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Vitamin B 12 Deficiency Among Depressive Patients Presenting in Tertiary Care Hospital of Karachi

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ABSTRACT

Objective: To determine the frequency of deficiency of levels of vitamin B12 among depressed patients presenting in tertiary care hospital.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Pakistan Naval Ship Shifa Hospital, Karachi Pakistan, from Jun to Dec 2022.

Methodology: The clinically diagnosed depressed patients aged 18 to 90 years after ERC approval were included. The inclusion criteria was clinical depressive symptoms, single and multiple episodes, and scoring of more than 10 on the Hamilton depression rating scale (HAM-D). After consent, a blood sample was sent for serum vitamin B12 levels. Levels less than 200 pg/ml were considered as deficient.

Result: The mean age for the study population was 46.82±15.64 years. 39(19.5%) of the patients were aged more than 55 years. The majority, 112(56%), were females; 121(60.5%) had no known psychiatric co-morbid; 115(57.5%) had no known medical co-morbid; 128(64%) had vitamin B12 deficiency; 128(64%) were diagnosed one year or more and 111(55.5%) were on oral vitamin B12 supplements. 67(33.5%) had serum vitamin B12 deficiency. 128(64%) were currently depressed; 130(65%) had HAM scores greater than 10.

Conclusion: Our study has shown high vitamin B12 deficiency in depressive patients. It was shown to be significantly associated with female gender, age >30 years, co-existing psychiatric illness, disease duration greater than 1 year, Hamilton Rating Score >10, and multiple episodes.

Keywords: Depression, Hamilton Rating Score, Vitamin B 12 deficiency.

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INTRODUCTION

Depressive disorder is characterized as a psychiatric illness with three main symptoms: low mood, decreased interest, and low energy, along with low self-esteem, guilt, pessimistic thoughts, worthlessness, hopelessness, loss of sleep, appetite, and thoughts of self-harm or suicidal thoughts as per diagnosis criteria of ICD 10 (International Classification of Diseases 10). B12 deficiency causes neurological diseases and megaloblastic anemia and can impair cognitive functioning.[1] Folate, vitamin B12, homocysteine, and methylenetetrahydrofolate reductase (MTHFR) are important substrates in the methylation reactions that result in the formation of the Monoamines neurotransmitters in the brain.[2-4] They are also involved in the production of phospholipids and nucleotides.[5,3] If they are deficient, the methylation is impaired, and monoamine production is decreased, resulting in depressive symptoms.[6,7]

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The presentation of Vitamin B12 deficiency as a mood disorder has been under study for more than a decade. Much research has been underway regarding etiology, precipitating factors, and maintaining factors of depression in adults.[8,9] Low mood, forgetfulness, lethargy, irritability, and psychomotor retardation are all explained by the contributory role of homocysteine and vitamin B12 in neurotransmitter pathways.[10] Furthermore, there was a need for research in Pakistan on this topic as our population also has dietary deficiencies due to poverty and socio-economic reasons. The question of whether resistant depressive disorder patients need Vit B12 supplementation or not needs to be investigated, and the unnecessary burden of unjustified prescription of multivitamins needs to be addressed. The objective of this study is to find out the prevalence of the deficiency of vitamin B12 among depressed Pakistani patients in the outpatient of an urban hospital setting.

METHODOLOGY

After approval of the Ethical Review Committee (ERC/2022/PSYCHIATRY/215), comparative cross-sectional study was conducted at the Outpatient

Department of the Pakistan naval ship Shifa Hospital Karachi Pakistan, from June to December 2022. The size of the sample was estimated by the WHO calculator taking the expected frequency of 12% vitamin B deficiency in depression.[11]

Inclusion Criteria: All patients aged 18 to 90 years reporting to the outpatient department who ful filled criteria for single or multiple/recurrent episodes of depression as per International Classification of Diseases 10(ICD-10) were included.

Exclusion Criteria: The patients suffering from chronic systemic diseases like anemia, diabetes, ischemic heart disease, epilepsy and hypertension, malabsorption syndromes, or chronic malabsorption diseases of the gastrointestinal tract and any other psychiatric disorder were the criteria for exclusion from the study.

The depressive symptoms were characterized by severity of depressive symptoms by using the Hamilton Depression Rating Scale 17 items HDRS or HAM D.[12] A Score of more than 7 was included. After consent, a venous sample was taken for vitamin B12 level.

Patients with vitamin B12 deficiency (<200pg/ml) were taken as Group A versus patients with normal vitamin B12 levels (>200pg/ml) in Group B. The consent was taken from the patients. A self-designed questionnaire was designed as a record of age, gender, number of episodes of depression, present status of depression or remission, co-morbid physical or psychiatric illness, and level of vitamin B12 in pictogram milliliter. The outcomes of our study were: frequency of vitamin B deficiency in depressed patients and its association with HAM Score, number of episodes of depression, and current mood of the patient.

The data was analyzed using IBM Statistical Package for Social Sciences (SPSS) version 26. The qualitative data was presented as frequency and percentage. Chi-square was used to analyze significance. The quantitative variables were presented as Mean±SD for which an independent sample t-test was used, and *p*-value ≤0.05 was taken as significant.

