



Original Article

Impact of Frailty on Geriatric Patients with Fractures and its Association with Functional Activities

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ABSTRACT

Background: Fragility fractures are breaks in the continuity of bones that result from minor traumas caused by mechanical forces that would not usually result in fractures. Geriatric fractures represent a major source of dysfunction and declining health-related quality of life in the elderly following a limb fracture, most of the interventions are centered on restricting mobility dysfunction and improving independence with activities of daily living. **Objective:** To find the impact of frailty on the geriatric population presenting in the hospital with fractures and how this frailty is associated with their functional status. **Methods:** An observational cross-sectional study was performed on a sample of 97 geriatric population using non-probability convenient sampling in six months. Permission from the ethics committee of Rashid Latif College of Physical Therapy was obtained to carry out the study. The data was collected from Jinnah Hospital, Arif Memorial Teaching Hospital and National Hospital, Lahore. The inclusion criteria were participants with age 65 years or older, admitted to the hospital and presented with fragility fracture. Participants with a history of high-velocity crush injury, complicated surgical conditions and any malignancy were excluded from the study. Participants were assessed based on the frail questionnaire for frailty and the Groningen frailty index for their functional activities status. The quantitative variables were presented as mean and standard deviation while qualitative variables were evaluated as proportions, frequencies, cross-tabulations, pie charts, etc. The test results for multiple choice questions were compared using a chi-square test. **Results:** The mean age of the participants was 73.63±6.91, among which 53(54.6%) were males and 44(45.4%) were females. The prevalence of fragility fractures in frail participants was 79.4% and pre-frail participants were 20.6%. About 64.9% of frail participants and 2.1% pre-frail were having impaired functional activities while 56.7% of participants were having fitness between 0-6 out of 10 and 22.7% were having fitness from 7-10 ($p=0.047$). **Conclusion:** Frailty index has a significant impact on fractures and is associated with the functional status of participants. Most patients were not able to perform their activities of daily living and those who can perform were having limited functional activities.

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INTRODUCTION

Geriatrics is a specialty that emphasizes on health care of elderly people. In old age, the human body becomes physiologically different from a fully developed body and various body systems and organs become to decline. Geriatric fractures represent a primary foundation of disability and declining health-related quality of life in the elderly. Age, sex, associated conditions, functional abilities before fracture, and fracture type have an impact on the outcome associated with movement, activities of daily living (ADLs) and health-related quality of life.¹ Growing old is related to a deterioration in body reserves, which impedes the body's potential to resist and get over most important and minor challenges, for instance, a pelvic fracture. This condition is defined as frailty (the state of being weak and delicate).² The word fragility means "quality of being easily broken or damaged" and fracture is "any break in the continuity of the bone". These are fractures that result from low-degree trauma, that are the result of impulsive forces that might not typically result in fracture.

Diminished bone density is a prime risk factor for fragility fractures. Recovery can be slow and rehabilitation is often incomplete.^{3,4} The diminished muscle function which is generally referred to as sarcopenia that happens with aging represents a weakened state of health with increased risk of movement disorders, high risk of falls and fractures, reduced ability to carry out everyday activities, disabilities, dependence on others and increased threat of death.⁵ In old females, estrogen deficiency leading to bone loss, is a lifetime threat of pelvic fracture.⁶ Old age fractures may occur in almost any part of the human skeleton, but the most common locations are the hip bone, the origin points of the humerus and the femur. Decreased absorption of vitamin D-related metabolism, is also a factor that

contributes to a diagnosis of osteoporosis and fragility fractures.⁷ Geriatric fractures cause major dysfunction, notable morbidity, diminished health-related quality of life, and functional restrictions. Pelvic fractures are also thought to be a manifestation of continuing decline in geriatric patients with complex clinical conditions and dysfunctions.⁸ Numerous threatening elements act simultaneously through several mechanisms. In patients presenting with several threatening factors fracture threat is higher than in patients presenting with a single threat factor.⁹ Risk factors of old age fractures are increasing age, decreased body mass index (<20 kg/m²), family history of fragility fracture, corticosteroid intake, people with Cushing's syndrome, having alcohol three or more times per day, smokers and ethnicity. Other reasons for atypical bone, falls and disorders increasing the risk of falls. Curative goals for age-associated bone loss include uncertain bone loss, improvement of bone mineral disease and reduction in fragility fractures.¹⁰ Research endorses that pelvic fractures have an intense effect on health-related quality of life, mainly for the mobility, movement and health care attributes in both males and females and additional pain for women.^{11,12}

