Research Paper

Investigating the Prevalence of Depression in Older People With Hip Fractures

Ali Yeganeh[1], MahMonir Haghighi[2], Siamak Kazemi[3, 4*], Hamed Amani[4], Bushra Zareie[3]

1. Department of Orthopaedic Surgery, Trauma and Injury Research Center, School of Medicine, Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran.
2. Department of Psychiatry, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran.
3. Department of Orthopedics, Bone and Joint Reconstruction Research Center, School of Medicine, Iran University of Medical Sciences, Tehran, Iran.
4. Department of Orthopedics, Imam Khomeini Hospital, Urmia University of Medical Sciences, Urmia, Iran.

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ABSTRACT

Background: A common complication during the healing of hip fractures is depression. It is recognized as a leading cause of disability in such patients. Older adults may face an increased risk of falls and fractures due to the effects of antidepressants or sedative medications. Patients with depression exhibit poorer recovery outcomes following fractures.

Objectives: This study examines the prevalence of depression in elderly patients with trochanteric or peri-hip fractures.

Methods: This cross-sectional study included all patients aged 65 years and older with trochanteric or peri-hip fractures who were admitted and treated in the orthopedic ward of Imam Khomeini Hospital, Urmia, Iran, in 2021. A demographic questionnaire was used to collect data, including age, gender, duration of depression diagnosis, place of residence, and history of psychiatric medication use. In the study title, we used the term "hip fractures" to broadly refer to various fractures in this area, including subtrochanteric and femoral head fractures. However, our analysis specifically focused on femoral neck and intertrochanteric fractures, as these are more prevalent in the elderly population we examined.

Results: A total of 325 patients were included, with a mean age of 74.9±8.9 years; 172(52.9%) were male, and 153(47.1%) were female. Among the patients, 49.5% had femoral neck fractures, 43.4% had intertrochanteric fractures, and 7.1% had both types of fractures. Depression was diagnosed in 24 patients before the fracture, with an average duration of diagnosis of 7.2±4.6 years. The mean depression score at the time of fracture was 4.27±2.98, with 14 patients reporting a depression score of zero. Three months after the fracture, the mean depression score remained 4.27±2.98, with 11 patients reporting a depression score of zero. A paired samples t-test revealed no significant difference between depression levels at the time of the fracture and three months after the fracture (P=0.208). No significant differences in depression levels were observed between men (P=0.936) and women (P=0.077) three months after the fracture, though depression levels were slightly higher in women. Additionally, no significant differences

*** Corresponding Author:**
Siamak Kazemi, Assistant Professor.
Address: *Department of Orthopedics, Bone and Joint Reconstruction Research Center, School of Medicine, Iran University of Medical Sciences, Tehran, Iran.*
E-mail: *Dr.s.kazemisufi@gmail.com*

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in depression levels were found between the time of fracture and three months later in age groups 65–75 years and over 85 years (P>0.05). However, in the 75–85 years age group, a significant difference in depression levels was observed (P=0.022). Depression scores were 3.9, 4.6, and 5.2 for the 65–75 years, 75–85 years, and over 85 years age groups, respectively, indicating an increase in depression levels with age. No significant differences in depression levels were identified based on the duration of depression diagnosis, place of residence, income, or educational level (P>0.05).

Conclusion: While depression levels did not significantly change three months after the fracture in most subgroups, the findings suggest that older age is associated with higher depression levels following hip fractures. These results underscore the importance of considering age-related psychological factors in the management of older patients with hip fractures.

Introduction

The most frequent psychiatric disorder is depression all over the world and a leading cause of disability [1]. The prevalence of depression is 13.7% in the Iranian population [2]. Depression significantly impacts quality of life and imposes a substantial economic burden [3, 4].

Hip fracture is a serious medical condition that disrupts general health [5] and is among the most common physical damages in older people [6]. Surgical repair of hip fractures is one of the most frequently performed orthopedic procedures, particularly in older adults compared to younger populations. This injury predominantly affects patients over 60 years of age, who often have multiple comorbidities [7]. Globally, 120 million individuals suffer from hip fractures [8], and approximately 25000 older adults experience hip fractures in the United States every year [9].

