

ORIGINAL RESEARCH

A prospective clinical study of incidence of vitamin B12 deficiency in infants of 6-12 months age group at a tertiary care centre

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ABSTRACT

India has high prevalence of nutritional anaemia. Vitamin B12 deficiency is a hidden condition which presents as anaemia. Children will often present with or without various clinical signs. Most common symptoms include weakness, lethargy, feeding difficulties, failure to thrive and irritability. A prospective cross-sectional study was undertaken in Pediatric ward on infants between 6 months to 12 months. In our study the mean age was found to be 9.7 months and more associated with vegetarian diet. Morphologically macrocytic anaemia is seen in Vitamin B12 deficiency and MCV >70 and MCHC >34 is also significant with B12 deficient states.

Keywords: Vitamin B12, tertiary care centre, nutritional anaemia

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INTRODUCTION

There is a high prevalence of nutritional anaemia in India. Prevalence is higher in women and preschool children.

Clinical features of B12 deficiency often presents with nonspecific manifestation such as weakness, lethargy, feeding difficulties, failure to thrive and irritability. Other common findings include pallor, glossitis, vomiting, diarrhoea and icterus. Neurological features include parasthesias, sensory deficit, hypotonia, seizures, developmental delay and neuropsychiatric changes. Neurologic changes in B12 deficiency may occur in absence of haematologic findings.

Vitamin B12 deficiency is a hidden condition in infant and may be found with screening of other illness.

AIMS AND OBJECTIVES

1. To study the incidence of Vitamin B12 deficiency anaemia in 6 to 12 months infants.
2. To detect clinical and morphological patterns of B12 deficiency anaemia.
3. To assess the severity and degree of vitamin B12 deficiency anaemia in 6 to 12 months infants.

MATERIALS AND METHODOLOGY

DESIGN OF STUDY

- A prospective cross-sectional study was undertaken in Pediatric ward on infants between 6 months to 12 months.

SAMPLE SIZE

- Patients in age group 6-12 months were selected from Pediatric ward.
- Subjects were selected based on systemic sampling by including every 7th infant from this age group.
- In this manner 72 subjects were selected but 12 were ultimately excluded from the study as per study design and analysis conducted in 60 subjects was thus obtained.

INCLUSION CRITERIA

- Infants between age group of 6 months to 12 months admitted in pediatric ward.

EXCLUSION CRITERIA

- Anaemia due to other causes like haemorrhagic disease, chronic conditions.
- Anaemia due to bone marrow disease and haemolytic diseases.

- Infants with chronic conditions and congenital anomalies were excluded from the study.
- Infants less than 6 months and above 12 months were excluded from the study.

indices and peripheral smear morphology and serum vitamin B12 levels to analyse and interpret incidence and type of anaemia in infancy and any other associated developmental problems.

METHOD

Informed consent of caretaker of each infant was taken following which detailed general and systemic examination was done and blood investigations were sent-complete blood count, blood

RESULTS

60 pediatric patients were selected for the study. Out of them 38 were male and 22 were female. Mean age of the study was 9.7 months and the male: female ratio was 1.7:1.

Table 1

VITAMIN B12 LEVEL	MALE	FEMALE	TOTAL
Deficient	23	11	34
Normal	15	11	26
Total	38	22	60

Out of 38 male enrolled in the study, 23 (60.5%) were deficient and 11(50%) female out of 22 enrolled were deficient.

Out of the deficient B12 patients 7 were having severe anaemia, 18 with moderate anaemia and 7 had mild anaemia and 2 having normal haemoglobin levels.

Table 2

Hb	NORMAL B12	B12 DEFICIENT	TOTAL
<7 gm%	01	07	08
7-10 gm%	14	18	32
10-12 gm%	11	07	18
>12gm%	00	02	02
Total	26	34	60

- Infants of vegetarian mother were significant deficient in vitamin B12 as compared to nonvegetarian mother (p=0.0001) (graph 1).

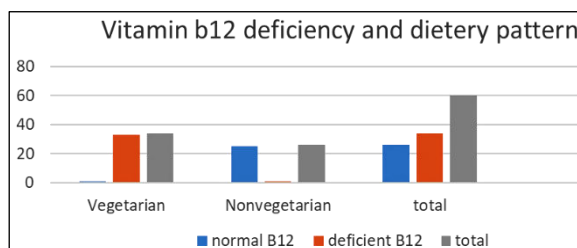


Fig 1

- There is a significant correlation between MCV>85 and vitamin B12 deficient state. (graph 2).

