PRELIMINARY AND SHORT REPORT

AN EFFECT OF PANTOTHENIC ACID ON SERUM COPPER VALUES IN HUMAN PELLAGRA*

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In Pretoria, roughly 5 per cent of Bantu (Negro) patients seen at the Skin Out-Patients Department have clinically obvious pellagra, and 5 per cent of the Bantu cases admitted to the medical wards show the clinical consequences of malnutrition. Latent malnutrition must therefore be widespread in the apparently normal Bantu population (1).

Studies made on the serum copper values of the normal Bantu in the environs of Pretoria have shown that the levels found are significantly higher than those of a control group of adequately nourished whites. The figures for the whites in Pretoria agree with those normals published from other countries (2).

The following extracts from Rothman's Physiology and Biochemistry of the Skin then gave us stimulus to investigate the matter further:

". . . Pantothenic acid may play a role in the utilization of copper for hair growth and melanin formation. Hundley and Ing find that the skin of pantothenic acid-deficient rats may contain five times as much copper as normal rat skin, and they suggest that graying and poor hairgrowth in these deficient rats result from faulty copper utilization in the skin so that copper accumulates" (p 672).

"Pantothenic acid deficiency has not been reported in man. . . " (p 673).

We therefore wondered whether the malnourished Bantu with their high serum copper values were not perhaps suffering from a fault of copper utilization, due to lack of pantothenic acid in the diet.

METHODS

Total serum copper levels were estimated spectrophotometrically, using bis-cyclohexanoneoxalyldihydrazone (3). Owing to the nature of the findings reported below, only one experiment was possible per patient, and for this purpose, eight adult Bantu patients with clinically obvious pellagra of the skin were used. Four normal white subjects were also subjected to similar tests.

RESULTS

A short sample series of serum copper determinations taken at random from untreated Bantu pellagra patients showed values that were up to double some of those obtained from healthy whites.

We further established that in those patients with pellagra, receiving no other treatment, the serum copper values fell to below half, and sometimes to almost one quarter of the original levels, after giving a single dose of 1–1.5 g. pantothenic acid (Bepantol, Roche) intramuscularly. This reduction in serum copper persisted at the low level for at least a week, and could not be lowered further by giving more pantothenic acid. It was found that nicotinamide given for a few days before or after the pantothenic acid did not influence this copper lowering effect. The copper levels that had been lowered by pantothenic acid now fell in a range probably below the normal. The rate of fall of the copper was rapid, and the low level was reached within a day, with some noticeable reduction after 2 hours. Some random urine samples failed to show copper excretion during the period of drop in serum copper. In normal white subjects no significant change in the serum copper was observed after the same doses pantothenic acid. Similarly, in one pellagra patient the copper values were within the normal range, and were unchanged by pantothenic acid administration.

SUMMARY

It was found that when serum copper levels were raised in human pellagra cases, the levels could be lowered to an irreducible value for at least a week by a single dose of pantothenic acid. Elevation of serum copper may thus be an index of pantothenic acid deficiency in man.

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