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A comparative study of depression in elderly men and women following major fractures

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***Abstract*---**Background: Depression accounts for approximately 8.2% of people living with disability worldwide. Depression and fractures are a common occurrence especially elderly who are predisposed to fractures due to low bone mineral density. Clinical Depression is linked to high cortisol levels and low mineral density. As most studies correlating fractures in the elderly and its association with depression have been done in the western countries, we felt the need to pursue a study to compare fractures in elderly men and women and its association with depression in the Indian population. Methods: This was a prospective study done over two years with continuous sampling method. The study included 90 inpatients (51males and 39females) with fractures of long bone and hip needing prolonged rehabilitation. Patients above 65 years of age admitted with fractures of long bones and hip were examined using Beck's depression inventory. The data was tabulated and compared between males and females. Results: We found 58.96% of females suffered from some form of depression as opposed to 39.21% of males. We found statistically significant association between depression and female suffering from major fractures. Conclusion: Our findings suggesting women with fracture of the long bones are at a higher risk for

developing depression are consistent with previous studies. Providing timely mental support, evaluation and intervention may be useful for early recovery from depression and associated fractures.

***Keywords*---**depression, fracture, elderly.

Introduction

The elderly are at a higher risk for a decrease in bone density and falls which could lead to a fracture. Depression and fracture is a common occurrence, particularly in women, and are concurrent with high levels of disability, functional impairment and early mortality[1]. Depression accounts for approximately 8.2% (5.9–10.8%) of people living with a disability worldwide[2]. Previous studies have concluded that the incidence of femoral neck fractures in the elderly is 10%, hip fractures occur predominantly in the elderly with 52% beyond the age of 80 years and 90% over the age of 50 years[3,4]. Depression usually follows a medical event and adversely affects patient's prognosis and treatment outcomes by interfering with patient's adherence to treatment regime and diminishing the patient's quality of life. Depression has also been found to predispose an individual to various chronic diseases like osteoporosis, stroke, diabetes, and dementia [5].

Depression could lower bone mineral density and spiked plasma cortisol levels have been linked with clinical depression [6,7]. With advancing age, there is an increase in the ratio between cortisol and DHEAS (anti-glucocorticoid dehydroepiandrosteronesulphate) which can contribute to a reduction in physical function. Higher levels of cortisol in the elderly predispose to frailty with a reduction in grip strength, standing and walking performance [8,9]. As most studies correlating fractures in the elderly and its association with depression have been done in the western countries, we felt the need to pursue a study to compare fractures in elderly men and women and its association with depression in the Indian population.

Materials and Methods

This was a prospective study done over a period of two years using a continuous sampling method. After obtaining informed consent, 90 patients (51 males and 39 females) admitted as in-patients with fractures of long bones and hip, needing prolonged rehabilitation were included in the study. Their mood states were examined using Beck's Depression inventory. The data was tabulated according to the inference from Beck's Depression inventory based on the patient's gender and was further subjected to SPSS (Statistical Package for Social Sciences) version 21.0 to perform the statistical analysis.

Inclusion criteria

- Adults aged more than 65 years who sustained fractures of long bones and hip, and admitted as in patient and requiring prolonged rehabilitation.
- Patients with no history of previous mental illness/depression.

Exclusion criteria

- Patients with severe medical comorbidities.
- Patients with history of mental illness or depression.

Results

In the study 90 patients (51 males and 39 females) admitted as in-patients with fractures of long bones and hip, needing prolonged rehabilitation were included and we found that 30.76% females suffered with moderate depression and 2.56% with severe depression as opposed to only 13.72% moderate depression and no severe depression in men. 27.45% of men felt absolutely normal with no signs of depression after a fracture, 33.33% had borderline depression and 25.49% had mild depression. Contrastingly, only, 5.12% women felt normal after a fracture. Hence, based on the above data it could be said that elderly males could suffer from normal to mild depression in comparison to elderly females who had more moderate to severe depression. The above findings correlate with previous studies which showed that men suffered with mild depression and women had moderate to severe depression following fracture [10].