The incidence of frailty increases with age. In the geriatric population, the prevalence of frailty has been described as $>25\%$ for people with age 85 years.¹³ Taxonomy of frailty is recognized by the presence of 3 or more of the following constituents of the hypothesized cycle of frailty: shrinking, fragility, unsatisfactory endurance and power, sluggishness and declined physical activity level. The minimum quintile of physical activity was pinned down for each gender.¹⁴ There is a proposal to support a link between physical activities and various dietary elements, particularly protein and some multi-dietary supplements, on muscle and skeletal health in geriatrics.¹⁵ To the best of the

researcher's knowledge, there is not enough data available on the impact of frailty on fractures. There is limited literature available regarding the pre-fracture frailty index causing fractures and its association with functional activities in Pakistan. Previous literature does not explain the association of frailty level with functional status and incidence of fragility fractures. The purpose of this study was to find the impact of frailty on the geriatric population presenting in the hospital with fractures and how this frailty is associated with their functional status.

METHODS

An observational cross-sectional study was conducted over six months duration at the emergency and orthopedic departments of different hospitals in Lahore including Jinnah Hospital, Arif Memorial Teaching Hospital and National Hospital. Permission from the ethics committee of Rashid Latif College of Physical Therapy was obtained to carry out the study. The cultural and religious considerations were duly taken at the time of collection of data. This study was performed on a sample of 97 geriatric population of age 65 and older, using non-probability convenient sampling. The sample was calculated using the formula:

$$f = \frac{Z_{\alpha/2} \sqrt{2p(1-p)} + Z_{\beta} \sqrt{p_1(1-p_1) + p_2(1-p_2)}}{(n - n_0)^2}$$

Participants were included if they were 65 or older, admitted to the hospital, and presented with a fragility fracture. Participants with a history of high-velocity crush injury, complicated surgical conditions and any malignancy were excluded from the study. Data was collected by direct personal interview method and medical records. Participants were selected according to inclusion and exclusion criteria. The procedure was explained to the patient and

consent was taken by the patient. The Groningen frailty index (GFI) and frail questionnaires were filled out by each participant for their functional activities and frailty. The GFI is a 15-item proforma and screens for the loss of function in four domains of functioning: physical, social, cognitive and psychological. The sum of the score ranges from 0 to 15, with a score of ≥ 4 representing frailty. The frail scale comprised 5 items: exhaust or fatigue, ambulation, resistance, ailment, and reduction of weight. This scale scores range from 0 to 5 [with frail having a score of 3–5, pre-frail having a score of 1–2, and robust having 0] health status. The data was analyzed by IBM SPSS STATISTICS 25. The quantitative variables were presented as mean and standard deviation while qualitative variables were evaluated as proportions (%), frequencies, cross-tabulations and pie charts. The test result for multiple choice questions was compared using a chi-square test. An alpha level of 0.05 was chosen for significance.

RESULTS

Out of 97 subjects included in the study, the mean age of the subjects was 73.63 ± 6.91 years. The minimum age range was 65 years and the maximum age range was 95 years as shown in Figure 1. About 53 were males and 44 were females. The greatest number of fractures occurred in the thigh (29.9%) and pelvis (21.6%) followed by the leg (13.4%) and trunk (8.2%) presented in Figure 2. Almost 53.6% of patients presented with fractures occurred indoors and 46.4% occurred outdoors while 97 participants filled out the frail questionnaire, 81(24.8%) participants were easily fatigued, 69(21.2%) were unable to walk up one flight of stairs, 65(19.9%) had problems in ambulation and can not even walk one block, 36(11%) participants have more than 5 illnesses and 75(23%) participants had lost more than 5% of weight in past six months. Statistics showed

that among 97 participants, 20(20.6%) were pre-frail and 77(79.45) were frail as shown in Table 1. From the findings of our data collected on patients who suffered from fragility fractures, it was clear that there is a significant association between mobility limitations and frailty index.

Among 20(20.6%) pre-frail participants, 6(6.2%) were not able to do grocery shopping without assistance, 3(3.1%) were not able to walk outside the house without assistance, 3(3.1%) were unable to get dressed or undressed without assistance and 5(5.2%) were unable to visit toilets without assistance. Among 77(79.4%) frail participants, 48(49.5%) were unable to do grocery shopping without assistance, 39(40.2%) were not able to walk outside the house without assistance, 26(26.8%) were unable to get dressed or undressed without assistance and 26(26.8%) were unable to visit toilets without assistance. So the report findings showed that out of 97 participants, 54 were unable to do grocery shopping without assistance, 42 were unable to walk outside the house without assistance, 29 were unable to get dressed or undressed without assistance and 31 were unable to visit the toilet without assistance. So the results show that most fragility fractured patients have limited mobility. Hence there is a significant association between the frailty index and mobility. From Table 2 among 20 (20.6%) pre-frail participants, 10 (10.3%) participants were having physical fitness from 0-6 out of 10 and 10 (10.3%) were having fitness between 7-10 that whereas 77 (79.4%) frail participants, 55 (56.7%) participants were having fitness between 0-6 out of 10 and 22 (22.7%) were having fitness between 7-10. According to the research findings, 97 fragility fractures patients were asked to fill out the GFI questionnaire, 32 participants were having limited functional activities whereas 65 participants were having impaired functional activities. Among 20 pre-frail