Old age, osteoarthritis, malnutrition, muscle weakness, visual impairment, and osteoporosis are the primary risk factors for hip fractures. However, osteoporosis is the most critical factor [9]. In addition to osteoporosis, several other medical conditions, such as hypertension, diabetes mellitus, and cerebrovascular diseases, contribute to prolonged recovery and increased mortality rates [10]. The incidence of hip fractures is estimated to be approximately 1.5 million cases annually and is projected to rise to around 2.6 million cases per year by 2025 [11]. Furthermore, mortality associated with hip fractures is significant, with post-fracture mortality increasing 4.6-fold in men and 2.8-fold in women within one year of the fracture [12]. Given the increasing global aging population, hip fractures are expected to become a major public health concern among older people.

Accidental falls among older adults typically occur at home, resulting in hip fractures with or without pre-existing comorbidities. This condition marks the beginning of a series of healthcare challenges, involving numerous healthcare professionals (such as surgeons, physicians, and physiotherapists), family members, social workers, and caregivers. Today, hip fractures have emerged as a significant global healthcare issue, presenting unique challenges and substantial economic implications for patients, their families, and healthcare budgets [13]. The financial burden of managing such patients is remarkably high. According to a 2013 national report, the average cost per patient was estimated at 64000 pound in the United Kingdom and 8 billion USD in the United States, directly correlating with variables such as hospital stay duration, surgical timing, and the availability of specialized orthopedic-geriatric units [14]. Numerous studies on hip fractures have focused not only on the socioeconomic aspects of patient management but also on the high mortality rates associated with this condition [15].

Experiencing a hip fracture can be a sudden and life-altering event, significantly increasing patient vulnerability over time. Hip fractures pose a significant threat to all aspects of functional status, particularly in older people. Loss of independence, physical limitations, pain, and fatigue are major complications of hip fractures, making recovery particularly challenging for older adults [16]. Additionally, hip fractures are associated with high mortality rates [17]. The acute mortality rate is approximately 5%, while one-year post-fracture mortality ranges between 15% and 25%. It is estimated that 20% of patients with hip fractures never regain their ability to walk independently [8], and fewer than 30% return to their previous activity levels [5]. Early post-fracture mortality remains high, with rates of 8%-10% within the first 30 days and approximately 20%-28% within the first year. However, only one-third of these deaths are directly attributed to the fracture itself [17-20].

Cognitive impairment is another factor contributing to reduced functional recovery during the healing process [21]. Depression is the most prevalent mood and cognitive disorder among older adults and is recognized as one of the primary complications following hip fractures in this population [22]. Depression is frequently observed during hip fracture recovery and is considered a leading cause of disability in affected patients. A key clinical aspect of depression in hip fracture patients is the interplay between emotional status and functional recovery. Several studies have confirmed the negative impact of depression on functional outcomes and mortality [22, 23]. In patients with hip fracture, depression is associated with an increased risk of infection, reduced survival rates, and poorer prognosis [5]. Additionally, 15% of older individuals report clinical symptoms of depression. Depression is linked to increased disability, poor physical performance, falls, and low bone density, all of which elevate the risk of osteoporotic fractures. Older adults taking antidepressants or sedatives may also be at higher risk of falls and fractures. Moreover, patients with depression exhibit poorer recovery following fractures [24].

As no previous studies have examined this issue in Iran, the present study aims to investigate the prevalence of depression in elderly patients with trochanteric or hip fractures.

Methods

This cross-sectional study was conducted through a complete enumeration of patients over the age of 65 with trochanteric or hip fractures region who were admitted and treated in the Orthopedic Department of Imam Khomeini Hospital in 2021 (Urmia, Iran). In the study title, we used the term hip fractures region to broadly refer to various fractures in this area, including subtrochanteric and femoral head fractures. However, our analysis specifically focused on femoral neck and intertrochanteric fractures, as these are more prevalent in the elderly population we examined. A questionnaire was used to collect demographic data, including age, gender, disease duration, place of residence, and history of psychiatric medication use. After explaining the study objectives and obtaining informed consent, each patient was given the geriatric depression scale (GDS) to assess depressive symptoms. Patients were followed up three months post-fracture, during which they completed the GDS again. Changes in depression scores between the acute phase (during the fracture) and three months after the fracture were analyzed. Data collection tools included a demographic questionnaire and the GDS [25].

