Association of Sociodemographic Factors and Vitamin-D Levels with the Severity of Depressive Symptoms

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ABSTRACT

Objective: To study the association of sociodemographic factors and Vitamin D levels with the severity of depressive symptoms in patients with depression.

Study Design: Cross-sectional study.

Place and Duration of Study: Psychiatry Department, Fauji Foundation Hospital, Rawalpindi Pakistan, from May to Nov 2021.

Methodology: This study included all the patients diagnosed with depression per ICD 10 criteria by the consultant psychiatrist. Depression was further categorized in severity using Beck's Depression Inventory. Vitamin D levels were sent to all the patients diagnosed with depression in the laboratory of our hospital. The cut-off score of less than 50nmol/l was taken as low vitamin levels.

Results: Out of 103 patients studied, 23(22.3%) had mild, 49(47.6%) had moderate, and 31(30.1%) had severe depression. In severely depressed patients, 19(61.3%) were above 50 years of age, 12(38.7%) had no formal education, and 21(67.7%) had low vitamin D levels. Among mildly depressed patients, 5(21.7%) were above 50 years of age, 2(8.7%) had no formal education, and 17(73.9) had low vitamin D levels. We found that vitamin D levels, age of the patient, and level of education had a statistically significant relationship with the severity of depression, (*p*-valve less than 0.05).

Conclusions: The level of vitamin D, age, and the level of education had a significant association in the target population with the severity of depressive symptoms.

Keywords: Depression, ICD-10 criteria, Sociodemographic factors, Vitamin D.

INTRODUCTION

Mental disorders play a significant role in increasing the worldwide burden of diseases.[1] Depression is the commonest mental disorder worldwide; approximately 280 million people worldwide suffer from it (WHO 2021). Pakistan, amongst the other developing countries, has a higher prevalence rate of depression ranging between 22%-60%.[2]

Vitamin D deficiency is an important public health issue worldwide in all age groups.[3] Vitamin D deficiency is a leading cause of osteoporosis,[4] contributing to an increased threat of slip-related fractures, mostly in the elderly, causing rickets and osteomalacia in the pediatric and adult category subsequently.[5]

Following the last decade, a considerable number of studies have highlighted the wider role of vitamin D in health-associated issues, with an important share for mental health.[6,7] In a recent study a statistically significant association between low vitamin D and negative and depressive symptoms in psychotic disorders was demonstrated after adjusting for confounding variables amongst the Norwegian popul-ation.[8] Another study proclaimed an inverse relation-ship between the vitamin D level and severity of depressive symptoms in the 196 patients hospitalized for a depressive episode.[9]

A recent review-based study critically analyzed vitamin D deficiency in Pakistan.[10] It was concluded that Vitamin D deficiency is commonplace. Vitamin D deficiency may be a vital predisposing factor to psychiatric illnesses, so we should not leave this important issue unaddressed. Since Pakistan is a low-economy country with fewer resources, if we work on modifiable risk factors for depression, we can effectively help prevent it. Given the limited local data at our disposal, we planned this research to determine the association of sociodemographic factors and vitamin D levels with the severity of depressive symptoms in patients with depression.

METHODOLOGY

The cross-sectional study was conducted at Fauji Foundation Hospital, Rawalpindi Pakistan, from June to October 2021 after seeking approval from the Ethical

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Committee of Fauji Foundation Hospital (483/RC/FFH/RWP dated 19 May 2021). The WHO sample size calculator was used to calculate the sample size, using the population proportion of vitamin D deficiency in depressed patients as 78%.[11] Convenience sampling was used to gather the sample.

Inclusion Criteria: All the patients above 16 years of age suffering from depression, coming to the Outpatient Department, or being admitted to the Psychiatry Department were included in this study.

Exclusion Criteria: All those depressed patients with thoughts of self-harm, already documented vitamin D deficiency, suffering from osteomalacia and neuroendocrine abnormalities, or taking vitamin D supplements were excluded from the study.

The Beck Depression Inventory (BDI) is a 21-item, self-report rating questionnaire which evaluates the severity of symptoms of depression.[12] The Urdu-translated version of the questionnaire was employed, which is validated in the population of our country in this study. The 21 items were rated from 0 to 3 in four categories. 0-9 Normal 10-16 mild depressive symptoms 17-29 moderate depressive symptoms 30-63 severe depressive symptoms.[13]

All the patients fulfilling the inclusion criteria were included. Written informed consent was taken following a complete description of the study. Each one was assigned a serial reference number, and complete data were handled with confidentiality. The patient was diagnosed with depressive illness by a consultant psychiatrist as per ICD-10,[13] and categorized according to the severity through BDI attached with Performa with a detailed demographic profile of the individual. Vitamin D levels were assessed by taking blood samples and sending them into the laboratory, taking 50nmol/l as a cut-off.[14]

(SPSS) version 26.0 was used for the data analysis. The association of sociodemographic factors & vitamin D levels with the severity of depressive symptoms in patients with depression was analyzed using descriptive statistics. The population sample was classified based on mild, moderate, and severe depressive symptoms. Variables studied are age, gender, education, marital status, and vitamin D levels to determine the variance between the groups. The Chi-square was used to evaluate categorical variables with the p-value of less than or equal to 0.05 taken significantly.

RESULTS

In total, 103 patients with depressive episodes were enrolled in the study. Of the total, 27(26.2%) were male, and 76(73.8%) were female. Among them, 23(22.3%) had mild symptoms of depression, 49(47.6%) had moderate, and 31(30.1%) had severe symptoms of depressive illness. Out of 103 patients suffering from a depressive episode, 82(79.6%) had low vitamin D levels, and the remaining 21(20.4%) had normal vitamin D levels (Table-I).

