

Original Research Article

Prevalence of frailty among rural community-dwelling elderly: a cross-sectional study in central India

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ABSTRACT

Background: People around the world are experiencing increased longevity. As the structure of the population changes, so do the health challenges we encounter, which means medical care also has to adapt accordingly. With the increase in the proportion of elderly, there is a corresponding increase in the prevalence of frailty. Information on the prevalence of frailty in the rural areas of India is scarce, where the health of the elderly is often neglected. The objective of this study is to evaluate the prevalence of frailty within a rural region of Maharashtra.

Methods: A community-based cross-sectional study was conducted on 114 elderly adults residing in a rural area in central India. A semi-structured questionnaire was administered by face-to-face interview method to collect data and the prevalence of frailty was assessed using Tilburg Frailty Indicator (TFI). Various sociodemographic factors related to frailty were also assessed and a p value of <0.05 was considered to be significant.

Results: Among the 114 study participants 57(50%) were found to be frail. Factors like increasing age, female gender, presence of ≥ 2 chronic diseases, and lower socioeconomic class were significantly related to frailty in both univariate and multivariate regression analysis.

Conclusions: Half of the study participants were found to be frail in the present study. The high prevalence of frailty among rural elderly populations emphasizes the need for targeted health interventions. The assessment of frailty using a simple tool like the TFI allows us to identify individuals who need more specialized and diversified care and thus supporting our elderly population in achieving healthy aging.

Keywords: Elderly, Frailty, Rural, Tilburg frailty index

INTRODUCTION

People across the world are now living longer. By 2030, 1 in 6 people in the world will be aged 60 years or over.¹ With increasing age, individuals become vulnerable and may encounter a range of complex health issues. Lower social involvement and quality of life, increased dependency, and higher rates of morbidity, health-care consumption, and mortality come from this increased vulnerability.² These conditions often stem from various factors, including frailty, falls, delirium among others.¹

Frailty is conceptually defined as a clinically recognizable state in which the ability of older people to cope with everyday or acute stressors is compromised by an increased vulnerability brought by age-associated declines in physiological reserve and function across multiple organ systems.³ It is a multidimensional syndrome caused by deficits not only in physical but also psychological, and/or social domains. As a result, frail people are more likely to have adverse health outcomes when exposed to stressors than non-frail people.⁴ It also serves as a more accurate indicator of biological age

compared to chronological age.⁵ Identifying frailty early is crucial, as it is considered a pre-disability condition. Early detection can help prevent a range of negative health outcomes in the elderly also assessing its prevalence within the community can significantly help in understanding the real impact of aging.

India has the second-largest geriatric population in the world.⁶ It is expected that the proportion of older adults will increase from 8% in 2015 to 19% in 2050. Previous studies in India have reported frailty prevalences ranging from 11 to 59%.⁷ It is important to quantify the burden of frailty to make policymakers aware of the evolving issues and the needs of the rising geriatric population. Thus this proactive approach contributes to better mental and physical health and enhances the overall quality of life. However, very few studies have investigated the prevalence of frailty among the elderly in rural area of central India. So this study was conducted with an aim to assess the prevalence of frailty among community-dwelling elderly from a rural area of Central India and to determine the various sociodemographic factors associated with frailty.

METHODS

Study setting and study population

A community-based descriptive cross-sectional study was carried out from 1st November to 31st December 2023 in a conveniently selected village in the rural field practice area of a tertiary healthcare centre in Central India.

Inclusion criteria

All elderly (≥ 60 years) individuals residing for ≥ 1 year in the study area were included.

Exclusion criteria

Those who were critically ill or mentally unstable and those who did not give consent were excluded from the study.

Sample size estimation and sampling method

The sample size was determined based on an estimated frailty prevalence of 38.8%, as reported by Dasgupta et al in their study of the rural elderly population in West Bengal. The final sample included 114 study subjects considering 9% absolute precision.

Data collection method and tools

The present study was conducted in the rural field practice area of a tertiary care health center in central India. Among the 30 villages, one village was conveniently selected for the study. The list of people above the age of 60 years was made with the help of ASHA and by random number table method required

number of study participants was selected. On predetermined dates, the houses of selected study participants were visited. The purpose and nature of the study were detailed to those who were present at the time of the data collection. After obtaining informed written consent from the study participants, a face-to-face interview was conducted using a predesigned semi-structured questionnaire. If more than one elderly were present in the selected house all were included if they fulfilled the inclusion criteria.