Data analysis

Data were analyzed using SPSS software, version 16. Quantitative variables were presented as Mean±SD, while categorical variables were reported as percentages. The paired t-test was used to compare depression scores at the time of fracture and three months post-fracture to assess changes over time.

Results

The Mean±SD age of patients with trochanteric or periprosthetic hip fractures over 65 years old at Imam Khomeini Hospital is 74.9±8.9 years. The mean depression score (at the time of fracture) for these patients was 4.27±2.98. The paired samples t-test reveals no significant difference in depression levels between the onset of the fracture and three months later (P>0.05) (Table 1). There is also no significant difference in depression levels based on gender (P>0.05). Women show a greater increase in depression three months after the fracture compared to men, but this is not statistically significant. For age groups, there is no significant difference in depression levels between patients aged 65 to 75 and those over 85 years old (P>0.05). However, a significant difference is noted for the 75 to 85 age group (P<0.05). At the onset, depression levels were 3.9, 4.6, and 5.2 for the respective age groups, indicating higher depression with increasing age. The paired samples t-test reveals no significant difference in depression levels based on place of residence (P>0.05). Depression levels at the onset for undiagnosed, under 5 years, 5 to 10 years, and 10 to 20 years were 4, 6.8, 7.6, and 9.5, respectively, suggesting higher depression with longer diagnosis duration. There is also no significant difference in depression levels based on income (P>0.05) (Table 2). At the onset, depression levels for low, average, good, and excellent income were 4.6, 4, 4.4, and 3.2, respectively, indicating lower depression in higher income patients. Lastly, the paired samples t-test reveals no significant difference in depression levels based on education (P>0.05). The analysis of the distribution of gender indicates that 50.9% of patients with femoral neck fractures, 52.5% of patients with intertrochanteric fractures, and 69.6% of patients with both femoral neck and intertrochanteric fractures are male (Table 3).

Table 1. Comparing depression levels in older patients with trochanteric fractures at the onset of fracture and three months after fracture

Variable	Mean±SD		P*
	At the Beginning of the Fracture	Three Months After the Fracture	
Severity of depression	4.27±2.98	4.38±2.96	0.637

*T-test.

Discussion

Aging is widely recognized as a significant risk factor for fractures. Research has demonstrated a clear correlation between advancing age and the incidence of hip fractures. As the population ages, both the frequency of hip fractures and the associated treatment costs are increasing. In the study by Cheng et al. [9], significant statistical differences were observed in the incidence of hip fractures among different age groups. However, as the population ages, the loss of bone and muscle mass increases the risk of falls, which can lead to fractures [26].

Table 2. Comparing depression levels in older patients with trochanteric fractures based on demographic variables and time of disease diagnosis at the onset of fracture and three months after the fracture

Variables		Total	No. (%)		P*
			At the Beginning of the fracture	Three Months After the Fracture	
All samples			4.27(2.9)	4.38(2.9)	0.208
Sex	Male	172	4.34(2.9)	4.34(3.1)	0.963
	Female	153	4.19(2.9)	4.43(2.8)	0.077
Age (y)	65-75	203	3.9(2.7)	4.0(2.9)	0.419
	75-85	81	4.6(3.1)	4.9(2.8)	0.022
	≥85	41	5.2(3.6)	4.9(3.3)	0.234
Residence	City	134	4.3(2.8)	4.4(2.8)	0.369
	Village	191	4.2(3.1)	4.3(3)	0.374
Education	Illiterate	136	4.5(3.1)	4.5(3)	0.718
	Primary	151	4.2(3)	4.4(3.1)	0.18
	Diploma	30	4.4(2.2)	4.4(1.7)	0.807
	University (or higher education)	8	2.6(1.4)	2.6(1.6)	0.954
Duration of disease diagnosis	Diagnosis not given	301	4(2.8)	4.1(2.8)	0.129
	Diagnosis under 5 years	10	6.8(2.6)	6.6(2.5)	0.78
	Diagnosis from 5 to 10 years	10	7.6(2.2)	7.5(2.2)	0.84
	Diagnosis from 10 to 20 years	4	9.5(3)	8.7(3)	0.319
Income level	Low income	157	4.6(2.9)	4.7(3)	0.349
	Middle income	141	4(2.9)	4.1(2.8)	0.416
	Upper middle income	21	4.4(3.3)	4.4(3.1)	0.906
	High income	6	2.3(1.5)	2.8(1.3)	0.296

* T-test.

