

Vitamin B₁₂ deficiency in anemic children before versus after age 2 years: a form of hidden hunger in India

To the editor,

Micronutrient malnutrition is an emerging health issue among the developing world. Recently, vitamin B₁₂ has been labelled as micronutrient of public health importance. As per Comprehensive National Nutrition Survey findings, 14% of preschool children aged 1–4 years, 17% of school-age children aged 5–9 years and 31% of adolescents aged 10–19 years had vitamin B₁₂ deficiency.¹⁾ Owing to lower concentration of vitamin B₁₂ in vegetarian diet, vegans are at increased risk of developing vitamin B₁₂ deficiency, which runs as a vicious cycle among malnourished vitamin B₁₂ deficient mothers passing it onto their progeny. Thus, highlighting the role of vitamin B₁₂ supplementation among pregnant, lactating females and infants to ensure adequate vitamin B₁₂ stores and intact neuro-developmental outcome. We conducted the present study to estimate the burden and risk factors of vitamin B₁₂ deficiency among admitted anemic children.

This was a cross-sectional study conducted in the Pediatric ward of a tertiary care hospital of northern India over a period of 1 year after seeking approval from the institutional ethics committee (SRMSIMS/2017-18/106). After taking written informed consent from the parents/caregivers, children aged 6 months to 18 years, with hemoglobin levels below age specific values were included in the study.²⁾ Children with chronic illnesses like tuberculosis, cancer or immunocompromised states, history of blood transfusion in preceding 6 weeks prior to admission, history of intake of vitamin B₁₂ supplements were excluded. Anemia, leucopenia and thrombocytopenia were defined as per the standard guidelines.^{3,4)} Deficiency of vitamin B₁₂ was considered when vitamin B₁₂ levels were less than 150 pg/mL.⁴⁾ Demographic details, clinical history and examination of the enrolled children were recorded in preformed proforma. Vitamin B₁₂ assay was done using chemiluminescence technique.

Statistical tests applied for qualitative data and quantitative data were chi square test and student t test respectively, using SPSS ver. 17.0 (SPSS Inc., Chicago, IL, USA).⁵⁾ *P* value less than 0.05 was considered significant

During the study period, 145 cases of anemia were admitted, of which 30 children had history of hematinics

intake, 12 children received blood transfusion, 3 children were diagnosed with hematological malignancies and parents of 15 children did not give consent for participation into this study. Therefore 85 children were included in the final analysis. Of the 85 anemic children, 40 (47%) had vitamin B₁₂ deficiency. As per this study, 32.5% of infants aged 6–12 months, 22.5% of toddlers aged 1–3 years, 5% of preschool children aged 3–6 years, 17.5% of children aged 6–12 years, and 22.5% of adolescents aged 12–18 years had vitamin B₁₂ deficiency.

India is facing the threat of micronutrient malnutrition as the silent epidemic. We evaluated 85 anemic children aged 6 months to 18 years, during the study period. As per the findings from our study, the average value of vitamin B₁₂ level obtained among infants aged 6–12 months, children aged 1–3 years, 3–6 years, 6–12 years, and 12–18 years was 223.7, 314.4, 284.5, 413.3, and 343.4 pg/mL, respectively. Vitamin B₁₂ deficiency was reported in 47% cases, reasons for such high prevalence could be a hospital-based study receiving relatively more sick and morbid children, thereby unmasking the underlying micronutrient deficiencies in at risk population. The prevalence of vitamin B₁₂ deficiency is variable in other hospital-based studies reported from India, ranging from 16.66% to 64.8%.^{6,7)} This difference could be attributed to variation in socio-cultural beliefs and feeding habits. In a multicenter cross-sectional study on urban school going children by Awasthi et al, vitamin B₁₂ deficiency was found to be 33.4%.⁸⁾ In the present study vitamin B₁₂ deficiency was found most commonly in the age group 6 months to 3 years (55%) followed by 12 to 18 years (22.5%), 6 years to 12 years (17.5%), and 3 years to 6 years (5%). Reasons for higher prevalence of cobalamin deficiency in infants and toddlers seen in our study (Fig. 1) are manifold. Exclusive breastfeeding by malnourished cobalamin deficient mothers confers additional risk of developing vitamin B₁₂ deficiency in their nursing infants. Delayed initiation of complementary feeding and inadequate bovine milk intake further limit dietary intake of infants aged 6 months and above children. The observations serve as an alarming call to action, emphasizing on vitamin B₁₂ supplementation in expectant and lactating mothers

as we practice with regards to folic acid intake. Bimodal age distribution of vitamin B₁₂ deficiency was observed in our study, adolescence is a phase of rapid growth, thus necessitating increased micronutrients intake.

India is a country of great socio-cultural diversity with varying dietary beliefs and practices, predominantly being the vegan diet followers. Strict vegetarians, or vegans, eat plant foods and reject all animal products—meat, poultry, fish, eggs, dairy products. Those who also eat dairy products are called lacto vegetarians. Vegetarians who eat both dairy and eggs are called lacto-ovo vegetarians.⁹ Vitamin B₁₂ deficiency was correlated with vegetarian diet in 65% cases, in our study (Fig. 1). An striking observation of more deficient cases in lacto-vegan group (50%) as compared to pure vegans (15%) was made in this study. It could be due to consumption of lesser quantity or diluted bovine milk. Previous studies have analyzed children till 5 years of age, while the present study evaluated adolescent age group in addition to infants and toddlers bringing out more clarity.

Micronutrient deficiency is aptly labelled as “Hidden hunger,” which can occur without a deficit in energy intake as a result of consuming an energy-dense, but nutrient-poor diet.¹⁰ In accordance with this, nutritional status was found normal in 62.5% cases with decreased vitamin B₁₂ in the present study (Table 1). Active screening for vitamin B₁₂ deficiency needs to be undertaken by clinicians even if the growth parameters remain normal.

Our study faced several limitations. Being a hospital-based study, the findings could not be generalized over a large population. Maternal vitamin B₁₂ levels were not studied and correlated with their vitamin B₁₂ deficient infants. Assessment of novel biomarkers like homocysteine, methylmalonic acid, holoTc (biologically active form of vitamin B₁₂ in plasma) could have been more valid and con-

firmatory in diagnosing vitamin B₁₂ deficiency.

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Footnotes

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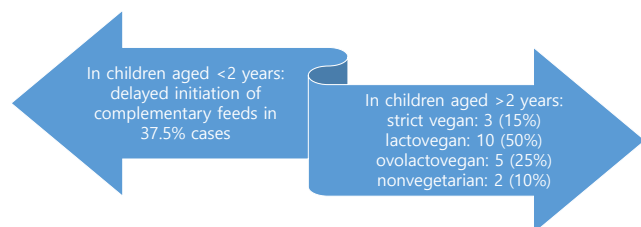


Fig. 1. Vitamin B₁₂ deficiency and dietary profile.

Table 1. Correlation between nutritional status and vitamin B₁₂ deficiency in anemic children

Nutritional status	Vitamin B ₁₂ levels		P value
	Deficient (n=40)	Sufficient (n=45)	
Moderate acute malnutrition	11 (27.5)	14 (31.1)	0.348
Severe acute malnutrition	4 (10)	3 (6.6)	0.467
Normal	25 (62.5)	28 (62.2)	0.004

Values are presented as number (%).

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