

Comprehensive, continuous, and compulsory monitoring of frailty in elderly

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ABSTRACT

Background: The increasing elderly population makes frailty an increasing concern in society with vulnerability to stress and functional decline. Unrecognised comorbidities are common among the elderly due to lack of mention by the patients. Physicians should be equipped with effective interviewing skills along with the use of screening tools to assess any impairments in activities of daily living, cognition and signs of depression. **Objectives:** To measure the degree of independence or dependence using scales and stratify patients based on Clinical Frailty Scale (CFS) so as to recommend it as a routinely usable tool. **Materials and Methods:** In total, 191 elderly subjects above the age of 65 years were recruited for geriatric assessment. Tools that assess performance in daily living activities and cognition were used. The prevalidated CFS was used to score frailty to stratify patients into frail and non-frail groups, and the parameters were compared. **Results:** Mean age of the study population was 69.54 years with 53.4% males and 46.6% females. Mean Katz index and mean Lawton score were >5. The mean Global Deterioration Scale (GDS) score was 1.5, and the mean clinical frailty score was 3.55. Significantly high number of male individuals were found in the frailty group. Hypertension was significantly higher in the frail group. The mean Katz scores were significantly lower, and mean GDS scores were significantly higher in the frailty group. Multivariable logistic regression has shown gender to be an important determinant of frailty with an odds ratio of 0.05 (CI: 0.01-0.20). The higher Lawton score and GDS scores were significantly associated with frailty with an odds ratio of 0.33 (CI: 0.21-0.52) and 2.62 (CI: 1.14-6.02), respectively. **Conclusion:** Men are more frail than women and co-morbidities like hypertension and coronary artery disease contribute to frailty with cognitive decline and decreased autonomy. A comprehensive assessment to identify frailty will provide a holistic view of well being among the elderly.

Keywords: Cognition, comprehensive assessment, dependence, frailty, geriatrics

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Introduction

The geriatric population of India has doubled in the last 40 years from 20 million in 1951 to 77 million in 2001.^[1] There has been a sharp rise in the elderly population from 1991 to 2001,

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and the number of elderly people is projected to rise to about 324 million by the year 2050.^[2] India is now labelled as “an ageing nation” with 7.7% of the population more than 60 years.^[2] The India Ageing Report of 2017 stresses the need to address issues faced by the geriatric population.^[3] Improvements in the healthcare system and increasing awareness have increased life expectancy in India. Despite the geriatric population constituting a major proportion of the Indian population, geriatric health care is neglected and largely ignored. Statistics show two-thirds of the elderly population live in villages with the majority being dependent women in lower socioeconomic strata.^[4] The prevalence of frailty in India was studied using Frailty Indicators and Frailty Phenotypes and ranged between 11% to 58%.^[5] The increasing elderly population makes frailty an increasing concern in society with vulnerability to stress and functional decline. Loss of resilience and tendency towards disability increase the need for dependency to perform essential activities, and risk of hospitalisation leading to morbidity and mortality.^[6,7] Unrecognised comorbidities are common among the elderly due to lack of mention by the patients or not being the primary concern. As a result, patients frequently present in tertiary care centres with more severe stages of frailty with limited benefits in reversing the complications. Undue hospital and emergency admissions not only cause anxiety for the patients and caretakers but also impose unnecessary costs.^[8,9]

Hence, physicians should be equipped with effective interviewing skills along with the use of screening tools to assess any impairments in activities of daily living (ADL), cognition and signs of depression.

Clinical Frailty Scale (CFS) is an effective objective tool that can be used as a first step to detect frailty early with the advantage of scoring and stratifying patients and can be used in routine screening and acute care settings.^[10,11] Studies have proved its reliability and validity in the elderly population.^[12] Recently, it was shown in COVID-19 studies that frailty is an independent predictor for mortality risk and early screening can reduce mortality rates.^[13] This promising tool has not been sufficiently explored in the context of Indian Geriatric Studies. Few studies from India focussed on the use of CFS in acute care settings but not in the general geriatric population where it can provide valuable information for early intervention to improve the quality of life of the elderly. The present study was taken up with the aim of objectively determining the level of fitness versus frailty in the geriatric population above 65 years.

The objectives of the study were to measure the degree of independence or dependence using the Katz Index of Independence in ADL, assess more complex skills using the Lawton Instrumental Activities of Daily Living (IADL) Scale, assess cognitive functions using Global Deterioration Scale (GDS) and categorise them based on CFS. Stratify patients on the spectrum of very fit to terminally ill based on CFS responses to help decide distinctive and appropriate care for elderly people by attending physicians.