RESULT

Group-A had vitamin B12 deficiency 67(33.5%), and Group B had normal vitamin B12 levels 133(66.5%). The mean age for the study population was 46.82±15.64 years. 39(19.5%) of the patients were aged more than 55 years. The majority, 112(56%), were females; 121(60.5%) had no known psychiatric co-morbid; 115(57.5%) had no known medical co-morbid; 128(64%) had vitamin B12 deficiency; 128(64%) were diagnosed one year or more and 111(55.5%) were on oral vitamin B12 supplements. The comparison of demographic profile is given in Table-I. 67(33.5%) had serum vitamin B12 deficiency. 128(64%) were currently depressed; 130(65%) had HAM scores greater than 10; the comparison of psychiatric outcomes is given in Table-II.

Table-I: Comparison of Demographic Profile of Study Participants (n=200)

Variables		Group A N=67	Group B N=133	*p*-value
Age (years)	15-30	17 (9.5%)	45(22.5%)	0.006
	30-60	49(24.5%)	89(44.5%)	
Gender	Male	22(11%)	66(33%)	0.034
	Female	45(22.5%)	67(32.5)	
Duration of illness	< 1 year	29(14.5%)	99(49.5%)	0.005
	> 1 years	38(19%)	34(17%)	
Psychiatric co-morbids		17(8.5%)	62 (31%)	0.003
Medical co-morbids		18(9%)	67(32.5%)	0.002
Use of multi-vitamin		33(16.5%)	78(39.5%)	0.133

Table-II: Comparison of Vitamin B12 deficiency with the Disease Outcome (n=200)

Variable		Group A N=67	Group B N=133	*p*-value
Current Mood	Depression	33(16.5%)	95(47.5%)	0.005
	Remission	34(17%)	38(19%)	
Hamilton Rating Score	<10	20(10%)	110 (55%)	<0.001
	>10	47(23.5%)	23(11.5%)	
Number of Episodes	One	24(12%)	97(48.5%)	<0.001
	>one	43(21.5%)	36(18%)	

DISCUSSION

In the current study, the percentage of deficiency in vitamin B12 prevalent in our population is 33.5%, while a cross-sectional study showed a prevalence of 22%.[12] One previous study showed a 38% prevalence at serum vitamin B12 cut-off of 211 picograms per milliliter and 70% at the cut-off of 380 pg/ ml. Epidemiological studies have shown that 31% of depressed patients have vitamin B12 deficiency.[13] One RCT carried out in AKUH Pakistan showed a favorable response to supplementation of vitamin B12 in depression.[7] Dementia, paranoia, affective disorders, and delirium have been linked to vitamin B12 deficiency and its associated demyelinating neurological disorder and hematological anemia.[13,14] The adequate supplementation of vitamin B12 with

antidepressants can remit these depressive symptoms.[14]

Multiple studies were done worldwide to find this association clinically.[15,16] There was a dearth of guidelines on this topic. The depressive symptoms are primarily seen in reproductive age in women.[17-20] A cross-sectional study in Gandaki, Nepal, yielded results that the low amount of vitamin B12 prevalence was 22 percent among depressed patients, especially elderly females presenting in outpatient in the specialist setting.[11] In India, an observational association study was done between the values of Vitamin B12 across postpartum depression among rural Indian women from 2014 to 2017, which showed a positive correlation (*p*-value 0.009).[17]

The deficiency of vitamin B12 in our study is mainly seen at the mean age of patients of 46.8 years ±15.4. The study in Nepal showed a mean age of 39.2 years ±13.75 years.[21] In this study, 55% of patients with low vitamin B12 values were more than 55 years of age, and 70% of them were women. The Nepalese study showed 55 % of deficiency above 60 years old, of which the majority were women.[21] An Indian study showed a 50% deficiency in patients above 50 years of age.[17] Thus, it can be established that deficiency of vitamin B12 is one of the important risk factors or contributory factors towards geriatric depression. The presence of various confounders cannot be neglected. The decreased appetite in depression, the malabsorption of vitamins in the stomach due to various factors, the use of proton pump inhibitors,[22] variations in dietary patterns, gastrointestinal diseases, and host-microbial interactions in the gastrointestinal tract are among them.[14]

LIMITATIONS OF STUDY

The limitations include the small number of participants with possible selection bias as they were already diagnosed cases of depression. The short time of six months for the study was not sufficient to explore the effect of dietary deficiency, and a longitudinal study is warranted for that. Furthermore, the use of medications like antidepressants, proton pump inhibitors, and dietary changes may have affected the results.

CONCLUSION

Our study has shown a frequency of 67 (33.5%) of vitamin B12 deficiency in depressive patients. It is shown to be significantly associated with female gender, age > 30 years, co-existing psychiatric illness, disease duration greater than 1 year, Hamilton Rating Score > 10, and multiple episodes.

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Authors Contribution

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

SI & SR: Conception, study design, drafting the manuscript, approval of the final version to be published.

UBZ & FI: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

WI & ZN: Conception, data acquisition, 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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