



ORIGINAL RESEARCH PAPER

Neurology

PREVALENCE OF VITAMIN B12 DEFICIENCY IN PATIENTS WITH SENSORY DYSFUNCTION IN A SOUTH INDIAN COMMUNITY – HOSPITAL BASED STUDY

KEY WORDS: B12, DEFICIENCY, SENSORY DYSFUNCTION

Dr. Kammineni Anjaneyulu

M.D.; D.M., associate Professor of General medicine, FIMS, Kadapa & Consultant Neurophysician, Kammineni neuro care, Kadapa.

Dr. Naga Srilatha Bathala*

M.D. Associate Professor of Microbiology, Kurnool Medical College, Kurnool
*Corresponding Author

ABSTRACT

Background: Vitamin B12 status relies not only on maintaining an adequate nutritional intake, but also ensuring an appropriate absorption process. Deficiency of this nutrient is not only an important cause of anemia but its deficiency may cause impaired myelination, axonal degeneration, and cerebral atrophy resulting in substantial neurological deficits. In developing countries, deficiency is much more common. Diagnosis at early stage and its remedy is extremely necessary and crucial to prevent neurologic disorders, poor outcomes. Our study population comprises of patients with symptoms of sensory dysfunction. **Materials and methods:** The present study was cross sectional, hospital based, an observational analytical study. Vitamin B12 levels of 867 patients, who attended medical outpatient department, along with basic demographic data were collected and entered in an excel sheet. **Results:** Among the total participants (867) 46.94% of participants were deficient. 26.64% of participants were deficient males. The mean age of participants was 49.92 years and it was 44.72 years among deficient. The mean B12 levels among all participants was 344.18 ng/l and it was 115.02ng/L in deficient individuals. Among the total participants almost one fourth of them were in the age group of 41-50 years and this group showed high percentage of deficiency. **Conclusion:** Prevalence of vitamin B12 deficiency was 46.94% in patients with neuropathies. Deficiency was more in males. The prevalence of Vitamin B12 deficiency was more in patients of age group 41-50 years of both genders. Further large prospective studies are needed to confirm these findings.

Background:

Vitamin B12 or cobalamin is a water-soluble vitamin [1] which has a complex structure and contains a metallic ion along with cobalt [2]. Cobalamins differ in the nature of additional side groups bound to cobalt. Examples include methyl (methylcobalamin), 5-deoxyadenosine [deoxyadenosyl (short form, adenosyl), cobalamin, or coenzyme B12], hydroxyl (hydroxocobalamin), H₂O (aquocobalamin, or vitamin B12b), and cyanide (cyanocobalamin) [3]. Among these cobalamin and cyanocobalamin are the most common forms [2]. B12 acts as a cofactor in one-carbon metabolism through methylation and molecular rearrangement. It is a vital micronutrient essential for the optimum hemopoetic, neurologic and cardio-metabolic function [4]. The main dietary sources are animal products like meat and meat products, fish and shell fish, dairy products and fortified cereals [5-7] Vitamin B12 status relies not only on maintaining an adequate nutritional intake, but also ensuring an appropriate absorption process [8]. Deficiency of this nutrient is not only an important cause of anemia but its deficiency may cause impaired myelination, axonal degeneration, and cerebral atrophy resulting in substantial neurological deficits such as hypotonia, cognitive deficits, and developmental delay in children [9,10]. Peripheral neuropathy (sensory disturbances in the extremities such as tingling and numbness, and impaired vibration and joint position sense) and myelopathy that can progress, if untreated, to severe motor problems [11,14]. In developing countries, deficiency is much more common, starting in early life and persisting across the life span and the prevalence of deficiency increasing with age [5]. Diagnosis at early stage and its remedy is extremely necessary and crucial to prevent neurologic disorders, poor outcomes [2,8,15].

Objectives:

Our study population comprises of patients with symptoms of sensory dysfunction. The hospital-based study was conducted to know the proportion of B12 deficiency based on lab parameters and to understand the age-wise distribution of the deficiency.