participants, two were having impaired functional activities and 18 were having limited functional activities whereas among 77 frail participants, 14 were having limited functional activities and 63 were having impaired functional activities. So there is a significant association between functional status and frailty as shown in Table 3. About 71.1% were having complaints with memory, 43.3% were using 4 or more different types of medications, 58.8% reduced weight in the past 6 months, 55.7% facing problems in daily life due to defective hearing, 61.9% facing problems due to defective vision, 84(86.6%) experience emptiness around them, 51(52.6%) miss presence of other people around, 52(53.6%) felt left alone, 62(63.9%) felt depressed or down lately and 60(61.9%) felt nervous or anxious lately. So the results show that most fragility fractured patients have limited mobility. There is a significant association between the frailty index and psychological aspects. The prevalence of fragility fractures in frail participants was 79.4% and pre-frail participants were 20.6%. The 64.9% frail participants and 2.1% pre-frail were having impaired functional activities. 56.7% of participants were having fitness between 0-6 out of 10 and 22.7% were having fitness from 7-10 ($p=0.047$).

DISCUSSION

The study was conducted at 97 geriatric participants who had fractures, from different hospitals of Lahore. The association between

Table 1: Frailty Index

	Frequency	Percent
Prefrail	20	20.6
Frail	77	79.4
Total	97	100.0

Figure 1: Mean Age of Participants

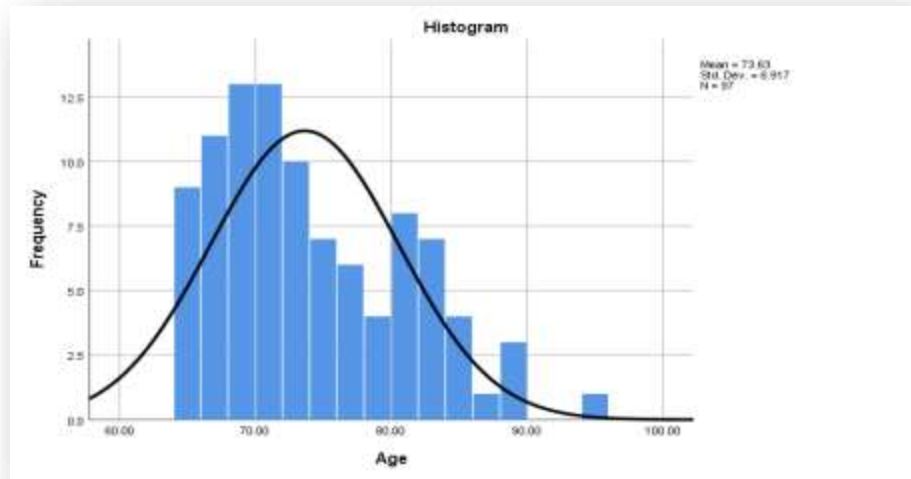


Figure 2: Statistics Showing Body Part Involved

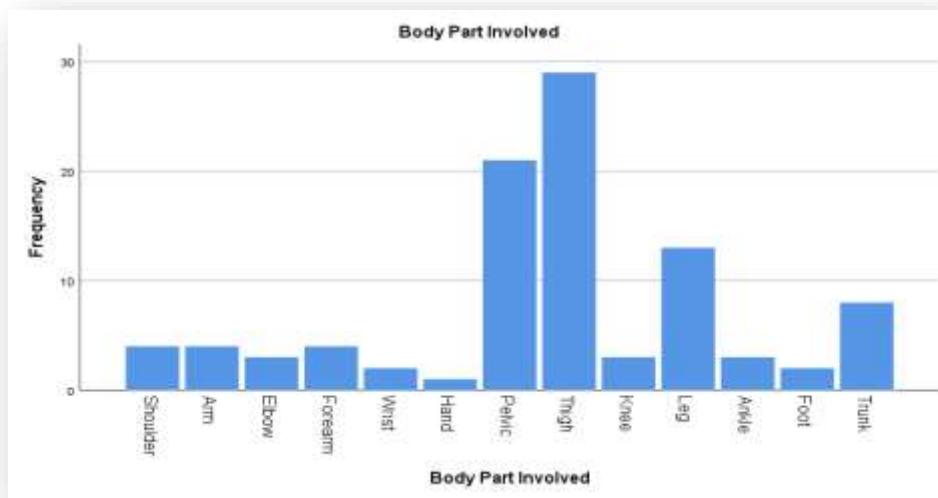


Table 2: Association Between Frailty and Physical Fitness

	Physical Fitness (Scale 1 – 10)			
	Between 0-6	Between 7-10	Total	
Frailty	Pre frail	10 (10.3%)	10 (10.3%)	20 (20.6%)
	Frail	55 (56.7%)	22 (22.7%)	77 (79.4%)
	Total	65 (67.0%)	32 (33.0%)	97 (100%)

