

Original Research Article

A study of clinical profile of frailty in elderly patients attending KIMS teaching hospital, Koppal

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ABSTRACT

Background: Frailty is a common geriatric syndrome associated with increased vulnerability to adverse health outcomes. Early identification is important for improving care among elderly populations. Objectives were to assess the clinical profile of frailty and identify factors associated with frailty among elderly patients attending a tertiary care teaching hospital in Koppal, Karnataka.

Methods: This prospective observational study was conducted over 18 months at KIMS Teaching Hospital, Koppal, among 100 patients aged ≥ 65 years. Frailty was assessed using the Fried frailty phenotype criteria. Demographic, socioeconomic, comorbidity, and functional data were collected and analyzed using descriptive statistics, bivariate analysis, and multinomial logistic regression.

Results: Among participants, 11% were robust, 52% pre-frail, and 37% frail. Frail participants were significantly older ($p=0.013$), with a higher proportion aged ≥ 70 years ($p=0.008$). Weak grip strength (73%) and reduced physical activity (48%) were the most common frailty components. Educational status ($p=0.002$), living arrangement ($p=0.038$), and income level ($p<0.001$) were significantly associated with frailty. Increasing age independently predicted frailty ($OR=1.32$, $p=0.038$), while hypertension showed a protective association ($OR=0.07$, $p=0.039$).

Conclusions: Frailty and pre-frailty were highly prevalent. Routine frailty screening may support early identification and targeted interventions.

Keywords: Frailty, Elderly, Geriatric assessment, Fried frailty phenotype, Tertiary care hospital

INTRODUCTION

Frailty is a multidimensional geriatric syndrome characterized by reduced physiological reserve and increased vulnerability to external stressors, resulting in a heightened risk of adverse health outcomes such as falls, disability, hospitalization, institutionalization, and mortality.¹ With global demographic shift toward an ageing population, frailty has emerged as a major public health concern. The World Health Organization estimates that the number of individuals aged 60 years and above will double by 2050, with a significant proportion residing in low- and middle-income countries.² India, in particular, is experiencing a rapid rise in its elderly population,

projected to reach nearly 340 million by 2050, thereby intensifying burden of age-related conditions including frailty.³

Frailty is distinct from normal ageing, disability, and comorbidity, although these conditions frequently coexist. Clinically, frailty manifests as a constellation of features including unintentional weight loss, exhaustion, weakness, slowness, and reduced physical activity.⁴ These manifestations reflect underlying dysregulation across multiple physiological systems such as the musculoskeletal, neuroendocrine, immune, and metabolic systems, leading to impaired homeostasis and diminished adaptive capacity.⁵ As a result, even minor stressors like

acute illness or medication changes may precipitate significant functional decline in frail individuals.

The reported prevalence of frailty varies widely depending on the population studied and the assessment tool used. Global estimates suggest that approximately 10-15% of community-dwelling older adults are frail, while an additional 40-50% fall into the pre-frail category.¹ Indian studies have demonstrated a broad prevalence range from 16% to over 50%, reflecting heterogeneity in socioeconomic status, nutritional factors, healthcare access, and rural-urban differences.^{3,6} Such variability underscores importance of region-specific studies to better understand frailty patterns within local healthcare settings.

Several validated tools are available for frailty assessment, among which the Fried Frailty phenotype is one of the most widely used. It defines frailty based on five physical criteria and allows classification into robust, pre-frail, and frail states.⁴ Early identification of pre-frailty is clinically significant, as evidence suggests that frailty is dynamic and potentially reversible condition, particularly when addressed through timely interventions such as exercise, nutritional optimization and comprehensive geriatric care.⁷

Despite growing recognition, data on the clinical profile of frailty in rural and semi-urban Indian populations remain limited. Karnataka, with its increasing elderly population, presents unique challenges related to healthcare access and socioeconomic disparities. Koppal Institute of Medical Sciences Teaching Hospital caters predominantly to a rural population, making it an ideal setting to study frailty in an under-represented group. Understanding the clinical profile and associated factors of frailty in this population is essential for developing targeted screening and management strategies suited to resource-limited settings.⁸

METHODS

Study design and setting

This was a prospective observational study conducted at KIMS Teaching Hospital, Koppal, Karnataka, India. The study duration was 18 months, from July 2023 to December 31, 2024.

Study population

The study population included elderly patients aged 65 years and above who attended the outpatient and inpatient services of KIMS Teaching Hospital during the study period. Participants were enrolled consecutively based on predefined inclusion and exclusion criteria after obtaining informed consent.