MATERIALS AND METHODS:

The present study was cross sectional, hospital based, an observational analytical study. It was undertaken in the month of August 2022. Vitamin B12 levels of 867 patients, who attended medical outpatient department, FIMS, and Kammineni neuro care, Kadapa, Andhra Pradesh for a period of 18 months from January 2021 to June 2022, along with basic demographic data were collected and entered in an excel sheet. The patients were categorized based on their B12 levels and age groups. (As per the WHO, in its report in 1968, defined a serum vitamin B12 concentration less than 150 ng/L (110 pmol/L) as deficient, and a concentration of 201 ng/L (147 pmol/L) or higher 681 as normal) [3] and the data was analyzed.

RESULTS:

Among the total participants (867) 46.94% of participants were deficient and 53.05% of them were having normal B12 levels. 26.64% of participants were deficient males and 28.37% of them were females having normal B12 levels as shown in Table 1. The mean age of participants was 49.92 years and it was 44.72 years among deficient. The mean B12 levels among all participants was 344.18 ng/l and it was 115.02ng/L in deficient individuals. The mean age of deficient females was 41.31 years. The mean B12 level was 111.89ng/L in deficient male participants as shown in Table 2. Among the total participants (867) almost one fourth of them were in the age group of 41-50 years and this group showed high percentage of deficiency. There was only one participant from less than 10 years and he was B12 deficient as shown in table 3. Among the deficient patients (407) males (56.46%) were more than females (43.24%). More percent of deficient patients were in 41-50 years age group and among them females (15.48%) were more than males (11.05%). Deficiency was more in males in all age groups except 41-50 years as shown in 4.

Table 1: Distribution of Participants – Gender Vise Along With B12 Status

	Male	Female	total
Normal	214(24.68%)	246(28.37%)	460(53.05%)
Deficient	231(26.64%)	176(20.30%)	407(46.94%)
Total	445 (51.32%)	422(48.67%)	867(100%)

Table 2: Means Values with Standard Deviation Of Participants

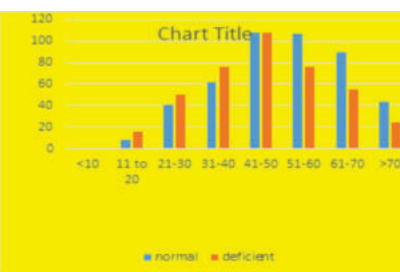
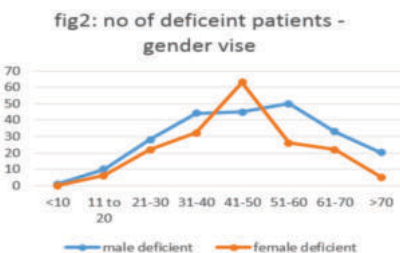
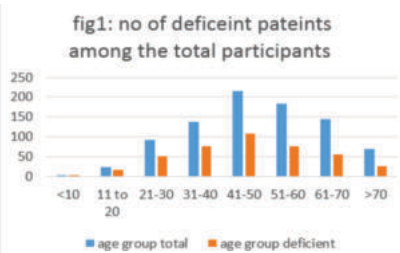
	mean	male	female	all
all participants	Value (ng/L)	289.99±418.24	389.58±414.96	344.18±416.24
	Age(yrs)	50.45±16.61	48.5±14.96	49.42±15.86
deficient	Value (ng/L)	111.89±39.91	118.7±36.46	115.02±38.52
	Age (yrs)	44.49±16.81	41.31±14.21	44.72±15.85

Table 3: percentage of B12 normal and deficient participants –age group wise

Age group	normal	deficient	total
<10	0	1	1
11-20	8(0.92%)	16(1.85%)	24(2.77%)
21-30	41(4.73%)	50(5.77%)	91(10.50%)
31-40	62(7.15%)	76(8.66%)	138(15.92%)
41-50	108(12.46%)	108(12.46%)	216(24.92%)
51-60	107(12.34%)	76(8.76%)	183(21.1%)
61-70	90(10.38%)	55(6.34%)	145(16.72%)
>70	44(5.07%)	25(2.88%)	69(7.95%)
total	460(53.05%)	407(46.95%)	867(100%)