Materials and Methods

After obtaining ethics approval from the Institutional Ethics Committee of AIIMS, Bibinagar (AIIMS/BBN/IEC/MAR/2022 / 157) and informed consent from the participants, a cross-sectional, hospital-based study was taken up. A total of 191 elderly subjects, above the age of 65 years, visiting the General Medicine outpatient department for various complaints, were randomly recruited for geriatric assessment. Apparently, healthy elderly people of both sexes with or without co-morbidities were included and those with musculoskeletal disorders limiting mobility and psychiatric disorders were excluded. Tools that assess performance in daily living activities and cognition were used. Then, CFS, a prevalidated scale, was used to score frailty to stratify patients into frail and non-frail groups.

Tools used

1. Activities of Daily Living (ADL)

The Katz Index of Independence in ADL was used to score activities with dependence as ‘0’ and non-dependence as ‘1’. The scores generally range from ‘0’ for a highly dependent person to a maximum score of 6 for an independently performing person. The tool is based on a combination of interview and observation.

2. Instrumental Activities of Daily Living

More complex daily activities were scored in eight domains using the Lawton IADL. Women and men were scored differently based on the general activities performed routinely. Women who scored on all eight areas of function and men who scored after excluding activities like food preparation, housekeeping and laundry were excluded. A score of 8 indicates high function and independent, while ‘0’ depicts low function and dependent.

3. The Global Deterioration Scale (GDS) was used to assess cognitive functions and to particularly identify primary degenerative dementia. It is divided into stages 1–3 labelled as predementia and stages 4–7 as dementia. Stage 5 indicates that an individual can no longer survive without assistance.

4. Clinical Frailty Scale (CFS)

The CFS (Version 2.0) is a nine-point scale incorporated with a visual chart to assist in the classification of frailty. Higher scores of ≥ 5 indicate a greater risk of being frail. No specialist training is needed to use the scale. Noting the casual observation of mobility, balance and routine daily activities provides vast information. Scoring is then matched with the description. Each score describes the level of fitness or frailty. Very fit (score 1) are people who are robust, active, energetic, and motivated. ‘Well’ are individuals (score 2) who are less fit than category 1 and without serious disease or symptoms. ‘Managing well’ (score 3) indicates people with medical problems but under control and are involved only in routine activities like walking. Individuals are ‘Vulnerable’ (score 4) who are not dependent on others for daily support but have symptoms that often limit their activities. Their common complaint is being “slowed-up” and becoming tired during the day. Mildly frail (score 5) are people with evident slowing

of activities who need support in performing higher-order IADLs such as managing finances, transport, heavy household work and taking medications. Typically, it progressively impairs outside activities. Moderately Frail (score 6) people need help with all outside activities and household work. They need help while climbing stairs, bathing and some assistance with dressing. Severely Frail (score 7) people are completely dependent on personal care whether physical or cognitive. Such individuals still maybe stable and not at risk of immediate death. Very Severely Frail (score 8) individuals are completely dependent and probably approaching the end of life. They typically do not recover even from minor illnesses. Terminally Ill (score 9) patients near the end of life stage and have a short life expectancy of less than 6 months.

Cumulative damage over a period of time with complex repair and maintenance networks is the hallmark of aging. The existence of a critical threshold to determine the cumulative decline in functions is an ongoing matter of discussion. There maybe some evidence to show an aggregate critical level of functional decline that makes frailty evident. However, identifying the prefrail stage to at least postpone frailty would be the biggest challenge. Using the above tools together to make a comprehensive judgement of frailty level will help prevent morbidity and mortality in the aging population.

Plan of analysis/statistical tools: SPSS software (version 25) was used to analyse the data. Results were expressed as percentages and proportions. Regression analysis was performed to establish a causal relationship. Correlation statistics were used to correlate any disability with the score obtained.

Results

The mean age of the study population was 69.54 years with 53.4% males and 46.6% females. According to Kuppusamy classification for socioeconomic status, 66.5% of the study population belonged to the upper lower class and only 3.7% belonged to the lower middle class. In total, 53.4% had hypertension, 37.7% had diabetes mellitus, and 12.6% had coronary artery disease. Mean Katz index and mean Lawton score were >5. The mean GDS score was 1.5 and mean clinical frailty score was 3.55 [Table 1].