Sample size calculation

The sample size was calculated using the formula

$$N = Z^2 \times p \times q / l^2$$

Where N is the sample size, Z is the standard normal deviate at a 95% confidence level (1.96), p is the estimated prevalence of frailty among the elderly (21% based on previous studies), q is 100-p (79%), and l is the allowable error (9%).

Based on this calculation, the minimum required sample size was 84. To improve the robustness of the study, a total of 100 participants were included.

Inclusion and exclusion criteria

Patients aged more than 65 years who were willing to participate and provided written informed consent were included. Patients with physical handicaps, known psychiatric illness, cerebrovascular accidents, Parkinson's disease, heart failure with ejection fraction less than 35%, and those unwilling to participate were excluded.

Ethical considerations

The study was approved by the Institutional Ethics Committee of Koppal Institute of Medical Sciences (IEC CDSO Registration No. ECR/1431/Inst/KA/2020). Written informed consent was obtained from all participants prior to enrollment. Confidentiality of patient data was maintained throughout the study.

Data collection

After enrollment, participants underwent a comprehensive evaluation that included demographic details, clinical history, physical examination, and frailty assessment. Information regarding age, gender, educational status, occupation, socioeconomic status, living arrangements, marital status, and caregiver availability was collected using a structured proforma.

Medical history was obtained through patient interviews and review of medical records. Information regarding self-perceived health status, unintentional weight loss ($\geq 5\%$ of body weight in the previous year), and physician-diagnosed comorbidities such as hypertension, coronary artery disease, diabetes mellitus, chronic respiratory diseases, arthritis, renal disease, malignancy, thyroid disorders, sensory impairments, and gastrointestinal diseases was documented.

Physical activity was assessed using the Minnesota Leisure time activities questionnaire. Participants reported the type, frequency, and duration of activities performed during the preceding two weeks. Weekly energy expenditure was calculated in kilocalories. Depressive symptoms were screened using modified 10-item center for epidemiological studies-depression (CES-D) scale.

Frailty assessment

Frailty was assessed using the Fried frailty phenotype, which includes five components: unintentional weight

loss, exhaustion, weakness, slowness, and low physical activity. Unintentional weight loss was defined as a loss of at least 5% of body weight in the previous year. Exhaustion was assessed using two CES-D questions, with responses of “moderate amount”/“most of time” considered positive.

Low physical activity was defined as weekly energy expenditure below the lowest gender-specific quintile (<383 kcal/week for men and <270 kcal/week for women). Slowness was assessed by measuring the time taken to walk 4 meters at usual pace using gender-and height-adjusted cut-offs. Weakness was evaluated using a hand-held dynamometer, with grip strength cut-offs adjusted for gender and body mass index, as described by Fried et al.¹

Participants meeting three or more criteria were classified as frail, those meeting one or two criteria as pre-frail, and those meeting none as robust.

Quality control

All assessments performed by trained personnel following standardized protocols. Equipment was regularly calibrated, and a pilot study was conducted prior to data collection. Random verification of 10% of collected data performed to ensure accuracy and consistency.

Statistical analysis

Data were entered into Microsoft excel and analyzed using statistical package for the social sciences (SPSS) version 25.0. Descriptive statistics were expressed as frequencies, percentages, means, standard deviations, medians, and interquartile ranges as appropriate. Associations between frailty and clinical variables were assessed using chi-square tests, independent t tests, or non-parametric equivalents. Multivariate logistic regression analysis was performed to identify independent predictors of frailty. A $p < 0.05$ was considered statistically significant.

RESULTS

A total of 100 elderly participants aged ≥ 65 years included in the study. Based on the Fried frailty phenotype, 11% were classified as robust, 52% as pre-frail and 37% as frail.

Age and gender

Frail participants were significantly older than pre-frail and robust participants (mean age: 69.68 ± 3.07 years vs.

67.27 ± 2.33 years and 67.55 ± 2.10 years, respectively; $p = 0.013$). Age distribution differed significantly across frailty categories, with higher proportion of frail individuals in the ≥ 70 year age groups ($p = 0.008$) (Table 1).

Gender distribution did not differ significantly across frailty categories ($p = 0.703$) (Table 2).

Frailty components

All five frailty components showed significant variation across Frailty categories (all $p < 0.001$). Weak grip strength (73%) was the most prevalent component, followed by low physical activity (48%), prolonged walk time (39%), exhaustion (30%), and weight loss (6%). Reduced physical activity and grip strength were most common among frail participants (Table 3).