Table 1

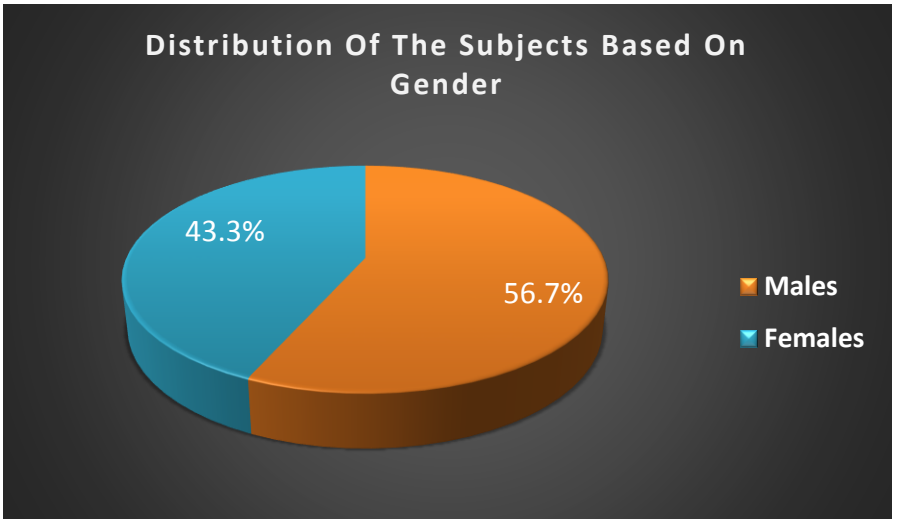
	Inference	Gender	Frequency	Percent
Depression	Normal	Females	02	05.12%
		Males	14	27.45%
	Borderline	Females	14	35.89%
		Males	17	33.33%
	Mild	Females	10	25.64%
		Males	13	25.49%
	Moderate	Females	12	30.76%
		Males	07	13.72%
	Severe	Females	01	02.56%
		Males	00	00
	Total		90	100.00

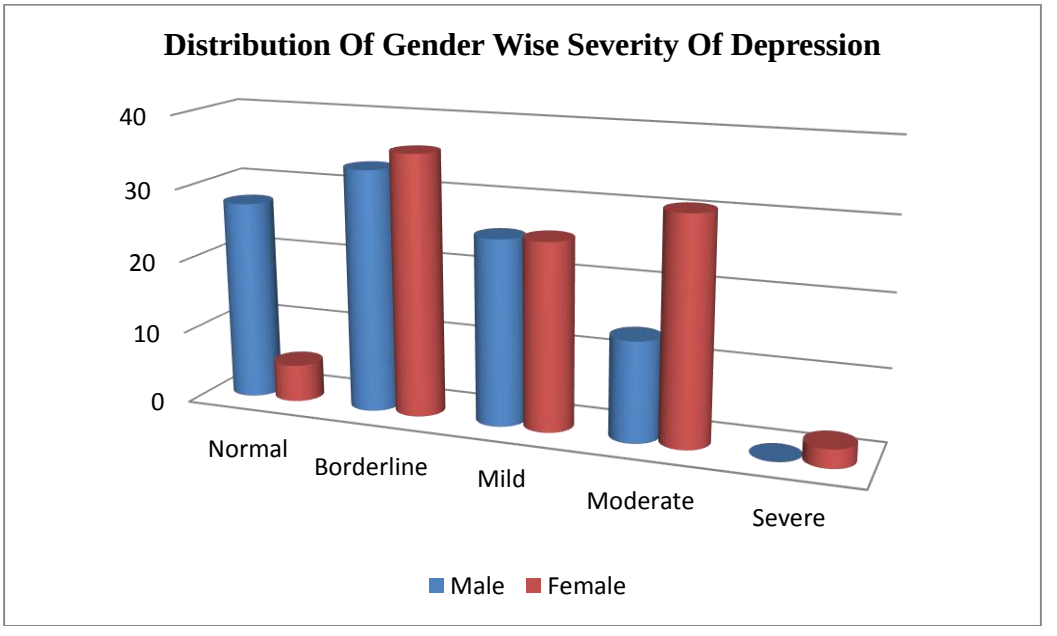
Table 1 shows the gender wise distribution of severity of depression (Normal, Borderline, Mild, Moderate, Severe) based on Beck's depression inventory.

