

Original Research Article

EVALUATION OF VITAMIN B12 LEVEL AND ITSCORRELATIONWITHCLINICALANDHEMATOLOGICALPARAMETERS:ATEACHINGHOSPITAL BASEDSTUDY

Jasneet Kaur Sandhu¹, Ashish Bajaj², Manoj Kumar Yadav³

¹Associate Professor, Department of Pathology, World College of Medical Sciences Research and Hospital, Jhjjar, Haryana, India ²Assistant Professor, Department of Microbiology, World College of Medical Sciences Research and Hospital, Jhjjar, Haryana, India ³Associate Professor, Department of Biochemistry, World College of Medical Sciences Research and Hospital, Jhjjar, Haryana, India

 Received
 : 15/09/2024

 Received in revised form
 : 25/10/2024

 Accepted
 : 27/11/2024

Corresponding Author:

Dr. Manoj Kumar Yadav, Associate Professor, Department of Biochemistry, World College of Medical Sciences Research and Hospital, Jhjjar, Haryana, India Email:mkybiochem@gmail.com

DOI: 10.70034/ijmedph.2025.2.174

Source of Support: Nil, Conflict of Interest: None declared

Int J Med Pub Health 2025; 15 (2); 963-966

ABSTRACT

Background: Vitamin B12 deficiency, or cobalamin deficiency, refers to the condition characterized by low levels of vitamin B12 in the blood. Animal proteins, particularly from meat and eggs, are essential cobalamin sources.

Materials and Methods: Patients who were admitted to medicine ward with Hb<12 gm% in males and <11 gm% in females are deemed anaemic and were examined for vitamin B12 insufficiency. Erba ELISA was used to measure each patient's serum vitamin B12 level. The study included 46 of these patients whose serum vitamin B12 levels were less than 200pg/mL.

Results: The mean vitamin B12 was 156.28+25.46 pg/mL. The age range of the group was 16–59 years old. The majority of patients were in the second decade, or between the ages of 25 and 35. A significant negative correlation was found between vitamin B 12 levels and mean corpuscular volume & total leukocyte count. A positive correlation was found between vitamin B12 and Hemoglobin& platelet count. This correlation was found to be statistically significant (p = < 0.01).

Conclusion: A wide range of clinical manifestations is linked to a deficiency of vitamin B12. Men, people with alcohol dependence and vegetarians are at risk. Early intervention prevents late complications.

Keywords: Vitamin B12 deficiency, anaemia, Mean corpuscular volume and hemoglobin.

INTRODUCTION

Vitamin B12, generally known as cobalamin, is an essential vitamin that dissolves in water. It is necessary for cellular metabolism, DNA synthesis, and maintaining the integrity of the nervous system. Humans can only obtain vitamin B12 from animalbased foods including meat, fish, and dairy products. The diagnosis of vitamin B12 deficiency might be made more difficult because it can mimic other illnesses. Megaloblastic anemia, cognitive decline, peripheral nerve issues like paraesthesia, and age-related macular degeneration are some of its possible symptoms. Cobalamin shortage is prevalent in India for both religious and economic reasons, and the average Indian diet is inadequate in this nutrient.^[1]Adults with deficiencies have been shown to have prevalence rates ranging from 47 to 71%.^[2,3] A deficiencies of vitamin B12 can result in a variety of symptoms. These often appear gradually, but if treatment is not received, they may get worse. There might not be any noticeable symptoms from a mild deficiency, but as it worsens, anemia symptoms like exhaustion, lightheadedness, a fast heartbeat, rapid breathing, and pale skin can appear. Additionally, it may result in easy bleeding or bruises, including bleeding gums. digestive side effects, such as constipation or diarrhea, weight loss, upset stomach, and painful tongue. Damage to nerve cells may occur if the deficit is not promptly rectified. If this occurs, a vitamin B12 shortage may cause trouble walking, mood swings, depression, memory loss,