Table 3. Frequency distribution of gender in patients based on types of trochanteric fractures

Variables		Total	No. (%)		
			Femoral Neck	Intertrochanteric	Intertrochanteric & Femoral Neck
All samples		325(100)	161(49.5)	141(43.4)	23(7.1)
Sex	Male	175(52.9)	82 (50.9)	74(52.5)	16(69.6)
	Female	225	79(49.1)	67(47.5)	7(30.4)

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Aging also plays an important role in the occurrence of depression. Studies indicate that both the prevalence and incidence of major depression approximately double between the ages of 70 and 85 [27]. Given that age is a recognized risk factor for both hip fractures and depression, it is plausible that advancing age may contribute to an increased risk of developing depression after experiencing a hip fracture.

In our study, no significant difference was observed in depression rates at the onset of fracture and three months post-fracture among age groups 65–75 and over 85 years ($P>0.05$). However, in the 75–85 age group, a significant difference was found between depression rates at the time of fracture and three months post-fracture ($P=0.022$). The depression rates in the 65–75, 75–85, and over 85 age groups were 3.9%, 4.6%, and 5.2%, respectively, indicating that depression rates increased with age.

The prevalence of depression is affected by its baseline occurrence within the population and the duration of symptoms. Research shows that depressive symptoms tend to rise during the final years of life [28]. In older age groups, the prevalence of depressive disorders in both men and women has been reported to surpass 85%. Prior research has emphasized the importance of accurately diagnosing depression in the elderly [29]. Additionally, findings suggest that one in ten adults experiences severe depressive symptoms, with a higher percentage of older adults being affected [29]. Meta-analyses of prospective studies on depression risk factors in elderly populations have identified four major risk factors: Sleep disorders, disability, previous depression, and female gender [30]. Therefore, a substantial portion of depression among older people may be attributed to these risk factors [24]. Given that these risk factors are common in older individuals, their modification could have a significant impact on public health [31].

In our study, depression was diagnosed in 24 patients before the fracture. The mean duration of diagnosed depression was 7.2±4.6 years. The mean depression score at the onset of fracture was 4.27±2.98. Studies have shown that female gender and event severity are associated with depression [32]. Furthermore, elevated depressive symptoms have been demonstrated to affect functional independence in the early stages of hip fracture care [33]. Postoperative depression diagnosis in hip fracture patients influences their functional outcomes and survival [34].

Hip fracture is a significant and disabling condition in older adults, particularly women. Epidemiological data vary across countries, but globally, hip fractures are estimated to affect 18% of women and 6% of men. A fundamental reason is that functional outcomes reported among survivors differ between genders, with men often exhibiting equivalent or even better functional outcomes than women, despite experiencing higher postoperative complications [35].

In the present study, no significant difference in depression rates three months post-fracture was found between men ($P=0.936$) and women ($P=0.077$). However, depression rates increased more in women than in men three months post-fracture, although the difference was not statistically significant. In the study by Shyu et al. [36], the authors found that female patients with lower pre-fracture daily living activity levels were at a higher risk of developing depression.

Among the various factors influencing the epidemiology of hip fractures, gender appears to be the most significant. According to epidemiological data on depression in older people, depression affects women twice as often as men [27]. Several studies have investigated mechanisms linking pain and depression, suggesting that pain can restructure neural pathways to trigger negative depressive symptoms [37-39]. Voshaar et al. identified postoperative pain and baseline anxiety as the strongest independent risk factors for depression [40]. Bruggemann et al.

demonstrated that post-injury beliefs and hopelessness influence depression and anxiety levels in patients with hip fractures during the acute injury phase [41]. Long-term risk factors such as loss of ambulation ability and reduced self-care capacity may contribute to the progression of depression.

Studies have also found significant differences in depression prevalence between homebound and semi-homebound elderly individuals [42]. Psychological changes during recovery are also important [43]. Extended sleep duration, reduced activity levels, and severe impacts on daily activities all contribute to feelings of helplessness. Consequently, every stage of psychological and physical change post-surgery can affect the development of depression.