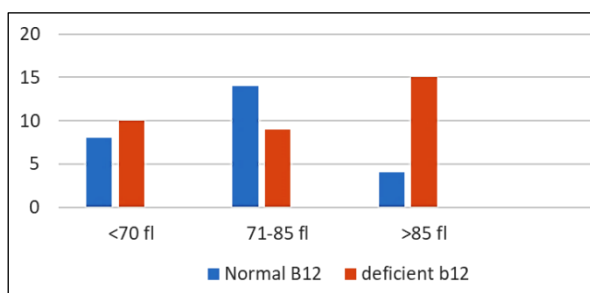


Fig 2

- There is a significant correlation between MCHC >36 and vitamin B12 deficiency.
- There is a significant correlation between RDW > 20 in vitamin B12 deficiency state.
- In our study, there is extremely significant relation between peripheral smear and deficient B12 level. There are 80% chances of macrocytic peripheral smear in vitamin B12 deficiency.
- In our study, among the patients having B12 deficiency, 7 are severe anaemia, 18 having moderate anaemia, 7 are mild anaemia and 2 are having normal Hb level.
- Drugs like Metformin, proton pump inhibitors and histamine (H₂) receptor antagonists may increase the risk of deficiency.
- Hereditary intrinsic factor deficiency and Imerslund-Gräsbeck disease are inborn errors of metabolism leading to vitamin B12 malabsorption and deficiency.

DISCUSSION

Vitamin B12 is a water-soluble vitamin.

Vitamin B12, in form of deoxyadenosylcobalamin, functions as a cofactor for isomerization of methylmalonyl-CoA to succinyl-CoA, which is an essential reaction in lipid and carbohydrate metabolism.

Vitamin B12 is important in hematopoiesis, CNS myelination and mental and psychomotor development.

ABSORPTION

Vitamin B12 is absorbed from ileum at alkaline pH after binding with intrinsic factor. Enterohepatic circulation, direct absorption, and synthesis by intestinal bacteria are additional mechanisms helping to maintain the vitamin B12 nutriture.

SOURCES

- Dietary sources of vitamin B12 are mostly exclusively from animal foods. Organ meats, muscle meats, seafood (mollusks, oysters, fish), poultry and egg yolk are rich sources for it.
- Fortified ready-to-eat cereals and milk and their products are the important sources of the vitamin for vegetarian population.
- Human milk is an adequate source for vitamin B12 breastfeeding infants if the maternal serum B12 levels are adequate.

DEFICIENCY

Deficiency of vitamin B12 caused by inadequate dietary intake occurs primarily in persons consuming strict vegetarian or vegan diets. Breastfeeding infants of B12-deficient mothers are also at risk for significant deficiency.

CAUSES OF VITAMIN B12 DEFICIENCY

- Vegetarian or lactovegetarian populations. Breastfeeding infants of B12-deficient mothers are at risk for significant deficiency.
- Malabsorption diseases (celiac disease, ileal resections, Crohn disease, Helicobacter pylori infection and autoimmune atrophic gastritis (pernicious anemia).

CLINICAL MANIFESTATIONS

Irritability, hypotonia, developmental delay, developmental regression and involuntary movements (predominantly coarse tremors) are the common neurologic symptoms in infants. Older children with vitamin B12 deficiency may show poor growth and poor school performance, whereas sensory deficits, paresthesias, peripheral neuritis, and psychosis are seen in adults. Hyperpigmentation of the knuckles and palms is also a common observation with B12 deficiency in children. Maternal B12 deficiency may also be an independent risk factor for fetal neural tube defects.

LABORATORY FINDINGS

Hematologic manifestations of folate and Cbl deficiency are identical. The anemia resulting from Cbl deficiency is macrocytic, with prominent macro-ovalocytosis of the RBC. The neutrophils may be large and hypersegmented. In advanced cases, neutropenia and thrombocytopenia can also occur, simulating aplastic anemia or leukemia. Serum vitamin B12 levels are low and the serum concentrations of methylmalonic acid and homocysteine are usually elevated. Concentrations of serum iron and serum folic acid are normal or elevated. Serum lactate dehydrogenase activity is markedly increased, a reflection of ineffective erythropoiesis. Moderate elevations of serum bilirubin levels (2-3 mg/dL) also may be found. Excessive excretion of methylmalonic acid in the urine (normal: 0-3.5 mg/24 hr) is a reliable and sensitive index of vitamin B12 deficiency.

CONCLUSION

Vitamin B12 deficiency is a hidden condition in infant and may be found with screening of other illness. In our study the mean age was found to be 9.7 months and more associated with vegetarian diet. Morphologically macrocytic anaemia is seen in Vitamin B12 deficiency and MCV >70 and MCHC >34 is also significant with B12 deficient states. Vitamin B12 supplementation given to mother along with iron folic acid in pregnancy would be beneficial to the baby.

CONFLICT OF INTEREST

The authors reveal that there is no conflict of interest.

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