Comorbidities

Diabetes mellitus (68%) and hypertension (84%) were highly prevalent in the study population. However, neither diabetes mellitus ($p = 0.946$) nor hypertension ($p = 0.727$) showed a significant association with frailty status on bivariate analysis (Table 4).

Socioeconomic factors

Educational status differed significantly across frailty categories ($p = 0.002$), with lower education levels more common among frail participants (Table 5). Marital status and occupation were not significantly associated with frailty. Living arrangements varied significantly, with living with children being universal in the robust group but less common among frail participants ($p = 0.038$) (Table 6). Income distribution also differed significantly across frailty categories ($p < 0.001$), with frailty more common at both the lowest and highest income levels (Table 6).

Multivariate analysis

Multinomial logistic regression identified increasing age as an independent predictor of frailty compared to robustness (OR=1.32, 95% CI: 1.02-1.72; $p = 0.038$). Hypertension showed a significant protective association against frailty (OR=0.07, 95% CI: 0.01-0.90; $p = 0.039$). Sex, diabetes mellitus, education, income, and living arrangement were not independently associated with frailty (Table 7).

Table 1: Age distribution of study population.

Age characteristics	Robust, (n=11)	Pre-frail, (n=52)	Frail, (n=37)	Total, (n=100)	P value
Mean$\pm$SD (in years)	67.55 $\pm$ 2.10	67.27 $\pm$ 2.33	69.68 $\pm$ 3.07	68.19 $\pm$ 2.84	0.013*
Age categories					
65-69	9 (81.8%)	42 (80.8%)	19 (51.4%)	70 (70.0%)	0.008**
70-74	2 (18.2%)	9 (17.3%)	14 (37.8%)	25 (25.0%)	
≥ 75	0 (0.0%)	1 (1.9%)	4 (10.8%)	5 (5.0%)	

*ANOVA test, **Chi-square test

Table 2: Gender distribution of study population.

Sex	Robust (n=11)	Pre-frail (n=52)	Frail (n=37)	Total (n=100)	P value
Male	7 (63.6%)	34 (65.4%)	27 (73.0%)	68 (68.0%)	0.703*
Female	4 (36.4%)	18 (34.6%)	10 (27.0%)	32 (32.0%)	

*Chi-square test.

Table 3: Percentage distribution of frailty components among study participants.

Frailty component	Robust, (n=11)	Pre-frail, (n=52)	Frail, (n=37)	Total, (n=100)	P value
Weight loss	0 (0.0%)	0 (0.0%)	6 (16.2%)	6 (6.0%)	<0.001
Exhaustion	0 (0.0%)	3 (5.8%)	27 (73.0%)	30 (30.0%)	<0.001
Physical activity	0 (0.0%)	14 (26.9%)	34 (91.9%)	48 (48.0%)	<0.001
Walk time	0 (0.0%)	14 (26.9%)	25 (67.6%)	39 (39.0%)	<0.001
Grip strength	0 (0.0%)	41 (78.8%)	32 (86.5%)	73 (73.0%)	<0.001

Table 4: Distribution of co-morbidities in study population.

Comorbidity	Robust, (n=11)	Pre-frail, (n=52)	Frail, (n=37)	Total, (n=100)	P value
Diabetes mellitus	8 (72.7%)	35 (67.3%)	25 (67.6%)	68 (68.0%)	0.946
Hypertension	10 (90.9%)	44 (84.6%)	30 (81.1%)	84 (84.0%)	0.727

Table 5: Distribution of socio-economic characteristics of study population.

Characteristics	Robust, (n=11)	Pre-frail, (n=52)	Frail, (n=37)	Total, (n=100)	P value
Marital status					
Married	11 (100%)	51 (98.1%)	36 (97.3%)	98 (98.0%)	0.836
Unmarried	0 (0.0%)	1 (1.9%)	1 (2.7%)	2 (2.0%)	
Education level					
Pre-primary	0 (0.0%)	9 (17.3%)	14 (37.8%)	23 (23.0%)	0.002
Primary	8 (72.7%)	37 (71.2%)	15 (40.5%)	60 (60.0%)	
Secondary	1 (9.1%)	3 (5.8%)	0 (0.0%)	4 (4.0%)	
Tertiary	2 (18.2%)	3 (5.8%)	7 (18.9%)	12 (12.0%)	
Occupation					
Skilled	11 (100%)	49 (94.2%)	32 (86.5%)	92 (92.0%)	0.157
Unskilled	0 (0.0%)	3 (5.8%)	5 (13.5%)	8 (8.0%)	

Table 6: Living arrangement and income distribution in study population.