Table 3: Association Between Functional Status and Frailty

	Functional Status			Total
		Limited Functional Activities	Impaired Functional Activities	
Frailty Index	Pre frail	18 (18.6%)	2 (2.1%)	20 (20.6%)
	Frail	14 (14.4%)	63 (64.9%)	77 (79.4%)
	Total	32 (33.0%)	65 (67.0%)	97 (100%)

the frailty index and their functional status were assessed. The incidence of geriatric fractures was increased by the increase in the frailty index. Measures of socioeconomic status, health status, cognition, mobility, nutrition, vision, hearing, psychological impact, comorbidities, depressive symptoms, and disability status showed that frailty increases the risk of adverse consequences and problems including fractures. The mean age of the subject was 73.63 ± 6.91 . About 53(54.6%) participants were males and 44(45.4%) were female which means fragility fractures were more common in males as compared to females. About 53.6% of patients presented with fractures occurred indoors and 46.4% occurred outdoors. The relationship between place of occurrence and gender association showed that females are more prone to indoor fractures as compared to men who are more prone to outdoor fractures. Geriatric fractures were more common in the thigh at 29.9% and pelvic at 21.6% followed by the leg at 13.4% and trunk at 8.2%.

A study held in 2017 by N.K. Baidwan, around 5 million emergency department admissions were of fracture-related injuries. There was a drop-in drift of female fractures over the years, the drift was observed to be increasing in males. Homes were the most frequently occurring place, followed by public areas where the fractures occurred.¹⁶ According to the research findings from 97

fracture participants who filled out the frail questionnaire, 20(20.6%) were pre-frail and 77(79.4%) were frail. In a survey taken place in Italy in 2009, 239 patients aged 65 and above underwent a comprehensive geriatric assessment. Results showed that 72 participants were robust, 89 participants were pre-frail and 78 participants were frail. A negative drift of health-related quality of life with frailty status was found for almost all domains of life except for social relationships and interactions and financial conditions.¹⁷

Another study to describe the natural history of frailty in 5086 old participants held in 2017 showed 8% of the participant were frail, 46% of participants were pre-frail, and 46% of participants were robust at baseline. Between baseline and follow-up, 35% died, 56% remained the same regarding frailty status, and 15% of participants improved.¹⁸ This report shows that most fragility-fractured patients have limited mobility. There is a significant association between the frailty index and mobility and psychological aspects. Of 97 fragility fractures patients 32(33%) participants were having limited functional activities whereas 65(67%) participants were having impaired functional activities. Frailty has been linked with an increased threat of fractures in the geriatric population. According to a study held in 2018, about 2113 geriatric men and women participated in the study with no fractures at baseline. Frailty was

assessed at baseline. At follow-up, they identified 233 participants with new cases of fracture, with an age- and gender-specific incidence rate of 22/1000 person-years. Compared with the non-frail, frail and pre-frail individuals carried a significant 59% and 21% higher risk of fractures, respectively.¹⁹ Hence, the prevalence of frailty was 79.4% and pre-frailty was 20.6% among 97 geriatric patients with fragility fractures. 64.9% frail participants and 2.1% pre-frail were having impaired functional activities. The present study confirms the fact that the prevalence of geriatric fractures and decreased functional status among geriatric patients is associated with their frailty index. Due to limited resources sample size of only 97 was taken. The sample was confined to Lahore due to financial constraints. It was a long process to take permission from hospitals in Lahore within defined time limit. Future researchers are advised to take larger sample and obtain data from different hospitals. Add more cites and expand the target population to apply generalizability of results. Data can be collected from multiple departments of different hospitals.

CONCLUSION

This study shows the impact of frailty on fractures among geriatric patients and its association with their functional status, in hospitals of Lahore. During the conduction of the study, various patients from various hospital settings were assessed for geriatric fractures. Although a good number of patients were suspected of having the impact of frailty on their functional status, this frailty increases the risk of complications and further fractures in the future. Most patients were not able to perform their ADLs and those who can perform were having limited functional activities. The frailty index has a significant impact on geriatric fractures and is associated with the functional status of participants.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

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