Our study found no significant difference in depression rates at the onset of fracture and three months post-fracture based on patients' educational levels. At the time of fracture, depression rates among illiterate, primary school, high school, and university-educated patients were 4.5%, 4.2%, 4.4%, and 2.6%, respectively. In the study by Liu et al. [44], researchers distinguished groups of postoperative depressive symptom trajectories. They found that the likelihood of illiteracy was lower among those in the low-risk group compared to those in the high-risk group (P=0.02). Emotional support from family, friends, and the community plays a crucial role in an individual's psychological well-being, particularly for those with a compromised health-related quality of life [45].

In the present study, no significant difference in depression rates at the onset of fracture and three months post-fracture was observed based on patients' place of residence or income levels. At the time of fracture, depression rates in patients with poor, moderate, good, and excellent income levels were 4.6%, 4%, 4.4%, and 2.3%, respectively. The findings suggest that depressive symptoms were less severe in patients with higher income levels compared to those with lower income levels. Research has indicated that low socioeconomic status, rural residency, being single, and housing conditions contribute to depressive disorders. However, no direct empirical data have demonstrated a link between post-hip fracture depression and these factors [46].

In the present study, no significant difference in depression rates at the onset of fracture and three months post-fracture was observed based on the duration of depression diagnosis (P>0.05). At the onset of fracture, depression rates in undiagnosed patients, those diagnosed for less than 5 years, those diagnosed for 5–10 years, and those diagnosed for 10–20 years were 4%, 6.8%, 7.6%, and 9.5%, respectively, indicating that longer depression duration was associated with higher depression rates.

Regarding medication management, concerns arise as antidepressants may increase fracture risk and reduce physical function. Agarwal et al. [47] compared physical function in women who were current users versus non-users of antidepressants and found that grip strength in non-users was 13.3% lower than in current users (P=0.04). Wu et al. [48] demonstrated that depression and antidepressant use were independently associated with an increased risk of fractures. Consequently, antidepressant treatment may elevate the risk of secondary fractures in patients experiencing post-hip fracture depression.

Selective serotonin reuptake inhibitors (SSRIs) have been linked to reduced bone mineral density and increased osteoporosis-related fracture risk. Tricyclic antidepressants may elevate fracture risk through mechanisms independent of bone density effects. However, data on the effects of other antidepressants on bone remain insufficient [49]. Elderly patients, who are particularly vulnerable to osteoporosis, may be better suited for non-SSRI antidepressants. Therefore, determining the necessity and appropriate choice of antidepressant therapy for post-hip fracture depression remains unclear. At a minimum, patients with post-hip fracture depression should undergo bone mineral density testing before initiating antidepressant treatment.

Conclusion

The results of this study indicate that the level of depression three months post-fracture was higher in women compared to men, though this difference was not statistically significant. Furthermore, a significant difference was observed in depression levels between the acute phase of the fracture and three months post-fracture in the age group between 75 and 85 years (P=0.022). Specifically, as the age of the patients increased, the severity of depression also increased. Understanding the impact of post-hip fracture depression on patients can assist healthcare providers in developing more comprehensive treatment strategies. Given the high prevalence of depressive disorders in patients with physical illnesses, clinicians need to be familiar with the symptoms, complications, and treatments of depression, as well as the effects of various medications in inducing or exacerbating depressive symptoms. This goal can be achieved through collaborative efforts between different healthcare professionals, including consultations with psychiatrists. Psychiatric counseling should be arranged during hospitalization to facilitate diagnosis, recommend psychosocial interventions, and manage medications. Patients who exhibit high-risk factors should receive appropriate interventions before surgery, rather than after the onset of post-operative depression symptoms, at which point it may be too late. Timely intervention can prevent increased treatment costs and ensure the effectiveness of therapeutic outcomes.

Ethical Considerations

Compliance with ethical guidelines

The study was conducted following the ethical principles outlined in the Helsinki Declaration and was approved by the Ethics Committee of Urmia University of Medical Sciences, Urmia, Iran (Code: IR.UMSU.REC.1400.074). Written informed consent was obtained from all patients before their participation.

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Authors' contributions

Conceptualization and supervision: Siamak Kazemi; Methodology and literature search strategy: MahMonir Haghighi and Hamed Amani; Investigation and data collection: Ali Yeganeh, Bushra Zareie, and Hamed Amani; Writing the original draft: Ali Yeganeh and Bushra Zareie; Review and editing: Siamak Kazemi and MahMonir Haghighi; Visualization: Bushra Zareie.

Conflict of interest

The authors declared no conflict of interest.

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