Characteristics	Robust, (n=11)	Pre-frail, (n=52)	Frail, (n=37)	Total, (n=100)	P value
Living arrangement					
With spouse	0 (0.0%)	3 (5.8%)	5 (13.5%)	8 (8.0%)	0.038
With children	11 (100%)	48 (92.3%)	30 (81.1%)	89 (89.0%)	
Alone	0 (0.0%)	0 (0.0%)	2 (5.4%)	2 (2.0%)	
With mother	0 (0.0%)	1 (1.9%)	0 (0.0%)	1 (1.0%)	
Income level					
<12,000	0 (0.0%)	5 (9.6%)	9 (24.3%)	14 (14.0%)	<0.001
12,000-24,000	8 (72.7%)	31 (59.6%)	3 (8.1%)	42 (42.0%)	
24,000-50,000	1 (9.1%)	10 (19.2%)	10 (27.0%)	21 (21.0%)	
>50,000	2 (18.2%)	5 (9.6%)	13 (35.1%)	20 (20.0%)	

Table 7: Multinomial logistic regression for factors associated with pre-frailty and frailty.

Variables	Pre-frail vs. robust	Frail vs. robust
	OR (95% CI)	P value
Age (in years)	0.94 (0.72-1.23)	0.652
Sex (Female)	0.93 (0.25-3.47)	0.910
Diabetes (Yes)	0.77 (0.18-3.24)	0.720
Hypertension (Yes)	0.56 (0.06-4.93)	0.601

Continued.

Variables	Pre-frail vs. robust	Frail vs. robust
	OR (95% CI)	P value
Education (Primary vs. pre-primary)	-	-
Income (>50,000 vs. <12,000)	-	-
Living with children vs. spouse	-	-

DISCUSSION

In this prospective observational study of elderly patients attending a tertiary care teaching hospital in Koppal, a high burden of frailty was observed, with 37% of participants classified as frail and an additional 52% as pre-frail. These findings highlight frailty as a common and clinically relevant condition among elderly individuals seeking healthcare in this region. Similar proportions of frailty and pre-frailty have been reported in hospital-based geriatric studies from other low- and middle-income countries, emphasizing the need for routine frailty screening in clinical practice.^{9,10}

Increasing age emerged as a significant determinant of frailty in both univariate and multivariate analyses. Frail participants were older and more frequently belonged to the ≥ 70 -year age groups, consistent with existing evidence that frailty prevalence increases progressively with advancing age due to cumulative physiological decline and reduced homeostatic reserve.¹¹ The independent association between age and frailty observed in this study reinforces the concept of frailty as an age-related vulnerability syndrome rather than a direct consequence of isolated comorbid conditions.

Gender was not significantly associated with frailty status in the present study. While some community-based studies have reported a higher prevalence of frailty among women, hospital-based studies have shown inconsistent sex-related differences, possibly due to differential healthcare-seeking behavior and referral patterns.¹² The lack of association in this study suggests that frailty affects both sexes substantially in this population.

Among the individual frailty components, weakness assessed by grip strength and reduced physical activity were the most prevalent, particularly among frail participants. These findings align with previous studies demonstrating that sarcopenia and physical inactivity are central features of frailty and often precede other manifestations such as weight loss and exhaustion.¹³ The low prevalence of weight loss observed suggests that functional decline may be a more sensitive early marker of frailty in this population than nutritional parameters alone.

Although diabetes mellitus and hypertension were highly prevalent in the study population, neither showed a significant association with frailty on bivariate analysis. Interestingly, hypertension demonstrated a protective association against frailty in the multivariate model. Similar paradoxical findings have been reported in older populations, where higher blood pressure may reflect

better physiological reserve or survival bias, particularly in the very elderly.¹⁴ This underscores the complexity of interpreting traditional cardiovascular risk factors in frailty research.

Socioeconomic factors showed meaningful associations with frailty. Lower educational attainment was significantly more common among frail participants, supporting evidence that education influences health literacy, lifestyle behaviors, and access to healthcare across the life course.¹⁵

Income demonstrated a U-shaped relationship with frailty, with increased prevalence at both low- and high-income levels. This pattern has been described previously and may reflect financial insecurity at one extreme and lifestyle-related risk factors or survival bias at the other.¹⁶

Living arrangements also differed significantly, with frail individuals more likely to live alone or without children, highlighting the role of social support in maintaining functional independence among older adults.¹⁷

Overall, these findings emphasize that frailty is a multifactorial condition influenced by age, functional status, and socioeconomic determinants rather than comorbidity burden alone. Incorporating frailty assessment into routine geriatric care may facilitate early identification of at-risk individuals and enable targeted interventions aimed at preserving functional capacity and improving quality of life.