Table 4: age group wise distribution of B12 deficient patients

age group	male	female	Total
<10	1	0	1
11 - 20	10(2.46%)	6(1.47%)	16(3.93%)
21-30	28(6.88%)	22(5.4%)	50(12.28%)
31-40	44(10.81%)	32(7.86%)	76(18.67%)
41-50	45(11.05%)	63(15.48%)	108(26.53%)
51-60	50(12.28%)	26(6.38%)	76(18.67%)
61-70	33(8.11%)	22(5.4%)	55(13.51%)
>70	20(4.91%)	5(1.23%)	25(6.14%)
Total	231(56.76%)	176(43.24%)	407(100%)



DISCUSSION:

Though micronutrient deficiency has assumed a shape of pandemic, yet it is the most under diagnosed and undertreated nutritional deficiency in the world [16]. Now

Vitamin deficiencies are a common problem worldwide, with vitamin B12 deficiency being recognized as a health concern nearly 100 years ago [17]. The deficiency of B12 is common and the frequency increases with age. The vegetarian diet, blood diseases, food-bound cobalamin malabsorption, poor nutrition and usage of some drugs are the other contributing factors for the deficiency of B12 [4,8] B12 deficiency affects the nervous system, resulting in demyelination of peripheral and central neurons, which is generally considered to be the mechanism underlying the classic myeloneuropathy of B12 deficiency [8]. Sometimes this may lead to Serious and often irreversible neurologic disorders, such as burning pain or loss of sensation in the extremities, weakness, spasticity and paralysis, confusion, disorientation, and dementia. The incidence of neurologic complications is between 75% and 90% of all individuals with clinically observable vitamin B12 deficiency; in about 25% of cases, these may be the only clinical manifestation of deficiency. As the response of neurologic symptoms to vitamin B12 replacement is often dependent on the duration of the symptoms [3]. The early diagnosis and treatment of vitamin B12 deficiency is crucial for significant neurological impairment and long-term prognosis [8].

The present study observed that 46.94% of patients with sensory dysfunction were deficient. But it was more when compared with Katakam etal (17%) (18) in patients with dementia, sowndarya et al (28%)[4], Singla et al (31.4%) [19] and Lachner etal (40%) [8]. As current study looked at vitamin B12 status of patients attending hospital for sensory dysfunction, so this group has comparatively lower vitamin B12 levels as compared to general population. Majority of studies including present study showed that deficiency was more in males than females [14,18,20-24]. Present study showed that among all the participants 20.30% of deficient patients were females but it was 26.4% in study by Lindenbaum et al [21], 29% in Lindgren et al [22] study, and in a study on maternal woman by Finkelstein et al 63.2% [25] were deficient. The mean age of participants in present study was 49.42 years ±15.86 and mean B12 levels was 344.18ng/L±416.24. The mean age 44.49yr±16.81 and 41.31yr±15.85 of deficient males and females respectively, which was comparable with a study by Debasmita et al [5], the mean B12 level in present study (115.02pg/ml ± 15.85) was comparatively less to study by Debasmita et al (181pg/ml) [5] and almost same with a study by Sahu et al [26] The most common tested (24.92%) and deficient (26.53%) age group in present study was between 41-50 years (24.92%) and it was same in majority of studies. Though B12 deficiency increases with age, as it was mentioned earlier, multiple factors – gastritis, fat malabsorption, poor nutrition, medication, changing dietary habits - which act as risk factors for deficiency would be responsible for this. And it was also observed that among the deficient 56.76% were males.

Strengths and Limitations:

This was the first study from our area reporting vitamin B12 status. However, a few limitations of this study must be mentioned. Data presented here did not exclude people who might have already taken supplements including vitamin B12. But, same limitation has been faced by other researchers worldwide. Even though Current data collected from a tertiary hospital and a super specialty clinic located in urban area, the patients were from remote urban and rural areas. As it was conducted in patients attended hospital for sensory dysfunction, as their prime complaint so results cannot be generalized to general population. Further large prospective studies are needed to confirm these findings.

CONCLUSION:

Prevalence of vitamin B12 deficiency was 46.94% in patients with neuropathies. There was no much gender variation, but still deficiency was more in males. The prevalence of Vitamin B12 deficiency was more in patients of age group 41-50 years

of both genders. Further large prospective studies are needed to confirm these findings.

Acknowledgement: nil

Conflicts of interest: nil

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