 (19.5) | 28 (18.5) | 57 (19) |
| 90--99 | 24 (16.1) | 23 (15.2) | 47 (15.7) |
| 100 | 96 (64.4) | 100 (66.2) | 196 (65.3) |

## Table 3: Mean ADL Scores and prevalence of ADL dependence according age, sex & numbers of morbidities

| Variables | Mean ADL (mean±SD) | Prevalence of ADL dependence* n (%) |
|---|---|---|
| Age (Years): | | |
| 60--69 | 96.9±8.5 | 49 (27.4) |
| 70--79 | 95.4±8.8 | 35 (38.9) |
| 80+ | 87.7±18.6 | 20 (64.5) |
| All Age | 95.5±10.4 | 104 (34.7) |
| P value | 0.000 | 0.000 |
| Sex | | |
| Male | 94.7±12.5 | 53 (35.6) |
| Female | 96.3±7.7 | 51 (33.8) |
| P value | 0.174 | 0.419 |
| Numbers of morbidities | | |
| 0-2 | 98.5±8.2 | 14 (12.1) |
| 3-5 | 95.1±8.4 | 61 (42.1) |
| >5 | 88.1±17.1 | 29 (74.4) |
| P value | 0.000 | 0.000 |

*Complete or partial dependence in one or more ADL item

## Discussion

This study is attempted to highlight the ADL profile and its relationship with different dimensions of HRQOL among elderly individuals in an urban setting in India. Almost one third of the study population had limitations in one or more ADL items. This prevalence of ADL dependence among elderly population in this urban area of northeastern region of India was found to be lower compared with that of rural elderly people of the same area and also the elderly living in other urban and rural localities in India.[9,17-19] In contrast, two other studies from Jhansi and Chandigarh have reported lower prevalence of ADL disability compared with this study.[20,21] Functional decline is usually associated with chronological aging which was found to be true in this study.[8,9] However, it was also found that a good proportion of elderly people maintain a good functional health even into the advanced age.[9,17,19] In this study, ADL dependence was found to be strongly associated with chronic morbidities which highlight the importance of chronic diseases in causing disabilities in elderly.[5,9,12,22,23] Prevalence of ADL disability was found to be slightly higher among male in this study which is consistent with our previous report from this region.[10]

To best of our knowledge, this was the first study to evaluate the HRQOL among elderly people in this region of India. Participants scored above average in all domains except VT and GH. Having ADL dependence was significantly associated with lower average HRQOL scores in all SF-36 domains indicating that functional dependence not only negatively impact physical well-being but also social, emotional, and mental well-beings.[13] Mean HRQOL scores in all SF-36 domains decreased with increased severity of ADL dependence indicating that HRQOL worsens with worsening functional dependence. The age and sex-adjusted binary logistic regression analysis also confirmed that probability of poorer HRQOL increased with increasing level of functional disability. Studies elsewhere have also shown that HRQOL have graded relationship with categorical levels of functional disability.[24]

Among the ADL compromised elderly individuals, the most affected HRQOL domain was RP. Such result was expected because RP domain of SF-36 evaluates the problems experienced by individuals with their work or other regular daily activities as a result of their physical health problems.[25] Therefore, ADL restricted individuals were expected to perform badly in this domain. Similar negative relationships observed between other physical health-related scales of SF-36 (PF, BP and VT) and ADL status are also explicable. There is similarity in both PF and ADL scale as both evaluate ADL,[25] hence ADL compromised individuals are also likely to score at similar level in PF scale. BP domain was not found to be as affected as other physical domains. It could be because many elderly were already under pain relieving medications or most of them were suffering from low grade pain. VT scale of SF-36 represents the energy/fatigue level of individuals.[25] VT domain may be affected more severely as persons with functional disability suffer from elevated levels of

