Frailty and its Determinants among Elderly People of Rural Tamil Nadu - A Cross-Sectional Study

Malai Ammal M[1], Vijayakumar M[2], Vijayalakshmi M[3]

[1]Assistant Professor, Department of Community Medicine, Government Medical College, Omandurar, Chennai, India
[2]Associate Professor, Department of Community Medicine, Government ESI Medical College, Coimbatore, India
[3]Professor and Head, Department of Community Medicine, Government Medical College, Thiruvallur, Tamil Nadu, India

Correspondence: Dr. Malai Ammal M, Email– malaisiva08@gmail.com

Abstract:

Introduction: Frailty is defined as a clinically recognizable state of increased vulnerability resulting from aging associated decline in reserve and function across multiple systems. Unlike chronological aging, frailty is a dynamic and potentially reversible condition if identified early. Understanding its prevalence, risk factors, and consequences is essential for developing targeted interventions that can improve quality of life, reduce healthcare costs, and promote healthy aging. **Objectives:** To assess the prevalence of Frailty among elderly people aged 60 years and above in a rural area of Tamil Nadu. **Methods:** A community based cross sectional study was done in 166 elders using multistage sampling method to assess the prevalence of frailty of rural Tamil Nadu. A semi-structured pretested questionnaire was used and Frailty was measured using Fried's phenotypic criteria. **Results:** The study revealed that the prevalence of Frailty was found to be 33.1%, 54.2% were pre-frail and 12.7% were non-frail. Statistically significant association was found between prevalence of frailty and age, gender, level of education, marital status, living arrangement, economic independence and vision. Female participants were more frail (41.4%) than male participants (16.4%).This study shows 92.9% of the participants who were of age 80 years and above were frail. **Conclusion:** The study shows that frailty is a prevalent condition among the elderly, reflecting the growing vulnerability of this age group to adverse health outcomes. Comprehensive Geriatric Care addressing all domains of ageing must be implemented from primary health care.

Keywords: Elderly, Frailty, Fried's criteria

Introduction:

With the elderly population increasing rapidly, frailty has emerged as a major public health concern. Unlike chronological aging, frailty is potentially reversible if detected early, making its study highly relevant. Understanding its prevalence and determinants is crucial for developing targeted interventions to promote healthy aging, reduce healthcare burden, and improve quality of life.

Methods:

This cross sectional study was conducted among 166 elderly people, of 60 years and above of a village in North Tamil Nadu. Basic sociodemographic details, presence of comorbidities, polypharmacy (consuming more than 4 drugs) were collected. The participants were asked about life description i.e., whether they are feeling happy with their life. Then frailty was assessed followed by assessing vision using Snellen's chart.

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Study Tool:

Frailty was assessed by Fried's phenotypic criteria.[3]

Phenotypic criteria devised by Fried et al:

a) Low grip strength assessed by handheld Dynamometer[6]
   - Weakness was assessed by hand grip strength using Dynamometer.
   - Maximum strength of dominant hand was assessed.
   - Male participants whose hand grip strength <26 kg and female participants with hand grip strength <16 kg were documented as low grip strength.

b) Slow walking speed assessed by 4m walking speed test[7]
   - Walking speed was calculated for each participant using distance in meters and time in seconds.
   - Participants whose gait speed is less than 1m/s (i.e., >4 seconds) were documented as slow walking speed
   - Participants whose gait speed <1m/s i.e., >4 seconds were documented as slow walking speed.

c) Low physical activity by Katz ADL scale[8]

   This measures their ability to perform activities of daily living independently.

   The scale consists of adequacy of performance for six functions without supervision, assistance or direction being given. – bathing, dressing, toileting, transferring, continence and feeding. A score of 1 is given for independence of each function. The score ranges from 0 to 6. Score of 5 and above means no impairment in activities of daily living.

d) Low energy by self- declaration of tiredness and

e) Unintentional weight loss was assessed by self-declaration and nutritional status was measured using Mini Nutritional Assessment scale.[9] Total score for MNA is - maximum 14 points. 12-14 points: Normal nutritional status. 8-11 points: At risk of malnutrition. 0-7 points: Malnourished

Sampling method:

Multistage random sampling was used in which initially districts, then villages and later participants were listed and selected using lottery method. The sample size was calculated based on the prevalence of frailty is 12.2% by Curcio et al[10], with a 95% confidence and an absolute precision of 5%. An excess sampling of 10% was taken to account for non-response. Minimum sample size was calculated as 166.

Data Analysis:

Data were entered in Microsoft Excel 2010 and analysed using Statistical Package for Social Sciences software (Version 16). Descriptive statistics were shown by frequencies and percentages. Data were represented by tables, charts, and figures. Factors were tested for significance (p-value <0.05) at 95% confidence interval. Finally multivariable logistic regression was performed, including all the significant risk factors.