On dividing the study population into the frailty group and non-frailty group based on clinical frailty score, there is no difference in the age of the two groups. Significantly high number of male individuals were found in the frailty group. The socioeconomic status did not show any difference between the groups. The presence of hypertension was significantly higher in the frail group. There was no difference in the diabetic status in frail and non-frail groups. The mean Katz scores were significantly lower and mean GDS scores were significantly higher in the frailty group. The Lawton scores were decreased in the frailty group, but this was not significant [Table 2]. On performing multivariable logistic regression, gender was found to be an important determinant of frailty with an odds ratio of 0.05

Table 1: General characteristic of the study population

Parameter	N=191
Mean age in years (SD)	69.54 (5.66)
Male <i>n</i> (%)	102 (53.4)
Female <i>n</i> (%)	89 (46.6)
Socioeconomic status <i>n</i> (%)	
Lower	57 (29.8)
Lower middle	7 (3.7)
Upper lower	127 (66.5)
Co-morbidities <i>n</i> (%)	
Diabetes mellitus	72 (37.7)
Hypertension	102 (53.4)
Coronary artery disease	24 (12.6)
Tools of assessment mean (SD)	
Mean Katz index (SD)	5.72 (0.74)
Mean Lawton score (SD)	5.21 (1.72)
Mean GDS score (SD)	1.5 (0.65)
Mean clinical frailty score (SD)	3.55 (1.13)

GDS=Global deterioration scale

Table 2: Comparison of parameters between frailty and non-frailty groups

Parameter	Nonfrailty group N=148	Frailty group N=43	P
Mean age in years (SD)	69.44 (5.74)	69.91 (5.5)	0.949
Male	65 (43.9)	37 (86)	0.000
Female	83 (56.1)	6 (14)	
Socioeconomic status			0.206
Lower	41 (27.7)	16 (37.2)	
Lower middle	7 (4.7)	-	
Upper lower	100 (67.6)	27 (62.8)	
Diabetes mellitus	58 (39.2)	14 (32.6)	0.478
Hypertension	71 (48)	31 (72.1)	0.006
Coronary artery disease	17 (11.5)	7 (16.3)	
Mean Katz index (SD)	5.86 (0.40)	5.26 (1.29)	0.000
Mean Lawton score (SD)	5.66 (1.56)	3.70 (1.35)	0.071
Mean GDS score (SD)	1.41 (0.58)	1.84 (0.78)	0.068
Mean Clinical frailty score (SD)	3.09 (0.79)	5.16 (0.43)	0.000

GDS=Global deterioration scale

(CI: 0.01–0.20). The higher Lawton score and GDS scores were significantly associated with frailty with an odds ratio of 0.33 (CI: 0.21–0.52) and 2.62 (CI: 1.14–6.02), respectively [Table 3].

Discussion

There was almost equal distribution of male and female population in the study group, and most of them belonged to lower socioeconomic groups. Since the data were taken from individuals visiting the government hospital with free treatment, most of the study population belonged to the lower socioeconomic class. The ageing population is at greater risk of developing hypertension and diabetes mellitus, which are well-known risk factors for cardiovascular disease.^[14] In our study, 53.4% had hypertension, 37.7% had diabetes mellitus, and 12.6% had coronary artery disease. In a retrospective study in Korean population, the presence of hypertension alone or the presence

Table 3: Multivariable logistic regression for prediction of frailty among study population

Parameter	Odds ratio (95% CI)	P
Age	-	0.296
Gender	0.05 (0.01–0.20)	0.000
Socioeconomic status		
Lower	-	0.569
Lower middle	-	0.288
Upper lower	-	0.999
Diabetes mellitus	-	0.213
Hypertension	-	0.059
Coronary artery disease	-	0.807
Katz index	-	0.058
Lawton score	0.33 (0.21–0.52)	0.000
GDS score	2.62 (1.14–6.02)	0.023

GDS=Global deterioration scale

of hypertension along with diabetes in the older age group has been found to have greater cardiovascular events.^[15] However, in the case of mortality compared to hypertension alone, the presence of diabetes alone increases all-cause mortality by 62%, as observed in an Iranian study.^[14] Diabetes increases the risk of cardiovascular disease, and cardiovascular problems are closely correlated with age. The role of inflammation and oxidative stress appears to be the mechanisms underlying ageing, diabetes, cardiovascular disease, and other complications.^[16]