disorientation, tingling or numbness in the fingers and toes, and, in extreme situations, dementia. Vitamin B12 deficiency is also connected with elevated plasma homocysteine levels, which is a risk factor for cardiovascular disease.^[4] Vitamin B12 deficiency's hematological profile ranges from normal blood parameters to the classic signs of megaloblastic anemia, which include a slightly elevated mean corpuscular volume (MCV), macroovalocytes and hypersegmented neutrophils (six or more lobed) on peripheral smears (PS), a slight increase in indirect bilirubin, and a decreased retic count. All hematopoietic cell types can be impacted by vitamin B12 deficiency, while mild-to-moderate anemia results in a decrease in red blood cells, while severe cases result in a decrease in white blood cells and platelet count. In several nations, investigations on B12 insufficiency have been carried out in hospitals. There is, however, a dearth of information from Indian studies that have used sizable sample sizes to assess B12 insufficiency. In order to determine the prevalence of B12 deficiency and to establish a relationship with haematological findings such Hb, TLC, MCV, and platelet counts, we have conducted this study.

MATERIALS AND METHODS

This present study was conducted in the Department of Pathology & Biochemistry at World College of Medical Sciences Research and Hospital, Jhajjar and collaboration with department of medicine during the period form April, 2022 to March, 2023. Patients who were admitted to medicine ward with Hb<12 gm% in males and <11 gm% in females are deemed anaemic and were examined for vitamin B12 insufficiency. Erba ELISA was used to measure each patient's serum vitamin B12 level. The study included 46 of these patients whose serum vitamin B12 levels were less than 200pg/mL. A pre-made pro forma was used to record complaints regarding presentation, thorough general and systematic evaluation, and all investigations. A series of tests,

including CBC, peripheral smear, retic count, liver function test, and renal function test, were performed on each patient. It was recommended that each patient receive four injections of 1000 µg of vitamin B12 intramuscularly spaced seven days apart. The patient described rare allergic reactions, including headache, chromaturia, erythema, nausea, and local site reactions. Patients had follow-up peripheral smears and repeat CBCs after the first, third, and sixth weeks. Following treatment, patients were monitored for improvements in their clinical and hematological conditions. A one-way analysis of variance test was used to compare hematology parameters at various follow-up times. Pearson's correlation coefficient was calculated by comparing the severity of hemoglobin to serum vitamin B12 levels. The threshold for statistical significance was set at P < 0.05. Data analysis is done using SPSS version 20, a statistical program.

RESULTS

In these cases, the mean vitamin B12 was 156.28+25.46 pg/mL. The age range of the group was 16-59 years old. The majority of patients were in the second decade, or between the ages of 25 and 35. The male-to-female ratio was 1.27:1, with males (56%) outnumbering females. 42% of patients had an alcohol addiction, while the majority of patients (58%) followed a vegetarian diet. Sixty-six percent of patients had nausea and decreased appetite, whereas the majority (84%) reported with exhaustion. Neuropsychiatric symptoms included sadness and psychosis (1%), memory loss (1%), walking difficulties (4%), and tingling and numbness (12%). Pallor was the most frequently elicited symptom (89%). Icterus and skin hyperpigmentation were found in 52% and 69% of patients, respectively. In 42% and 20% of cases, respectively, organomegaly manifested as hepatomegaly and splenomegaly. There was only one patient with a hemic murmur.

Table 1: Shows the change in haematological parameters pre and post treatment.				
Haematology parameters	Pre-treatment(Mean±sd)	Post-treatment(Mean±sd)	P-value	
RBC (×106/ L)	2.32±0.76	2.82±0.98	0.14	
TLC (/µL)	3892.2±256.32	8135.4±468.26	0.001	
PLT (×105/ L)	1.25±0.48	2.36±0.92	0.02	
Hb (g/dL)	5.9±1.42	8.96±2.56	0.01	
MCV (fl)	96.48±16.32	84.21±12.06	0.04	
RDW (%)	17.04±4.36	13.2±3.24	0.02	
MPV (fl)	8.52±2.34	9.56±4.37	0.01	
Vitamin B12	156.28+25.46	202.04+27.12	0.001	

A significant negative correlation was found between vitamin B 12 levels and mean corpuscular volume & total leukocyte count. A positive correlation was found between vitamin B12 and Hemoglobin& platelet count. This correlation was found to be statistically significant (p = < 0.01).