Ethical approval:

The study was approved by Institutional Ethical Committee of Madras Medical College, Chennai. (Cert. No – 30122017). Informed written consent was obtained from the participants before data collection. Confidentiality and privacy of the participants were maintained.

Results:

The data obtained were analysed using SPSS software version 16. Among 166 study participants, 71.1%(118) belonged to age group 60 to 61 years, 20.5% (34) in the age group 70 to 79 years and 8.4% (14) were 80 years and above, with mean age of 66.2 years and standard deviation of 7.3 years. Predominantly, the participants were female. Of the study participants, 111 were females (66.9%) and 55 (33.1%) were males. Most of them are illiterates (64.5%), 31.1% had school education and 4.2% were graduates. Almost 90%

Table 1: Sociodemographic details and their association with prevalence of Frailty (N=166)

Variables	n (%)	P-value
Age Group (years)		
60-69	118 (71.1%)	<0.001
70-79	34 (20.5%)	
≥80	14 (8.4%)	
Gender		
Male	55 (33.1%)	0.001
Female	111 (66.9%)	
Education		
Illiterate	107 (64.5%)	0.001
Primary	19 (11.4%)	
Middle	16 (9.7%)	
High	12 (7.2%)	
Higher Secondary	5 (3%)	
Graduate	7 (4.2%)	
Religion		
Hindu	150 (90.4%)	0.153
Christian	12 (7.2%)	
Muslim	4 (2.4%)	
Marital Status		
Never Married	2 (1.2%)	<0.001
Married	82 (49.4%)	
Widowed	80 (48.2%)	
Divorced/Separated	2 (1.2%)	
Source of Income		
Work/Pension	68 (40.9%)	0.003
Spouse	23 (13.9%)	
OAP	41 (24.7%)	
Children	21 (12.7%)	
Property	8 (4.8%)	
No income	5 (3%)	
Living		
Alone	26 (15.7%)	0.004
With relative	140 (84.3%)	
Co-morbidities		
Has at least one co-morbidity	99 (59.6%)	0.240
No comorbidity	67 (40.4%)	
Vision		
Normal	43 (25.9%)	0.001
Decreased	123 (74.1%)	
Polypharmacy		
Yes	59 (35.5%)	0.594
No	107 (64.5%)	
Nutritional status		
Normal	82 (49.4%)	<0.001
At risk of malnutrition	45 (27.1%)	
Malnourished	39 (23.5%)	
Sleep		
Normal	82 (49.4%)	<0.001
Decreased	84 (50.6%)	
Life description		
Happy	94 (57%)	0.004
Unhappy	72 (43%)	

(90.4%) of the participants were Hindus. Of the study participants, around 49% were staying currently married and 50.6% were widowed/separated/never married. 41% of the participants are either working or receiving pension, around 25% were depending on Old age pension by the Government and 3% had no source of income and are depending on others for their expenses. About 15.7% of participants were living alone.

Among the participants, 59.6% had at least one co-morbidity. Around 74% were having diminished vision and 25.9% had normal visual acuity. Of the participants 35.5% had polypharmacy (consuming more than 4 drugs). In respect to nutritional status, 23.5% and 25.1% were malnourished and at risk of developing malnutrition respectively. The study participants showed decreased sleep in 50.6% of elderly people. The participants when they are asked to about life description i.e whether they are feeling happy with their life, 43% described their life as unhappy. (Table 1)

Among the study participants, 33.1% (55) were frail, 54% (90) were pre-frail and 12.7% (21) were non frail. (Figure 1) Frailty was found to be more prevalent among females in the study. 41.4% of female participants were frail while 16.4% of males were frail. Pre-frailty was more among males (70.9%) than females (45.9%). Around 13% of both males and females were non-frail. (Table 1) Frailty was more prevalent among participants whose age were 80 years and above. Almost 93% of the participants who age was 80 years and above were frail. Above 70 years, all of the participants were

