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## Association between Clinical Frailty Scale and Risk of Hip Fractures among Geriatric Population

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## **Abstract**

### **Background**

The study aims to identify the association between frailty and risk of hip fracture among the geriatric population admitted in the orthopaedic wards of tertiary care hospitals for the procedure of hip arthroplasty to determine if the cause of hip fracture is underlying frailty as estimated using a Clinical Frailty Scale.

### **Methods**

A cross-sectional study was conducted in the orthopedic ward of a tertiary care hospital, involving a total of 345 geriatric individuals who were admitted due to a hip fracture. The study examined various factors related to hip fractures in individuals aged 65 years and above, encompassing both males and females.

### **Results**

The association between clinical frailty scale and hip fracture were determined, and the findings revealed that 34.78% of the participants who had suffered from hip fracture had a clinical frailty score of 7 which is severely frail, whereas 29.85% had a clinical frailty score of 6 (moderately frail), 21.7% were at 5 (mildly frail), 3.76% were at a score of 4 (vulnerable), 2.89% were at a score of 3 (managing well), 2.31 at a score of 2 (well) and 1.73% who suffered from hip fracture were not frail at all and found at a score of 1 (very well).

### **Conclusion**

A higher frailty score is associated with a higher risk of hip fracture among the older adult population.

### **Keywords**

*Geriatrics, Hip fracture, Frailty, Orthopedics.*

## Introduction

The risk of hip fracture has recently become a serious public health concern worldwide<sup>1</sup>. According to the study, it has been estimated that by the middle of this century, more than 6 million people will suffer from hip fractures, most of whom will be elderly<sup>2</sup>. Hip fractures can lead to a significant impact on mobility as they can cause severe disability, compromised independence and even leads to mortality<sup>3</sup>. Literature has provided evidence that 22% to 30% of the mortality rate is associated with one year of hip fracture, and 50% among those who survived suffer from loss of functional independence<sup>4-5</sup>. With the rapidly increasing elderly population globally, the burden of hip fracture poses a severe challenge to healthcare setups<sup>6</sup>. Multiple risk factors are associated with hip fracture, and according to available evidence, increasing age, female gender, alcohol intake, cigarette smoking, sedentary lifestyle, hypertension, overweight/obesity, and diabetes, along with various other factors, are the leading underlining cause of hip fracture<sup>7-8</sup>.

Besides that, another important factor that links with the increasing risk of hip fracture is frailty<sup>9</sup>. Studies have shown that frail individuals have a higher rate of adverse outcomes. For this reason, National Institute of Aging Conference on Frailty recommended that the geriatric population be assessed for frailty to facilitate patient care based on individual needs<sup>9-10</sup>. The Clinical Frailty Scale (CFS) is a tool commonly used by healthcare providers to assess the levels of frailty among older adults. The scale extends from points 1 to 9, where one denotes very fit, and 9 represents terminally ill<sup>11</sup>. The scale is used in the health care setups to determine the frail state of older adults so that postoperative health care plans can be modified according to individual needs. CFS is designed to consider various factors like physical function, cognitive function and comorbidities. Besides that, it is regarded as a quick and most accessible tool that can be used by health care providers in the fastest possible way to assess the frailty scale of an individual<sup>12</sup>.

Studies have also provided evidence that CFS has a validity of  $r=0.89$ , hence considered a valid and reliable tool to assess frailty among elderly individuals<sup>13</sup>. According to the study, a positive link has been found between frail and CFS  $r=0.761$  and a CFS and Edmonton among the

population of 65-95 years<sup>13</sup>. It is therefore, this study is aimed to identify the association between frailty and risk of hip fracture among the geriatric population who are admitted to the orthopedic wards of the tertiary care hospital of Karachi for the procedure of hip arthroplasty to determine if the cause of hip fracture is underlying frailty as estimated using a CFS or any other. Moreover, the study has also aimed to identify an association between CFS and hip fracture so that the data can be used to bring awareness among the health care providers and geriatric population families to evaluate CFS and to strategize preventive roles against possible hip fractures.

## **Methodology**

A total number of n=345 geriatric individuals who suffered from a hip fracture and were admitted to the orthopedics ward of tertiary care hospitals were enrolled in this study. All participants were initially informed regarding this purpose, and after obtaining written consent, their demographic description as per the self-designed proforma was taken. The data regarding demographic description includes patient age, gender, history of smoking/tobacco consumption, weight and height. Afterwards, the patient's frailty before fracture was assessed based on CFS. The assessment was performed in the presence of trained healthcare providers attending to the patients in the hospital and in any cases where the patient reported frailty greater than mild to moderate levels to avoid discrepancies regarding the scoring of frailty. The patient's family attendant confirmed the same. In case of differences between the responses provided by the patient and family attendant or where it was found difficult as to which scale of frailty the patient lies, higher scores were marked. The study design was cross-sectional, and for patients who suffered from hip fractures and were in the age group of  $\geq 65$  years, both male and female populations were included. All those patients who suffered from any other fracture than hip fractures and had any mental and psychological conditions that made them difficult to identify their frailty score, such as Alzheimer, Dementia etc. were excluded.

## ***Statistical Analysis***

The entire data was analyzed using SPSS version 22. Descriptive analysis was performed based on frequency and percentage, whereas the association between the variables were determined

using a chi-square and Pearson correlation at 95% of Confidence Interval (CI). The significance level was fixed at  $p \leq 0.05$ .