Table 2: Shows the correlation of haematological parameters with vitamin B12 levels.			
Variables	r-value	P-value	
Hb	+0.28	0.01	
TLC	-0.032	0.24	
MCV	-0.025	0.12	
PLT	+0.76	0.01	

DISCUSSION

Clinically, vitamin B12 deficiency presents as a multisystem disease. Megaloblastic anemia and neurological diseases are common haematological presentations. Megaloblastic anemia in India is largely caused by folate insufficiency, while recent research emphasizes the importance of vitamin B12 deficiency.^[5] 46.9% of non-anemic adult participants have either subnormal levels of B12 alone or a combined folate-B12 insufficiency, according to reports by Khanduri et al. Compared to folate insufficiency alone, this is five times more prevalent.^[6] Although the prevalence of vitamin B12 insufficiency in India is unknown, current research has revealed that it is more widespread than previously believed. All age groups were impacted, but the majority of patients in our study were in the second decade, specifically those aged 25 to 35. The mean age of the patients was 32.46 ± 8.24 years. Another study conducted in India by Khanduri et al,^[7] found that the age group of 10 to 30 years old had the highest incidence. Megaloblastic anemia is said to affect older age groups in Chinese and Caucasian populations. Similar to India, it impacts people of all ages and may be linked to a poor diet brought on by financial and religious constraints. Similar to research by Paudel et al,^[8] and Bhatia et al,^[9] males were more frequently impacted than females. The vast majority of patients followed a vegetarian diet. In their studies, Bhole et al,^[10] and Suthar and Shah,^[11] also noted that the majority of cases were vegetarian. Because vitamin B12 does not occur in vegetarian diets, strict vegetarian is at high risk of getting deficiency. Additionally, since alcohol usage is known to result in vitamin B12 deficiency, the findings of our study are consistent with those of earlier research.^[12] Pallor was the most prevalent observation, and the majority of patients had constitutional symptoms, such as fatigue, lightheadedness, and dizziness, which are symptoms related to anemia. These symptoms and results were similar to those of several previous Indian investigations.^[13,14] Impaired joint and position sensation was the most frequent finding among with neurological patients involvement. Additionally, 40% of patients with neurological features had poor joint posture, according to Suthar and Shah.^[11] The preferential susceptibility of the lateral and posterior columns to demyelination is the reason for the neurological manifestation of vitamin B12 deficiency. The majority of bone marrow examinations reveal a megaloblastic appearance, which is consistent with earlier research, and the most frequent finding on peripheral smear examinations was macrocytosis.^[9,15] Increased hemolysis due to ineffective erythropoiesis was the cause of the elevated mean bilirubin. Mean Hb and MCV were 5.9±1.42 g/dL and 96.48±16.32 fl. About 68% of patients had Hb<7g/dL, and 43% had MCV >100 fl. Mean corpuscular hemoglobin and

mean corpuscular hemoglobin concentration, however, were within normal ranges. According to Srikanth,^[16] the study population's mean hemoglobin and MCV were 6.195 ± 2.54 g/dL and 98.47 ± 10.14 fl, respectively. As a result, macrocytosis brought on by a vitamin B12 shortage was the cause of the elevated MCV in the majority of patients, who also had severe anemia. Every patient displayed both clinical and haematological improvement, as evidenced by an increase in Hb. Therefore, it is recommended to check for compliance and look for alternative explanations in individuals with vitamin B12 insufficiency who are not responding to treatment. An alternate method of assessing the effectiveness of vitamin B12 therapy is to decrease MCV, decrease RDW, and raise MPV. Our findings were similar to those of Aktas et al.'s study on the Turkish population.^[17] Haematological marker abnormalities and a range of clinical symptoms are the primary consequences of a B12 deficiency. If there is anemia with elevated MCV, blood levels of B12 should be measured, particularly if there is multiple cell line insufficiency. Early problem detection finds a treatable cause and avoids irreparable late complications.

CONCLUSION

In India, vitamin B12 deficiency is not unusual. Alcoholics and vegetarians are vulnerable. There were many different clinical signs of deficiency. Both diagnosis and therapy are simple and reasonably priced. In resource-constrained nations like India, early diagnosis and treatment prevent late repercussions at the primary level itself and offer cost-effective care. Response to vitamin B12 therapy can be assessed by MPV and RDW. Our findings need to be confirmed by large prospective investigations.

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