The questionnaire included sociodemographic characteristics of the participants and for the assessment of frailty, part B of the Tilburg Frailty Indicator (TFI) was used. The Tilburg Frailty Indicator (TFI) is a widely used screening tool designed to assess frailty among older adults. Part A had 10 determinants of frailty which were separately covered in the interview questionnaire. Part B: comprises 15 questions that assess the components of frailty including physical frailty (eight), psychological frailty (four), and social frailty (three). The TFI ranges from 0 to 15, with sub-scores of 0 to 8 for physical frailty, 0 to 4 for psychological frailty, and 0 to 4 for social frailty. Higher scores indicate a higher level of frailty, and individuals with a total score of 5 or more are classified as frail. The questionnaire was translated into the local language and completed by the study participants. If participants encountered any difficulties, the researcher offered assistance in completing the form.

Statistical analyses

The collected data was entered in Microsoft Excel and was analyzed using SATA 14 software. Descriptive statistics are presented in frequencies and percentages. Univariate and multivariate regression analysis was done to assess the factors associated with frailty. A p value of <0.05 was considered statistically significant.

RESULTS

Of the 114 participants enrolled, most participants were male (60.53%) and belong to Hindu religion (92.98%). The mean age of the participants was 69.30 ± 6.41 years (ranging from 60 to 90 years). Less than one-third of the participants (19.29%) were widowed, while approximately 78% were living with their spouses. A significant portion, 83.3%, were either illiterate or had only completed primary school. A majority, of the study subjects (62.28%), were unemployed. Additionally, 57% of the participants belonged to lower socio-economic classes (classes IV and V) according to the Modified BG Prasad scale (Table 1).

In this study, frailty was detected in 57 out of 114 participants, constituting 50% of the sample, as assessed by the Tilburg Frailty Indicator (TFI). In the physical component (Figure 1), 64.1% of participants reported experiencing physical tiredness, while 57.1% faced difficulty walking. In the psychological component

(Figure 2), 67.5% of participants managed to cope with their problems, though 53.5% experienced feelings of anxiety. The social component (Figure 3) of the questionnaire revealed that 87.7% of participants received adequate support from others (family members and neighbours).

Table 1: Sociodemographic characteristics of study participants.

Variables	Number (%)
Gender	
Male	69 (60.53)
Female	45 (39.47)
Age (in years)	
60-69	61 (53.51)
70-79	41 (35.96)
≥80	12 (10.53)
Religion	
Hindu	106 (92.98)
Buddhist	7 (6.14)
Muslim	1 (0.88)
Marital status	
Married	89 (78.07)
Widow/widower	22 (19.29)
Unmarried/separated	3 (2.64)
Educational qualification	
Illiterate/primary	95 (83.33)
Secondary	12 (10.53)
Higher education	7 (6.14)
Occupation	
Unemployed	71 (62.28)
Employed	43 (37.72)
Socioeconomic status*	
Class I	4 (3.51)
Class II	20 (17.54)
Class III	25 (21.93)
Class IV	31 (27.19)
Class V	34 (29.83)

*Modified B. G. Prasad Scale 2023 (per capita income, Rs/month)

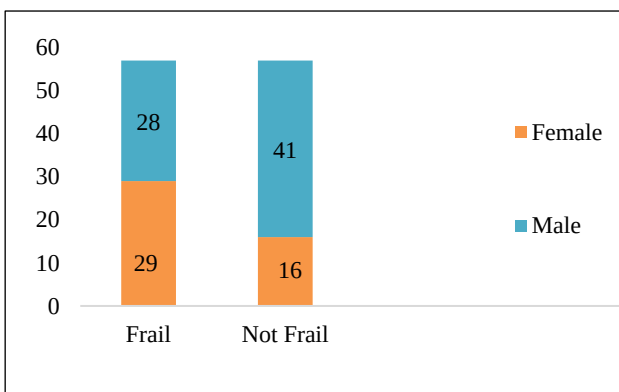


Figure 1: Frailty status among the study participants.