### ***Ethical Consideration***

The study observed all the guidelines provided in the Belmont report for human subjects<sup>14</sup>. Confidentiality of data was maintained and obtained during the conduct of the study. Moreover, before enrolling participants in the study, the entire purpose of the study was informed and signed written consent was taken. Besides that, all the participants were given complete autonomy to refuse to accept a part in the survey, and in case any of the queries participants had were answered comprehensively by the authors and the option was left at the disposal of the subject to accept or reject the proposal of becoming a participant in the study.

### **Results**

A total of  $n=345$  subjects were included in the study, of which 63.18% were female and 36.81% were male. The mean age of participants was  $73.56 \pm 2.18$  years. Further segregation of the data revealed that the average age of male participants was  $76.18 \pm 3.51$  years whereas women had a mean age of  $71.78 \pm 2.52$  years (Table-1).

**Table-1 Demographic description of participants**

<b>Variables</b>	<b>Number of participants</b>	<b>Age</b>
<b>Male</b>	218	$76.18 \pm 3.51$
<b>Female</b>	127	$71.78 \pm 2.52$

*Mean  $\pm$  S.D.*

In addition to that, information like participants' height and weight to determine body mass index along with the presence of comorbidities like diabetes, hypertension and history of smoking were also taken, and the information revealed that of all the participants,  $n=285$  were

both diabetic and hypertensive, whereas n=18 were hypertensive and n=42 were diabetic. Moreover, n=154 were overweight, of which 58.34% were female and 41.66% were male. Of the remaining 125, participants have average weight and n=66 were obese (Table-2).

<b>Table-2 General description of participants</b>	
<b>Variables</b>	<b>Frequency (%)</b>
<i>Body Mass Index</i>	
<b>Normal</b>	125 (36.23%)
<b>Overweight</b>	154 (44.63%)
<b>Obese</b>	66 (19.13%)
<i>Comorbidities</i>	
<b>HTN and DM</b>	285 (82.60%)
<b>HTN</b>	18 (5.21%)
<b>DM</b>	42 (12.17%)
<i>History of Smoking</i>	
<b>Positive</b>	165 (47.82%)
<b>Negative</b>	180 (52.17%)

*HTN: Hypertension*  
*DM: Diabetes*

Association between clinical frailty scale and hip fracture were determined, and the findings revealed that 34.78% of the participants who had suffered from hip fracture had a clinical frailty score of 7, which is severely frail, whereas 29.85% had a clinical frailty score of 6 (moderately frail), 21.7% were at 5 (mildly frail), 3.76% were at a score of 4 (vulnerable), 2.89% were at a

score of 3 (managing well), 2.31 at a score of 2 (well) and 1.73% who suffered from hip fracture were not frail at all and found a score of 1 (very well) (Table-3).

<b>Table-3 Association between frailty score and risk of hip fracture</b>			
<b>Variables</b>	<b>CFS</b>	<b>Number</b>	<b>Level of significance</b>
<b>Severely Frail</b>	7	120 (34.78%)	<0.001
<b>Moderate</b>	6	103 (29.85%)	<0.001
<b>Mild</b>	5	75 (21.7%)	<0.001
<b>Vulnerable</b>	4	13 (3.76%)	0.02
<b>Managing Well</b>	3	10 (2.89%)	0.04
<b>Well</b>	2	8 (2.31%)	0.09
<b>Very well</b>	1	6 (1.73%)	0.9

## **Discussion**

The findings of our study revealed that a high clinical frailty score is associated with a higher risk of hip fracture, and the association between the CFS and the risk of hip fracture was found to be significant ( $p < 0.005$ ). The findings of this study were according to Chan et al. 2019 in which the authors aimed to identify the predictive value of the clinical frailty scale on discharge destination and complications in older hip fracture patients. It was found that increased frailty score and length of hospital stay were significantly associated with  $p < 0.001$  along with discharge destination and hospital complications<sup>15</sup>. Similarly, in another study that was performed to determine the association between frailty and clinical outcomes and quality of life in older adults followed by hip surgery, it was found that a higher frailty score was associated with adverse post-operative effects, mortality and low-quality of life one-year postoperative hip arthroplasty<sup>16</sup>.

Another study conducted to determine frailty status before hip fracture, the authors found no association between pre-fracture frailty and post-fracture activity of daily living limitations. However, they suggested that older individuals with higher levels of frailty had an increased risk of post-operative mortality. Hence, preventive measures as per appropriate clinical interventions must be needed for an identified group of vulnerable populations<sup>17</sup>. In a study that was conducted to determine an association between clinical frailty scale and hospital readmission, the authors found that clinically frail individuals were at higher risk for hospital admission and readmission in comparison to non-frail individuals ( $p=0.001$ ) and concluded that assessing frailty score can be an excellent predictor to determine fall risk and discharge disposition among the population of aged 50 and above<sup>18</sup>. A study that was conducted to determine the association between hospital frailty risk score (HFRS) with healthcare costs and hospital readmission, it was found that higher HFRS charge higher hospitalization costs of around SGD\$22,432 followed by intermediate and low HFRS scores SGD\$18,759 and SGD\$15,671 whereas same study suggested no association between HFRS and hospital readmission<sup>19</sup>.

## Conclusion

The study has concluded that CFS is an easy and quick tool to determine the frail state of an older individual and, therefore, can be used to identify the risk of fracture as a higher frailty score, as per the findings of our study, is associated with a higher risk of hip fracture and by assessing the condition of frailty in older adults appropriate plan of care can be designed to prevent the risk of fracture.

## Authors Contribution

**Majid A:** Conception, design and data acquisition.

**Khan MU:** Drafting and data acquisition.

**Ghafoor A:** Critical revision and data analysis.

**Khan A:** Critical revision.



## Declaration of Interest

None.

## Funding Sources

None.

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