The study population was stratified into the frailty group and non-frailty group depending on the clinical frailty scores. In our study, in the frailty group, 86% were males and only 14% were females. Unlike our study, frailty prevalence was 5.4% in males, 8.8% in females in a study done by Zhang *et al.* Males being widowed/divorced/separated, low daily total calorie intake, physical inactivity, sleeping >9 h, smoking and hospitalization history contributed significantly to frailty. Obesity, physical inactivity, less than six hours of sleep, family history of diabetes and heart disease and hospitalisation history were all factors that contributed towards the occurrence of frailty in women.^[17] Observations have been made that while women are frailer, their life expectancy is more as compared to males as they are more resilient. This higher life expectancy might be responsible for increased frailty prevalence among women.^[18-20] These differences between the sexes extend the 'male-female health-survival paradox'.^[21] The difference in the observation may be due to regional variation. Persons with primary or secondary education had higher overall frailty and frailty component scores compared to persons with tertiary education.^[22] Frailty was more common in the low socioeconomic group.^[23] Adverse socioeconomic circumstances with low education and wealth are increasingly found to be associated with an increased prevalence of physical frailty.^[24]

In our study, the mean Katz scores [5.26 (1.29)] were significantly lower than the non-frail group. Katz Index of Independence in ADL is a key tool for assessing an elderly person's ability to take care of themselves. A person with a score of 6 is completely

functional, i.e. independent, while the person with a score of 0 would need full-time assistance. Though the scores were not too low to call them dependent, they had significantly lower values compared to the non-frail group. Similar results have been observed in other studies.^[25,26] Self-awareness of one's health is a key factor that determines longevity and may play a role in preventing cognitive decline, particularly in older people.^[27,28] Changing environments such as admissions in hospitals can subject the elderly to social and emotional stress with a feeling of helplessness.^[29] The decreased Lawton scores in the frailty group also suggest lack of autonomy in the frailty group. Since the study subjects were those visiting the hospital, they are in a state of partial not complete dependence, which may not be the case otherwise.

The higher mean GDS scores in our study were also suggesting that the frail group of patients had pre-dementia. The GDS assesses the severity of primary degenerative dementia and delineates stages of cognitive decline. It has already been established that cognition is a component of frailty and that it is linked to poor health outcomes. In Canada, Langlois *et al.* reported variations in executive functions and processing speed between frail and non-frail groups, with frail people doing the worst.^[30] All cognitive areas were found to be negatively linked with the probability of frailty in Han *et al.* study of 10338 old people from South Korean communities.^[31] There is a significant direct association between frailty and cognitive performance.^[32] Often physical frailty is associated with cognitive frailty and further worsens frailty, in general, as shown in a Chinese study.^[33]

The higher Lawton score and GDS scores are significantly associated with Frailty with an odds ratio of 0.33 (CI: 0.21–0.52) and 2.62 (CI: 1.14–6.02), respectively. The Lawton score assesses the autonomy for more complex activities and, hence, it is obviously expected to be positively correlated with frailty as it assesses tasks such as using a telephone, doing laundry, and handling finances.^[34,35] As observed by earlier studies, a higher cognitive decline is positively associated with higher frailty; our study is in line with the earlier observations.^[36-38]

The CFS can be used to identify patients who are vulnerable to negative outcomes. In addition to conducting appropriate preventive and therapeutic steps to lessen the likelihood of unfavorable outcomes, medical professionals could recognize the dangers of frailty and the high-risk categories as early as possible.

Conclusion

Men are more frail than women in our study. Co-morbidities especially hypertension and coronary artery disease contributed further to frailty. Low socioeconomic status also played a role in frailty and decreased autonomy. A positive association with cognitive decline was observed in the frail group. Hence, all these factors are directly as well as indirectly contribute to frailty in the elderly. Clinical frailty score when used in combination with other valuable tools makes it a comprehensive assessment and when

used routinely can provide vast information to differentiate frailty from normal aging. The use of this comprehensive assessment will provide a holistic view of well being among the elderly.

A comprehensive, continuous, and compulsory Geriatric Assessment with constant consultations between the elderly and the primary care physicians can help identify frailty to put forth a customized care plan to improve outcomes for the at-risk patient population. Participants from the community must be encouraged to take part in such evaluations, which will facilitate a process of cooperative inquiry and ownership of findings to act upon and effect change.

Limitations

Assessment of frailty at the community level would help in better stratification of frail and non-frail when compared to a hospital-based study.

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Conflicts of interest

There are no conflicts of interest.

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