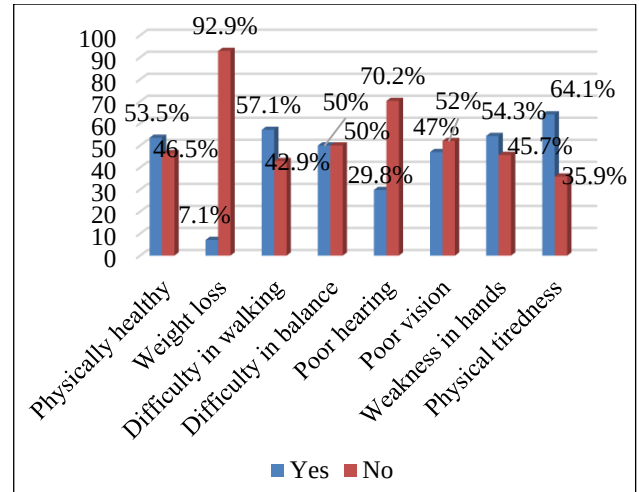


Figure 2: Responses to physical component of TFI.

The findings indicated a higher prevalence of frailty among females, with 64.4% affected, compared to 40.6% of males (Table 2). The majority of the participants were in the age group of 60-69 years (53.50%). Most of the participants were following the Hindu religion (92.98%). 78.7% were married. The educational qualification of the majority (83.3%) was primary level and below. Among them, 22.4% were illiterate. 37.7% were engaged in some work and were earning on their own. According to the Modified BG Prasad scale, there appears to be a greater proportion of individuals in the lower socioeconomic categories.

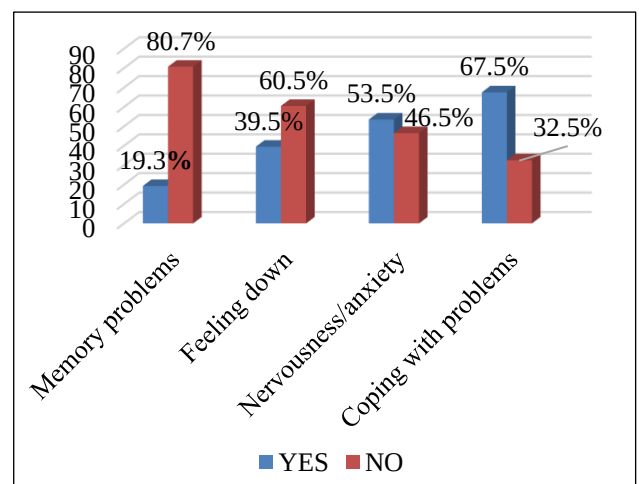


Figure 3: Responses to psychological component of TFI.

Females are more likely to be frail compared to males, with an OR of 2.65 (95% CI: 1.14-6.23). Increasing age, that is individuals aged 70 and above are more likely to be frail compared to those aged 60-69. For ages 70-79, the OR is 3.67 (95% CI: 1.47-9.24) with a significant p-value. For ages ≥80, the OR is 5.71 (95% CI: 1.22-35.40) with a significant p value (0.009). Individuals with two or more chronic illnesses have a significantly higher risk of

frailty, with an odds ratio (OR) of 3.26 (95% CI: 1.36-8.00) and a p value of 0.0034. Additionally, lower socioeconomic status is correlated with a greater

likelihood of frailty (Tables 2 and 3). Following multivariate analysis, all factors initially associated with frailty were confirmed to be statistically significant.

Table 2: Univariate and multivariable logistic regression showing factors associated with frailty (n=57).

Variable	Status	Number of frail elderly	OR (95% C.I)	P value	Adjusted OR	P value
Gender	Female	29	2.65(1.14-6.23)	0.0127	3.23(1.24-8.40)	0.016
	Male	28	-	-	-	-
Age (in years)	60-69	21	-	-	-	-
	70-79	27	3.67(1.47-9.24)	0.0018	3.18(1.18-8.54)	0.022
	≥80	9	5.71(1.22-35.40)	0.0090	4.47(1.12-11.96)	0.045
Marital status	Married/living with partner	42	-	-	-	-
	Widow/widower	13	1.61(0.57-4.73)	0.3175	-	-
	Unmarried	1	-	-	-	-
	Separated/divorced	1	-	-	-	-
Education	None/ primary	51	1.62(0.41-6.93)	0.4322	-	-
	Secondary	5	4.28(0.30-235.85)	0.2155	-	-
	Higher	1	-	-	-	-

Table 3: Univariate and multivariable logistic regression showing factors associated with frailty (n=57).