CONCLUSION

This study demonstrates a high prevalence of frailty and pre-frailty among elderly patients attending a tertiary care teaching hospital in Koppal. Increasing age emerged as a significant independent risk factor for frailty, while functional impairments such as reduced grip strength and low physical activity were the most common frailty components. Socioeconomic determinants, including lower educational status, income extremes, and living arrangements, were significantly associated with frailty, underscoring the multifactorial nature of this condition. Although comorbidities such as diabetes mellitus and hypertension were highly prevalent, they were not independently associated with frailty status. These findings highlight the importance of incorporating routine frailty assessment into geriatric care to enable early detection and implementation of preventive and rehabilitative strategies aimed at preserving functional independence and improving quality of life among older adults.

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REFERENCES

1. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci.* 2001;56(3):M146-56.
2. World Health Organization. World report on ageing and health. Geneva: World Health Organization. 2015.
3. Biritwum RB, Minicuci N, Yawson AE, Theou O, Mensah G, Naidoo N, et al. Prevalence of frailty and associated factors among older adults in low- and middle-income countries: a systematic review and meta-analysis. *Age Ageing.* 2016;45(6):746-54.
4. Bandeen-Roche K, Seplaki CL, Huang J, Buta B, Kalyani RR, Varadhan R, et al. Frailty in older adults: a nationally representative profile in the United States. *J Gerontol A Biol Sci Med Sci.* 2015;70(11):1427-34.
5. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. *Lancet.* 2013;381(9868):752-62.
6. Shilpa M, Kumar SG, Naik PR, Ashok NC. Prevalence of frailty and its association with socio-demographic factors among elderly in a rural area of Karnataka. *J Family Med Prim Care.* 2020;9(9):4766-71.
7. Hoogendijk EO, Afilalo J, Ensrud KE, Kowal P, Onder G, Fried LP. Frailty: implications for clinical practice and public health. *Lancet.* 2019;394(10206):1365-75.
8. Apóstolo J, Cooke R, Bobrowicz-Campos E, Santana S, Marcucci M, Cano A, et al. Effectiveness of interventions to prevent pre-frailty and frailty progression in older adults: a systematic review. *JBIC Database System Rev Implement Rep.* 2018;16(1):140-232.
9. Collard RM, Boter H, Schoevers RA, Oude Voshaar RC. Prevalence of frailty in community-dwelling older persons: a systematic review. *J Am Geriatr Soc.* 2012;60(8):1487-92.
10. Siriwardhana DD, Hardoon S, Rait G, Weerasinghe MC, Walters KR. Prevalence of frailty and prefrailty among community-dwelling older adults in low-income and middle-income countries: a systematic review and meta-analysis. *BMJ Open.* 2018;8(3):e018195.
11. Mitnitski A, Song X, Rockwood K. The estimation of relative fitness and frailty in community-dwelling older adults using self-report data. *J Gerontol A Biol Sci Med Sci.* 2004;59(6):M627-32.
12. Gordon EH, Peel NM, Samanta M, Theou O, Howlett SE, Hubbard RE. Sex differences in frailty: a systematic review and meta-analysis. *Exp Gerontol.* 2017;89:30-40.
13. Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, et al. Sarcopenia: revised European consensus on definition and diagnosis. *Age Ageing.* 2019;48(1):16-31.
14. Odden MC, Peralta CA, Haan MN, Covinsky KE. Rethinking the association of high blood pressure with mortality in elderly adults: the impact of frailty. *Arch Intern Med.* 2012;172(15):1162-8.
15. Stringhini S, Sabia S, Shipley M, Brunner E, Nabi H, Kivimaki M, et al. Association of socioeconomic position with health behaviors and mortality. *JAMA.* 2010;303(12):1159-66.
16. Kim S, Brooks AK, Groban L. Prevalence of frailty in older adults and its association with socioeconomic status: a systematic review. *BMC Geriatr.* 2018;18(1):1-12.
17. Gale CR, Westbury L, Cooper C. Social isolation and loneliness as risk factors for the progression of frailty: the English Longitudinal Study of Ageing. *Age Ageing.* 2018;47(3):392-7.

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