Table-I: General Characteristics of Patients Participating in the Study (n=103)

Study Parameters	n(%)
Age	
16 – 29 years	15(14.6%)
30 – 49 years	46(44.7%)
> 50 years	42(40.7%)
Gender	
Male	27(26.2%)
Female	76(73.8%)
Education	
No	24(23.3%)
Primary	29(28.2%)
Matric	30(29.1%)
Graduate	20(19.4%)
Marital Status	
Unmarried	17(16.5%)
Married	72(69.9%)
Widowed/Divorced	14(13.6%)
Severity of Depressive Episode	
Mild	23(22.3%)
Moderate	49(47.6%)
Severe	31(30.1%)
Vitamin-D Levels	
Normal Vitamin-D	21(20.4%)
Low Vitamin-D	82(79.6%)

Of the 31(30.1%) severely depressed patients, 10(32.3%) had normal vitamin D levels, and 21(67.7%) had low vitamin D levels. Of the 49(47.6%) moderately depressed patients, 5(10.2%) had normal vitamin D, and 44(89.8%) had low vitamin D levels. Among 23(22.3%) mildly depressed patients, 17(26.0%) had low, and 6(73.9%) had normal vitamin D levels among severely depressed patients, 19(61.3%) were above 50 years of age, and 12(38.7%) had no formal education. The age of the patient, level of education, and vitamin D levels had a significant association with the severity of symptoms of depressive illness, having a p-value less than 0.05 (Table-II).

DISCUSSION

In our study, increasing age and low literacy were strongly associated with the severity of depressive symptoms. It can be attributable to the co-occurrence of Vit D deficiency in the older population. However, gender and marital status, when assessed, were not

related to the severity of depressive symptoms. These findings were not consistent with the available literature. As indicated in a study conducted in the Nepalese population increased prevalence of clinically significant depression (BDI cut off >20) was found among the female gender and marital discord group.[7]

Table-II: Demographic factors and Vitamin D levels in Relation to the Severity of Depressive Symptoms (n=103)

Socio-demographic Factors	Mild Depression n(%) 23(22.3)	Moderate Depression n(%) 49(47.6%)	Severe Depression n(%) 31(30.1 %)	p-value
Age				
16-29 years	5(21.7%)	7(14.3%)	3(9.7%)	
30-49 years	13(56.5%)	24(49.0%)	9(29.0%)	0.049
>50 years	5 (21.7%)	18(36.7%)	19(61.3%)	
Gender				
Male	7(30.4%)	10(20.4%)	10(32.3%)	0.435
Female	16(69.6%)	39(79.6%)	21(67.7%)	
Education				
No	2(8.7%)	10(20.4%)	12(38.7%)	
Primary	3(13.0%)	20(40.8%)	6(19.3%)	0.005
Matric	13(56.5%)	11(22.4%)	6(19.3%)	
Graduate	5(21.7%)	8(16.3%)	7(22.5%)	
Marital Status				
Unmarried	6(26.0%)	8(16.3%)	3(9.7%)	
Married	15(65.2%)	36(73.5%)	21(67.7%)	0.314
Widowed/ Divorced	2(8.7%)	5(10.2%)	7(22.6%)	
Vitamin-D Levels				
Nor Vitamin-D	6(26.0%)	5(10.2%)	10(32.3%)	0.039
Low Vitamin-D	17(73.9%)	44(89.8%)	21(67.7%)	

A meta-analysis depicted vitamin D supplements as somewhat complementary in managing depression, and their effect size is comparable with anti-depressants.[15] In another interventional study, the level of depression in outdoor physical activity with vitamin D group was shown to have improved from severe to mild depression. There was a significant difference in the severity of depression of indoor physical activity with vitamin D and outdoor and indoor physical activity groups from severe to moderate.[16] Our study demonstrated a clinically significant association between low vitamin D and increased severity of depression. A retrospective study based solely on depressed hospitalized patients demonstrated that 16% of patients had a normal vitamin D level, suggesting an association of a low vitamin D with severe depression requiring hospitalization.[9] The result of our study also supports these findings, as 18% of patients with moderate to severe depression had normal vitamin D levels.

In a large cohort study conducted in the Netherlands, including both current or remitted depressive patients and healthy controls, the association between low vitamin D and depression was investigated. Of the sample, 33.6% had deficient vitamin D. Lower vitamin D was found in participants with current depression, particularly in those with severe symptoms, indicating that low vitamin D could reflect biological suscepti-bility to depression.[14] In our study, 67.7% of severely depressed patients have low vitamin D. The disparity can be elaborated as our study was exclusively on depressed patients compared with a cohort study including remitted patients and healthy controls along with currently depressed patients. In another study of patients with major depressive disorders, more severe symptoms of depression were related to smaller total intracranial volume and lower levels of vitamin D.[17] A tendency to decrease levels of vitamin D (p= 0.060) was observed in patients with severe symptoms of depres-sion compared to patients with non-severe symptoms of depression, providing preliminary evidence that the effects of vitamin D on depression seem to have a neuro-anatomic basis.[18] Our findings are also consis-tent with these results.

LIMITATION OF STUDY

Vitamin D levels were measured only once at the time of the study; individuals may have low levels of vitamin D before or after depression, making it impossible to establish a causal relationship.

CONCLUSIONS

The level of vitamin D, the patients' age, and the level of education had a significant association in the target population with the severity of depressive symptoms.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

QUA: Conception, study design, drafting the manuscript, approval of the final version to be published.
SM & UBZ: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.
MB & TL: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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