



Vitamin B12 Deficiency: Underdiagnosed and Overlooked in Clinical Practice-A Narrative Review

Dr. Om Patel

GMERS Medical College, Himatnagar- Hemachandracharya North Gujarat University, Gujarat, India

* Corresponding Author: **Dr. Om Patel**

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Abstract

Vitamin B12 (cobalamin) is an essential micronutrient required for DNA synthesis, neurological function, and erythropoiesis. Despite its clinical importance, Vitamin B12 deficiency remains significantly underdiagnosed globally, particularly in India, where vegetarian diets are prevalent. This review synthesizes current knowledge about vitamin B12 physiology, epidemiology, clinical presentations, diagnosis, and management, emphasizing greater clinical vigilance and public health intervention to address this critical nutritional deficiency.

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Introduction

Vitamin B12 (cobalamin) deficiency remains a significant, yet often overlooked, nutritional issue affecting populations worldwide. India, with its large vegetarian population, experiences a notably high prevalence. This review explores critical aspects of Vitamin B12 deficiency including physiology, epidemiological trends, clinical implications, diagnostic challenges, and management strategies, based exclusively on high-quality evidence from available literature.

Physiology and Functions of Vitamin B12

Vitamin B12 is integral to vital physiological processes, including erythropoiesis, DNA synthesis, and neurological function [2, 7]. It acts as a coenzyme in essential biochemical reactions, notably converting homocysteine to methionine, crucial for nervous system integrity, and methylmalonyl-CoA to succinyl-CoA, involved in energy metabolism [2, 7, 10].

Epidemiology of B12 Deficiency

Globally, vitamin B12 deficiency is prevalent, particularly in populations consuming predominantly vegetarian diets. Pawlak *et al.* [4] indicated significant deficiency among vegetarians due to limited dietary sources. In India, Gupta *et al.* [6] highlighted widespread deficiency affecting diverse demographic groups, exacerbated by socioeconomic factors and dietary patterns. Mahajan and Gupta [9] further emphasized that prevalence remains high, necessitating routine screening in clinical settings.

Causes and Risk Factors

Dietary insufficiency, malabsorption syndromes, and certain medical conditions significantly contribute to vitamin B12 deficiency. Antony [5] and Allen [1] underscored vegetarian and vegan diets as primary causes due to minimal dietary intake. Additionally, conditions such as pernicious anemia, gastrointestinal disorders, diabetes mellitus, and prolonged medication use (e.g., metformin) pose substantial risks [1, 3, 5].

Clinical Manifestations

Clinical presentations of B12 deficiency are diverse, ranging from asymptomatic or subtle neurological symptoms to severe hematological abnormalities.

Hunt *et al.* [2] and Shipton and Thachil [8] noted common presentations include macrocytic anemia, fatigue, pallor, peripheral neuropathy, cognitive impairment, and psychiatric disturbances. Early symptoms often remain unnoticed, resulting in delayed diagnosis and intervention.

Diagnosis

Diagnosis requires clinical suspicion combined with laboratory investigations. Serum B12 assays remain primary diagnostic tools; however, they may lack specificity. Oh and Brown [7] suggest concurrent measurement of methylmalonic acid and homocysteine levels to improve diagnostic accuracy, especially in ambiguous cases.

Management and Treatment Strategies

Management typically involves supplementation through oral or parenteral routes. Oral supplementation is effective for mild deficiency; severe cases necessitate intramuscular injections [2, 10]. Langan and Zawistoski [10] advocated ongoing monitoring and dietary counseling, particularly in high-risk populations. Public health strategies, including food fortification recommended by WHO [13], are essential preventative measures.

Public Health Implications

Vitamin B12 deficiency constitutes a significant public health concern, particularly in India, given dietary patterns and limited public awareness [11, 12]. WHO guidelines [13] recommend fortification and widespread educational initiatives to mitigate deficiency-related complications. ICMR guidelines [11, 12] also stress promoting dietary diversity and fortified foods in public health programs.

Conclusion

Vitamin B12 deficiency remains an underrecognized yet critical public health issue. Increased clinical vigilance, systematic screening, and public health interventions, including dietary education and food fortification, are essential steps toward preventing complications associated with this easily treatable condition.

References

1. Allen LH. How common is vitamin B-12 deficiency? *Food Nutr Bull.* 2008;29(2 Suppl):S20-34.
2. Hunt A, Harrington D, Robinson S. Vitamin B12 deficiency. *BMJ.* 2014;349:g5226. <https://doi.org/10.1136/bmj.g5226>
3. Kibirige D, Mwebaze R. Vitamin B12 deficiency among patients with diabetes mellitus: is routine screening and supplementation justified? *J Diabetes Metab Disord.* 2013;12:17. <https://doi.org/10.1186/2251-6581-12-17>
4. Pawlak R, Lester SE, Babatunde T. The prevalence of cobalamin deficiency among vegetarians assessed by serum vitamin B12: a review of literature. *Nutr Rev.* 2013;71(2):110-7. <https://doi.org/10.1111/nure.12001>
5. Antony AC. Vegetarianism and vitamin B-12 (cobalamin) deficiency. *Am J Clin Nutr.* 2003;78(1):3-6. <https://doi.org/10.1093/ajcn/78.1.3>
6. Gupta A, Kapil U, Ramakrishnan L, Pandey RM, Yadav CP. Prevalence of vitamin B12 deficiency among healthy adult school teachers residing in Delhi. *Indian J Community Health.* 2011;23(3):140-50.
7. Oh RC, Brown DL. Vitamin B12 deficiency. *Am Fam Physician.* 2003;67(5):979-86.
8. Shipton MJ, Thachil J. Vitamin B12 deficiency - A 21st century perspective. *Clin Med (Lond).* 2015;15(2):145-50. <https://doi.org/10.7861/clinmedicine.15-2-145>
9. Mahajan R, Gupta K. Revisiting vitamin B12 deficiency: A clinico-hematological appraisal. *Indian J Endocrinol Metab.* 2021;25(1):1-7. https://doi.org/10.4103/ijem.ijem_123_21
10. Langan RC, Zawistoski KJ. Update on vitamin B12 deficiency. *Am Fam Physician.* 2011;83(12):1425-30.
11. National Institute of Nutrition (ICMR). Dietary Guidelines for Indians - A Manual. Hyderabad: ICMR; 2020.
12. Indian Council of Medical Research - National Institute of Nutrition (ICMR-NIN). Nutrient Requirements and Recommended Dietary Allowances for Indians. Hyderabad: ICMR-NIN; 2020.
13. World Health Organization (WHO), Food and Agricultural Organization (FAO). Guidelines on food fortification with micronutrients. Geneva: WHO; 2006.