Variable	Status	Number of frail elderly	OR (95% C.I)	P value	Adjusted OR	P value
≥2 chronic diseases	Yes	28	3.26 (1.36-8.00)	0.0034	3.91 (1.41-10.87)	0.009
	No	29	-	-	-	-
Occupation	Yes	19	-	-	-	-
	No	38	1.45 (0.63-3.34)	0.3340	-	-
Socio-economic status	Class I	0	-	-	-	-
	Class II	3	-	-	-	-
	Class III	13	7.58 (1.56-47.70)	0.0032	8.09 (1.65-39.68)	0.010
	Class IV	16	7.46 (1.64-45.37)	0.0025	6.53 (1.38-30.86)	0.018
	Class V	26	22.75 (4.67-139.85)	0.0001	21.22 (4.23-106.42)	<0.001

DISCUSSION

In our study, we found that the prevalence of frailty was 50%. This is higher compared to studies done in other parts of the country like in rural West Bengal, where the prevalence was 38.8%, and in rural Thanjavur, which reported 28%.^{8,9} Additionally, a study of elderly people in rural Bengaluru found a frailty rate of 24.7% and prefrailty at 62.75%.² Similarly, Kashikar et al reported a frailty prevalence of 26% and prefrailty at 63.6% in Maharashtra, with both studies using the Fried phenotypic scale for their assessments.¹⁰

On univariate and multivariate regression analysis increasing age, gender, presence of ≥2 chronic diseases, and lower socioeconomic status were found to be statistically significant factors related to frailty.

Increasing age has been shown to be associated with increased prevalence of frailty, in previous studies.^{5,9,10} Similar to those results, the present study also witnessed an increase in frailty with increasing age. The rise in frailty with age can be linked to a complex interplay of physiological, biological, and psychosocial factors.

In this study, females were found to have a significantly higher risk of frailty. This aligns with the findings of Kendhapedi et al, Dasgupta et al, and Singhal et al, all of which indicated a greater prevalence of frailty among females compared to males.^{9,8,5}

Lower socioeconomic status was also found to be significantly associated with the presence of frailty even after multivariate logistic regression analysis. Kendhapedi et al in their study also found lower socioeconomic status, to be independently associated with frailty irrespective of the frailty definitions.⁹ The study conducted by

Singhal et al includes a subsample of selected LASI respondents aged 60 years and above from 18 states and union territories of India, thus representing 89% of the Indian population.⁵ The prevalence of frailty was 42.34%. In addition to older age and female sex, lower income, lower education, and rural locality were also associated with a high prevalence of frailty.