Table 2

Inference	Frequency	Percent
Borderline	31	34.4
Mild	23	25.6
Moderate	19	21.1
Normal	16	17.8
Severe	1	1.1
Total	90	100.0

Table 2 shows the total number of patients categorised in to normal, borderline, mild, moderate, severe based on beck's depression inventory





Discussion

Our findings suggesting women with fracture of the long bones are at a higher risk for developing depression are consistent with previous studies [11, 12]. Several authors have also concluded that depression is common and can negatively impact the patient's recovery [13, 14, 15]. Another study also concluded that older women ≥65 years exhibited increased depression compared to younger women following fracture [1]. A systematic review evaluated the prevalence of psychiatric

illness in hip fracture patients and suggested that the prevalence of depression following fracture ranged from 9% to 47% [16]. Also, the prevalence of depressive symptoms in postmenopausal women with osteoporosis was reported to be greater for women with prevalent vertebral fractures compared with those without [17]. It was concluded that depressive symptoms post fracture and patient's state of mind before injury plays an important role in predicting recovery in the elderly, and a failure to regain pre fracture function will increase the likelihood of depressive symptom [18,19]. Elderly women with osteoporosis often regarded fracture to be a part of 'getting older', emphasising the fact that fracture can increase the likelihood of depression for some older women [20].

It is now known that decreased bone mineral density in patients with depression may predispose to fracture. Hip bone mineral density was assessed to plummet by approximately 0.35% in patients with depression every year. Previous studies have found that depression results in a marked decrease in bone mineral density and subsequent occurrence of osteoporosis [21]. This relation between depression and its effect on bone metabolism has to be studied in depth to ascertain the pathophysiology behind it. Although, it's safe to say that depression activates hormones of bone metabolism contributing to a decrease in bone mineral density. Patients with depression have been found to show an elevation in serum cortisol levels, and this high level of cortisol in turn leads to a major depressive disorder in an individual. Apart from high levels of cortisol, patients with depression exhibit an altered diurnal rhythm and feedback regulation by glucocorticoid as a result of hyperactivity of the hypothalamic pituitary adrenal axis. This excessive glucocorticoid activity may lead to osteoporosis by induction of apotosis of osteocytes which in turn stimulates osteoclastic activity. Further, the inflammatory cytokines tumor necrosis factor-a, interleukin 1b, interleukin-6, and interleukin-8 have been found to be elevated in patients with depression and a resultant loss of bone mineral density[22,23,24]. This close association between depression and low bone mineral density calls for an updated regime of calcium supplementation to better manage patients with depression. Measures should be taken to train primary care physicians to be capable of managing a depressed individual and to lower their risk of fracture. The role of psychiatrists should be stressed upon in managing depression before and after a fracture. The benefits of calcium and vitamin D supplementation in these elderly individuals confined indoors after a fracture must be accentuated. Educating the patients the benefits of counselling, forming a support group, occupational therapy and exploring various coping mechanisms was found to improve depressed patients with hip fractures[25]. The need for the families of depressed patients to show empathy and support must also be highlighted which can very well promote the well-being of the patient.

Majority of the patients in our study belonged to a lower socioeconomic status and therefore the effect of socioeconomic status on depression can be considered as a confounding factor. We didn't consider history of psychiatric illness in the patient's family which is a major limitation of our study. We also could not study depressive symptoms in individual fractures, which need to be assessed and evaluated in further studies. A smaller sample size is also a disadvantage of this study because it is difficult for us to generalise the findings of the study to the population at large. Another shortcoming of the study was, not considering other

medical comorbidities that may coexist with fractures which also could be a cause of depression in the patient.

Conclusion

Our study showed that elderly females are more likely to experience subsequent depression than the males following major fractures. Providing timely mental support, evaluation and intervention may be useful for early recovery from depression and associated fractures. We need more studies in the future with a larger sample size which can assess depressive symptoms in individual fractures to accurately judge the correlation of fracture and its result in depression, thereby formulating protocols for psychological intervention.

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