



## VITAMIN B<sub>12</sub> DEFICIENCY POLYNEUROPATHY – AN AYURVEDIC VIEW

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### ABSTRACT

Vitamin B<sub>12</sub> consists of a class of chemically related compounds (Vitamers), all of which show pharmacological activity. Vitamin B<sub>12</sub> deficiency is a common but under-recognized, yet easily treatable disorder in older adults. Causes of deficiency include failure to separate Vitamin B<sub>12</sub> from food protein, inadequate ingestion, absorption, utilization, and storage as well as drug-food interactions leading to malabsorption and metabolic inactivation. *Ayurveda* The diseases are categorized into two due to *Santarpana* (increased nutrition) and *Aptarpana* (decreased nutrition). *The Aptarpanotha diseases* involves manifestations like fever, anorexia, papatations, body pain, joints pain. *Aptarpana* causes *Dhatu kshaya* which further leads to *Sneha kshaya* & *Vata prakopa* causing *vata vyadhi*. Role of *Vata* is indispensable as the entire nervous system is under the control of *vata*. Though the role of *Vata* is found at large in peripheral neuropathy, the role of *Pitta and Kapha* cannot be neglected as it is said that all diseases are *Tridoshaja* according to *Ayurveda*.

**KEYWORDS:** Vitamin b12 deficiency, neuropathy, *vata vyadhi*.

### INTRODUCTION

Nutritional deficiency is from various combinations of starvation, abnormal assimilation of the diet, the stress response of illness, and abnormal nutrient metabolism. Intestinal mucosal malabsorption (as in celiac disease) is commonly associated with additional deficiencies of other water soluble Vitamins. Vitamin B<sub>12</sub>, also called cobalamin, is a water-soluble Vitamin that has a key role in the normal functioning of the brain and nervous system, and the formation of red blood cells. Some research states that certain non-animal products possibly can be a natural source of Vitamin B<sub>12</sub> because of bacterial symbiosis.<sup>[1]</sup>

Vitamin B<sub>12</sub> consists of a class of chemically related compounds (Vitamers), all of which show pharmacological activity. It contains the biochemically rare element cobalt (chemical symbol **Co**) positioned in the center of a planar tetra-pyrrole ring called a corrin ring.<sup>[2]</sup>

#### Absorption

The total amount of Vitamin B<sub>12</sub> stored in the body is between two and five milligrams in adults. Approximately 50% is stored in the liver, but approximately 0.1% is lost each day, due to secretions into the gut not all of the Vitamin in the gut is

reabsorbed. While bile is the main vehicle for B<sub>12</sub> excretion, most of the B<sub>12</sub> secreted in bile is recycled via enterohepatic circulation.<sup>[3]</sup>

#### Causes

Vitamin B<sub>12</sub> deficiency is a common but under-recognized, yet easily treatable disorder in older adults. Causes of deficiency include failure to separate Vitamin B<sub>12</sub> from food protein, inadequate ingestion, absorption, utilization, and storage as well as drug-food interactions leading to malabsorption and metabolic inactivation.<sup>[4]</sup>

Generally in all ages the causes of cobalamin deficiency are infections like *H.pylori*, *Giardia lamblia*, fish tapeworm; malabsorption & medical conditions like Gastric resection, inflammation of small intestine, Crohn disease.<sup>[5]</sup>

It has been suggested that serum cobalamin <148 pmol/L (200 ng/L) would be sensitive enough to diagnose 97% of patients with Vitamin B<sub>12</sub> deficiency.<sup>[6]</sup> The clinical picture is the most important factor in assessing the significance of test results assessing cobalamin status because there is no 'gold standard' test to define deficiency.<sup>[7]</sup>

Recent research indicates it may also occur in some algae, such as *Chlorella* and *Susabi-nori* (*Porphyra*

yezoensis). However, B<sub>12</sub> deficiency can occur even in people who consume meat, poultry, and fish. An estimated 20% of patients with neurological signs do not manifest anaemia.<sup>[8]</sup>

### Neurological Mechanism

Neurological manifestations occur due to Vitamin B<sub>12</sub> deficiency. There is demyelination of peripheral nerves, posterior nerves, posterior & lateral columns of spinal cord & brain. Patient presents with paraesthesia & numbness of extremities, weakness & sensory ataxia. Involvement of brain results in irritability, dementia or frank psychosis.<sup>[9]</sup>

### Prevalance

In the developing world the deficiency is very widespread, with significant levels of deficiency in Africa, India, and South and Central America. Inadequate intake, due to low consumption of animal-source foods, is the main cause of low serum Vitamin B<sub>12</sub> in younger adults and likely the main cause in poor populations worldwide. The reported prevalence of deficient and marginal values is much higher in African and Asian countries eg 80% in Indian preschoolers and 70% in Indian adults.<sup>[10]</sup>

### AYURVEDIC REVIEW

*Ayurveda* The diseases are categorized into two due to *Santarpana* (increased nutrition) and *Aptarpana* (decreased nutrition),<sup>[11]</sup> *The Aptarpanotha diseases* involves manifestations like fever, anorexia, papatations, body pain, joints pain.<sup>[12]</sup> *Aptarpana* causes *Dhatu kshaya* which further leads to *Sneha kshaya* & *Vata prakopa* causing *vata vyadhi*. In such a case clinically manifestations will be similar to that of *prakupita Vata lakshan* & *Vata vyadhi* as *Dhatu kshaya* is the major cause for *Vata prakopa*.

As *Ayurveda* being a wholistic medicine the approach to understand B12 neuropathy revolves around a subtype of *Vata vyadhi*. Among *vata vyadhi*, few conditions like *padashula*, *suptapadata*, *bahu sosha*, *vepathu*<sup>[13]</sup> are mentioned. Also in *vata vyadhi samanya lakshanas*, *spandana*, *gatra suptata*, *toda*, *akshepa*.<sup>[14]</sup> etc are enumerated. Role of *Vata* is indispensable as the entire nervous system is under the control of *vata*. Two cardinal patterns of *vata vyadhi* is mentioned.<sup>[15]</sup>

- 1) *Dhatu Kshaya*
- 2) *Margavarodha*

As mentioned above, the pathology of Peripheral Neuropathy, according to contemporary science it is clearly understood that the major pathology involves Axon and Schwann cell that produces the myelin sheath. *Dhatu Kshaya* in peripheral neuropathy at micro level, there is degeneration of Schwann cells causing demyelination followed by axon degeneration. This particular condition can be considered as *dhatu kshaya* at *asthaya* or *sookshma* level as there is deprivation of myelin (principal constituents being *rasa*, *medo* and

*majja dhatus*). While mentioning the *samprapti* of *Vata Vyadhi* it is said that “*srotases*” which are devoid of *sneha* get filled up by *balavan vayu* causing different diseases either systemic (*sarvanga*) or local (*ekanga*).<sup>[16]</sup> Hence *Dhatu kshaya* in peripheral neuropathy is clearly understood. Though the role of *Vata* is found at large in peripheral neuropathy, the role of *Pitta* and *Kapha* cannot be neglected as it is said that all diseases are *Tridoshaja* according to *Ayurveda*. Few of the symptoms seen in peripheral neuropathy also show the impact of *Pitta* and *Kapha* i.e. *Kara Pada Daha* (burning sensation of palms and soles). At the same time it is also mentioned that *Pitta*, *Kapha* and all other *Dhatu*s and *Malas* are crippled and its only *vata* that controls all these components of the human body. Hence correction of *Vata* is very important so as to bring normalcy to the body.<sup>[17]</sup>

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