| Table 4: Mean HRQOL scores in eight domains of SF-36 according to ADL scores | | | | | |
|---|---|---|---|---|---|
| HRQoL Domain | Mean scores | | | | |
| | Total Sample | ADL score, 100 (*n*=196) | ADL score, 90-99 (*n*=47) | ADL score, 0-89 (*n*=57) | *P* |
| PF | 65.87±25.86 | 74.18±20.31 | 63.51±19.86 | 39.21±28.98 | 0.000 |
| RF | 57.08±42.08 | 70.28±38.98 | 41.49±37.69 | 24.56±33.34 | 0.000 |
| RE | 67.78±37.36 | 77.72±32.33 | 54.61±37.70 | 44.44±40.01 | 0.000 |
| VT | 49.33±13.65 | 53.06±11.78 | 46.91±53.06 | 38.51±15.91 | 0.000 |
| MH | 66.1±12.56 | 69.27±9.62 | 63.40±12.14 | 57.19±16.65 | 0.000 |
| SF | 71.1±24.46 | 78.12±20.47 | 66.76±21.69 | 50.44±26.93 | 0.000 |
| BP | 71.78±22.25 | 77.04±20.38 | 67.98±20.40 | 56.80±22.74 | 0.000 |
| GH | 48±16.93 | 52.12±15.26 | 43.83±15.08 | 37.28±18.42 | 0.000 |

PF=Physical functioning domain, RF=Role limitations caused by physical health problems, RE=Role limitations caused by emotional problems, SF=Social functioning domain, MH=Emotional or mental wellbeing, VT=Energy/fatigue or vitality, BP=Bodily pain, GH=General health perceptions

| Table 5: Association of ADL scores and poor HRQOL in eight SF-36 domains | | | |
|---|---|---|---|
| HRQoL Domain | Odds Ratio (95% CI)* | | |
| | ADL Score 100 | ADL Score 90--99 | ADL Score 0--89 |
| PF | 1 (reference) | 2.67 (1.32--5.38) | 6.43 (2.88--14.37) |
| RP | 1 (reference) | 5.50 (2.66--11.38) | 6.64 (3.17--13.89) |
| RE | 1 (reference) | 3.92 (1.99--7.71) | 5.93 (3.02--11.65) |
| VT | 1 (reference) | 2.34 (1.22--4.49) | 5.36 (2.75--10.47) |
| MH | 1 (reference) | 2.58 (1.33--4.99) | 3.69 (1.90--7.18) |
| SF | 1 (reference) | 2.40 (1.25--4.62) | 5.81 (2.93--11.50) |
| BP | 1 (reference) | 2.39 (1.22--4.68).01 | 5.24 (2.69--0.20).000 |
| GH | 1 (reference) | 2.05 (1.07--3.93).03 | 1.80--6.51).000 |

*Adjusted for age and gender

fatigue and reduced levels of energy compared with able-bodied individuals.[26] The present study also yielded similar types of observation.[26-28]

Consistent with previous reports, we also observed that functional disability not only adversely influence physical dimensions of SF-36 but also the other dimensions such as MH, RE, SF, and GH.[28,29] Lower scores in psychological domains such as MH, RE among functionally disabled elderly as compared with abled-bodied individuals could be attributed to various underlying factors such as negative feeling, low self-esteem, bodily image, appearance, spirituality, low life satisfaction, depression, anxiety.[30,31] We found that the GH perception of functionally compromised individuals were significantly lower compared with functionally normal individuals indicating that GH perception deteriorates with declining levels of functional status.[28] SF scale measures the extent to which ill health interferes with social activities.[25] The present study found that functionally disabled elderly faired significantly poorly in this scale compared with able-bodied elderly individuals indicating a link between functional disability and SF. The restrictions experienced by functionally limited individuals to participate in social life limitations may lead to lower level of social well-being and quality of life.[32]

There were certain limitations in this study which should be kept in mind in interpreting the results. The cross-sectional nature of this study restricts us to derive a conclusion regarding causal relationship between functional status and HRQOL. The study was carried out in only one urban locality; hence findings can not be generalized to whole country. Furthermore, various confounding variables were not taken into account in examining relationship between functional status and HRQOL. Many intermediary variables may mediate the relationship between functional status and HRQOL which could not be understood from this study;[29] and all these warrants further more indepth investigations. In this context, roles of chronic diseases need to be studied in more details as chronic diseases adversely impact both functional health and HRQOL.[33]

## Conclusion

We found a significant graded relationship between ADL disability and HRQOL among elderly individuals. Decline in ADL not only negatively impacts physical well-being but also social, emotional, and mental well-beings of elderly. Better understanding of precursors of functional decline during older age in India will help in preventing or delaying functional decline during older age and improving their quality of life. Primary care physicians can play a vital role in improving HRQOL among elderly individuals by detecting ADL disability through use of Barthel ADL tool, assessing causes of ADL disability, and by providing appropriate treatment and care or advice for restoration of functional health.

### Conflicts of interest

There are no conflicts of interest.

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