Figure 1: Prevalence of Frailty

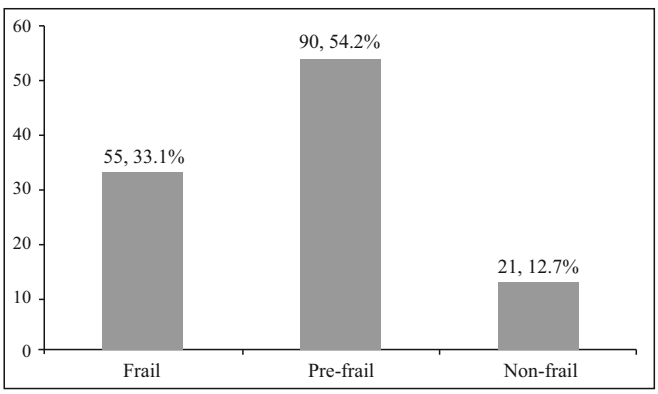

Table 2: Binary Logistic Regression between variables and prevalence of frailty

Variables included	Regression coefficient	P-value	Odds ratio	AOR, 95%CI
Age group	2.175	0.002	6.306	8.802 (2.2 - 35.211)
Gender	1.473	0.039	3.617	4.362 (1.075 - 17.708)
Life description	3.788	0.000	54.643	44.176 (11.83 - 164.959)
Vision	1.916	0.007	5.205	6.796 (1.681 - 27.476)

either frail or pre-frail. In the 60 - 69 years age group, 22% were frail. (Table 1) Statistically significant association was found between prevalence of frailty and age, gender, level of education, marital status, living arrangement, economic independence and vision. (Table 1). Logistic regression was performed to ascertain the adjusted effects of age, gender education, marital status, living arrangement, economic independence, life description, sleep, comorbidities, polypharmacy and vision on Frailty status of the participants.

The model identifies the following four variables as the most significant variables. i.e. age gender, life description and vision status. (Reference group – 80 years and above in age, females in gender, feeling unhappy in life description and low visual acuity in vision)

The adjusted odds of the participants in age group of 80 years and above are 8.802 times more likely to become frail than other age groups. The adjusted odds for female participants to become frail is 4.362 times more than the male participants. The adjusted odds for participants who describe their life as unhappy is 44.176 times more likely to become frail than who describe their life as happy. Participants whose had diminished vision have 6.796 times more odds to become frail than those with normal vision.

Discussion:

The study has been conducted to assess the prevalence of frailty and to identify the associated risk factors for frailty among elderly people of Tamil Nadu.

In the study, 71.1% of the participants were between 60 - 69 years of age. The mean age of the participants was 66.2 years. Almost 67% of the participants were females. Most of the participants (64.5%) were illiterate. Majority were following Hinduism. Around 50% were currently married. In the study of Curcio et al[10] Curcio et al, mean age of the participants was 70.2 years. 52.2% were women and 39% lack formal schooling. In this study, 70.7% were below poverty line. Buttrey et al, in Germany observed that 34.8% of the study participants were between were 65 – 69 years of age. 25.7% were in the low socioeconomic status. 9.7% were currently smoking.[11]

In the current study, prevalence of Frailty among the participants, was found to be 33.1%, 54.2% were pre-frail and 12.7% were non-frail which were consistent with similar study using similar criteria by Kashirkar et al[12] Kashirkaret al among 250 community dwelling adults in Pune, Maharashtra stated that the prevalence of frailty was 26%, Pre-frail was 63.6% and Non-frail was 10.4%. But the prevalence of frailty in the current study was found to be higher than the study done in geriatric department of Madras Medical College, in which the prevalence was 21%.[13] The difference in prevalence might be due to different study setting which was a hospital based study and also the participants with acute illness were excluded in the MMC study.

The prevalence of frailty was observed to be more in women in the present study. 41.4% of female participants were frail and 16.4% of men were frail. In the study by Palamo et al[14], Chile, in which the prevalence of frailty in women 27.1% and in men 19.3% which is in consistent with the present study with increased prevalence among females.

Frailty was observed to be more prevalent in participants who were 80 years and above in the present study. Almost 93% of participants who were 80 years and above were frail but in the study in Germany, by Buttery et al[11], prevalence of Frailty among older adults above 75 years was stated as 44.1% which was almost half of the prevalence of the current study. The high prevalence in the present study might be due to difference in study setting and standard of living. In Germany study, the data had been taken from German Health Interview and Examination Survey (DEGS) for adults and the data of adults above 65 years had been included for the study.[11] But in the current study, the age of the participants included were from 60 years and the number of participants above 80 years were also less.

Being a cross sectional study, the study doesn't establish causal relationships. As the study is from rural settings, the findings might not be generalizable to urban or diverse settings.

Conclusion:

The study highlights that frailty is a prevalent condition among the elderly, reflecting the growing vulnerability of this age group to adverse health outcomes. Early identification and management are essential, as frailty is potentially reversible. These findings emphasize the need for routine screening, community-based interventions, and policies focused on healthy aging to reduce the burden of frailty and improve quality of life in older adults.

Recommendations:

Comprehensive Geriatric Care addressing all domains of ageing must be implemented from primary health care. Targeted interventions to prevent progression from pre-frail to frail and also from frailty leading to disability must be planned and implemented.

Declaration

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Conflict of Interest: Nil

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