CONCLUSION

The assessment of frailty using a simple tool like the TFI allows us to identify elderly individuals who need more specialized and diversified care, thus supporting our elderly population in achieving healthy aging. The high prevalence of frailty among rural elderly populations emphasizes the need for targeted healthcare delivery. Furthermore, the higher incidence of frailty among females indicates the importance of implementing gender-specific interventions like self-help groups or technological literacy at the community level. Integrating frailty as a variable or outcome in state policymaking can enhance the evaluation and provision of health services for older adults.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- World Health Organization. Ageing and health. Available at: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>. Accessed 01 May 2024.
- Shilpa K, Norman G. Prevalence of frailty and its association with lifestyle factors among elderly in rural Bengaluru. *J Family Med Prim Care*. 2022;11(5):2083-9.
- World Health Organization. WHO Clinical Consortium on Healthy Ageing: Topic Focus: Frailty and Intrinsic Capacity. 2017. Available at: <https://www.who.int/publications/i/item/WHO-FWC-ALC-17.2>. Accessed 01 May 2024.
- Ghosh A, Kundu M, Devasenapathy N, Woodward M, Jha V. Frailty among middle-aged and older women and men in India: findings from wave 1 of the longitudinal Ageing study in India. *BMJ open*. 2023;13(7):e071842.
- Singhal S, Singh S, Dewangan G, Dey S, Banerjee J, Lee J, et al. The prevalence of frailty and its relationship with sociodemographic factors, regional healthcare disparities, and healthcare utilization in the aging population across India. *Aging Medi*. 2023;6(3):212-21.
- Rajan SI, Sarma PS, Mishra US. Demography of Indian aging, 2001-2051. *J Aging Soc Policy*. 2003;15(2-3):11-30.
- Seligman B, Agarwal A, Bloom DE. Frailty among older Indians: state-level factors. *J Population Age*. 2024;17(1):149-63.
- Dasgupta A, Bandyopadhyay S, Bandyopadhyay L, Roy S, Paul B, Mandal S. How frail are our elderly? An assessment with Tilburg frailty indicator (TFI) in a rural elderly population of West Bengal. *J Fam Medi Prim Care*. 2019;8(7):2242-8.
- Kendhapedi KK, Devasenapathy N. Prevalence and factors associated with frailty among community dwelling older people in rural Thanjavur district of South India: A cross sectional study. *BMJ Open*. 2019;9(10):e032904.
- Kashikar Y, Nagarkar A. Prevalence and determinants of frailty in older adults in India. *Indian J Gerontol*. 2016;30(3):364-81.
- Siriwardhana DD, Weerasinghe MC, Rait G, Falcaro M, Scholes S, Walters KR. Prevalence of frailty in rural community dwelling older adults in Kegalle district of Sri Lanka: A population based cross sectional study. *BMJ Open*. 2019;9(1):e026314.
- Collard RM, Boter H, Schoevers RA, Oude Voshaar RC. Prevalence of frailty in community-dwelling older persons: a systematic review. 2012;60(8).
- Dent E, Kowal P, Hoogendijk EO. Frailty measurement in research and clinical practice: A review. *Eur J Intern Med*. 2016;31:3-10.
- Srivastava S, Muhammad T. Socioeconomic vulnerability and frailty among community-dwelling older adults: cross-sectional findings from longitudinal aging study in India, 2017-18. *BMC Geriatr*. 2022;22(1):201.
- Meratwal G, Banseria R, Khanna M, Kumar A. Prevalence and factors associated with frailty among elderly in central Rajasthan: A cross-sectional study. *Clin Epidemiol Global Health*. 2023;20:101215.
- Ghose S, Pal D, Paul B, Dasgupta A, Ghosh P, Maurya N. Burden of frailty and its correlates among the elderly: a cross-sectional study in a rural community of West Bengal. *J Fam Medi Prim Care*. 2024;13(5):2066-72.
- Vadanere NP, Debnath A, Verma A, Gupta P. Prevalence and Determinants of Frailty amongst the Elderly: A Study from a Tertiary Care Hospital in North India. *Preventive Medicine: Research & Reviews*. 2024;10-4103.
- Kshatri JS, Palo SK, Bhoi T, Barik SR, Pati S. Associations of multimorbidity on frailty and dependence among an elderly rural population: Findings from the AHSETS study. *Mechanisms of Ageing and Development*. 2020;192:111384.
- Mohamed Zein El-Abdeen D, Hassan AbdElhameed S, Magdy Ali S. Frailty among community-dwelling older Adults: Prevalence and associated factors. *Egypt J Health Care*. 2021;12(2):1934-53.
- Kumar A, Dhar M, Agarwal M, Mukherjee A, Saxena V. Predictors of frailty in the elderly population: A cross-sectional study at a tertiary care center. *Cureus*. 2022;14(10).

21. Ugwu UC, Ene OC. Prevalence, association and correlation of frailty with sociodemographic and health-related factors among outpatient elderly persons: A cross-sectional study. *Clin Epidemiol Glob Health*. 2024;28:101642.
22. Takele MD, Sany K, Getie K, Wayessa DI, Jember G, Gobeze M, et al. Prevalence and associated factors of frailty among community dweller older adults living in Gondar town, northwest, Ethiopia: A community based cross-sectional study. *BMC Publ Health*. 2023;23(1):1309.
23. Yu X, Shi Z, Wang D, Niu Y, Xu C, Ma Y, et al. Prevalence and associated factors of frailty among community dwelling older adults in Northwest China: a cross-sectional study. *BMJ open*. 2022;12(8):e060089.

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