

Low Serum Vitamin B₁₂ Concentrations in Alcoholics; Improvement with Liver Therapy

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THE PROTECTIVE effect that vitamin B₁₂ exerts on the liver seems to be well established according to reports by Burns and McKibbin, Campbell and Pruitt, Strength *et al* as well as Hove and Hardin,¹ and Popper *et al*.² In addition, Wolff, Royer, and Karlin³ have determined the liver stores of vitamin B₁₂ after administration of carbon tetrachloride to rats. Following administration of this toxic agent by inhalation, injection, and ingestion, a 50 per cent reduction in concentration of vitamin B₁₂ in the liver was found. This reduction was related to the degree of fatty infiltration. Inasmuch as alcoholism is generally associated with various degrees of liver damage, the above findings suggested an investigation into the effects of alcoholism on the serum vitamin B₁₂ concentration in humans.

We have studied both healthy individuals and 18 patients, including cases of anemia, cancer, and myeloid leukemia. The average serum vitamin B₁₂ level in this group was 0.53 mμg per ml. The average total serum vitamin B₁₂ level was determined after heating at 120° C for 6 minutes with KCN (pH 5.5) and in dilutions at pH 6.8⁴ with *Escherichia Coli 113-3*. Further details can be obtained in work previously published.^{5,6}

We also selected nine cases of chronic alcoholism hospitalized for typical gastric or neuritic disorders or for withdrawal therapy. In these subjects the low serum vitamin B₁₂ concentrations were found as noted in Table I.

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Supported by Grant de l'Institut National d'Hygiène-Paris (Directeur Professeur L. Bugnard).

In these cases of chronic alcoholism the average serum vitamin B₁₂ concentration was found to be 0.26 mμg/ml, or approximately one-half that of the concentration found among normal individuals.

DISCUSSION

Several factors serve to explain the 50 per cent reduction in serum levels. These may be: the low intake of nutrients with a high vita-

TABLE I
Serum Vitamin B₁₂ Levels in Chronic Alcoholic Patients

Patient number	Age	Clinical condition	Serum vitamin B ₁₂ mμg/ml
1	53	Polyneuritis, cardiac failure	0.28
2	64	Pulmonary abscess	0.35
3	69	Cor pulmonale, acute alcoholism, withdrawal treatment	0.19
4	45	Withdrawal treatment	0.24
5	29	Withdrawal treatment	0.20
6	49	Delirium tremens	0.20
7	57	Polyneuritis, senility, cardiac failure	0.40
8	51	Cirrhosis	0.22
9	43	Delirium tremens	0.28
		Average	0.26

min B₁₂ content because of the lack of appetite, irregular diet, etc., and impaired absorption resulting from physiopathologic changes in the gastrointestinal mucosa.

Liver damage *per se* however is apparently not a predominant factor because in studies on five cases with extensive hepatic involvement we have found after the daily intramuscular

administration of liver extract* containing 10 μg of vitamin B₁₂, the average serum vitamin B₁₂ concentration was within the normal range (Table II). Simple intramuscular liver therapy

TABLE II

Improvement in Serum Vitamin B₁₂ Levels in Liver Disease after Intramuscular Liver Therapy*

Patient number	Age	Clinical condition and treatment	Vitamin B ₁₂ level $\mu\text{g}/\text{ml}$
1	62	Portal hypertension and polyneuritis; 15 days of treatment for a total of 150 μg vitamin B ₁₂	0.60
2	30	Cirrhosis, polyneuritis; 7 days of treatment, total 70 μg	0.54
3	45	Hepatomegaly polyneuritis; 5 days of treatment, total 50 μg	0.40
4	45	Early cirrhosis, polyneuritis; 13 days, total 130 μg	0.54
5	46	Cirrhosis, asthma; 150 μg	0.63
		Average	0.54

* Liver extract (Choay's) containing 10 μg vitamin B₁₂ per 2 ml administered daily.

containing minimal amounts of cyanocobalamin produces normal values. No reason, therefore, can be found to support the frequent use of enormous doses of vitamin B₁₂, that is, from 500 to 1,000 μg . It has been reported that almost total excretion of the vitamin occurs under these conditions. The specific mechanism of the action of vitamin B₁₂, when administered intramuscularly, has not been established. As far as we know, normalization of the serum level seems to be a reasonable objective. It appears that this can be satisfactorily achieved

* A preparation of liver extract (Choay's) containing 10 μg vitamin B₁₂ per 2 ml administered daily.

with liver extract therapy. Jones, Mills and Capps⁷ using a method with *Euglena gracilis* observed markedly elevated total serum level in patients with alcoholic cirrhosis. However, our alcoholic patients were without severe hepatic injury.

CONCLUSIONS

Serum total vitamin B₁₂ concentrations were found to be low in cases of chronic alcoholism. The concentrations were 50 per cent below that of a normal group (normal 0.53 μg per ml; the average in alcoholism was 0.26 μg per ml).

Normalization of vitamin B₁₂ concentrations was satisfactorily obtained with a daily intramuscular injection of liver extract containing 10 μg of cyanocobalamin. Mention is made of the waste that administration of large doses of vitamin B₁₂ represents.

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