A STUDY ON SERUM COPPER LEVEL IN 20 ACUTE SCHIZOPHRENICS*

By

E. L. EDELSTEIN, M.D., D. KRASSILOWSKY, M.D.

From the Psychiatric Hospital "Talbieh", affiliated to the Medical School, Hebrew University and Hadassah, Jerusalem

and

J. GDALIA, Ph.D.

From the Department of Preventive Medicine and Hygiene, Hebrew University-Hadassah Medical School, Jerusalem

BLOOD copper had been known to be increased in pregnancy, chronic infections and neoplasms. Since the publication of Ullrich in 1942 (9), who found an increased copper level in the blood of schizophrenics, the hypercupraemia has been recognized as possibly significant and pathognomonic in this disease. Therefore during the following years a few investigators studied this aspect and also tried to prove the implications of this fact.

Brenner and Breier (3) and Bischoff (2) found a high blood-copper level in schizophrenics.

It was found that 96 per cent. of the blood copper is bound to an α_2-globulin, named coeruloplasmin (6). This copper globulin has been recognized as the enzyme in serum, which catalyses epinephrine oxidation, at least in vitro (7). Leach *et al.* (7) also found a significantly high blood-copper content bound to coeruloplasmin in schizophrenics as compared with mentally healthy controls. This high copper level and simultaneously elevated serum amine-oxidase might be of some importance in epinephrine metabolism, as aberrations in the breakdown of epinephrine seem to make possible the liberation of toxic and hallucinogenic substances as adrenochrome and adrenolutin.

Lately, however, studies have been undertaken by Aprison *et al.* (1), Frohman *et al.* (5) and Scheinberg (8), who could not find any significant difference in blood copper or coeruloplasmin content in schizophrenics as compared with normals.

Stimulated by the investigation in this subject and by the possible important implications of its results on further enzymatic research, we examined the serum-copper content of a small number of schizophrenic patients.

MATERIAL

We examined the blood of 20 schizophrenic in-patients, who had not had any treatment yet, either at their home or in the hospital after admission. Their respective ages were between 22 and 45 years. As this is a country of constant immigration it might be of interest to state their various countries of origin: born in Israel were 4; from Poland 4; Germany 1; Bulgaria 1; Roumania 1;

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Chile 1; Morocco 1; The Yemen 2; Syria 1; Afghanistan 1; Turkey 1; Iraq 2.

Of the 20 schizophrenics, 10 were of the paranoid type, 3 catatonics, 2 hebephrenics, 3 simplex and 2 of the circular form. 10 control cases were taken from members of the hospital staff, belonging to the same age group of from 22 to 45 years.

Method

Blood was taken by syringes and needles, which had been previously treated by bi-distilled water.

Serum proteins were precipitated by trichloracetic acid. The clear filtrate was treated with sodium diethyl-dithiocarbamate and the amount of copper determined by the method of Cartwright *et al.* (4) using a photo-electric colorimeter (Lumetron model 402-E). The concentration of copper in normal serum by this method varies between 80 and 160 mcg per 100 ml. of serum.

Result

Schizophrenics:	*Copper content, expressed in mcg. per 100 ml.*				
(a) Paranoids:	(1) 120.	(2) 164.	(3) 100.	(4) 72.	(5) 106.
	(6) 177.	(7) 104.	(8) 160.	(9) 130.	(10) 115.
(b) Catatonics:	(11) 132.	(12) 120.	(13) 125.		
(c) Hebephrenics:	(14) 144.	(15) 130.			
(d) Simplex:	(16) 138.	(17) 200.	(18) 110.		
(e) Circular:	(19) 126.	(20) 96.			

The average of the serum copper level of all schizophrenics was 128 mcg/100 ml. serum.

Normal controls ranged between 66 to 142 mcg/100 ml., with an average of 107·5 mcg/100 ml. serum.

Only 3 samples of schizophrenic blood were at the upper limit obtainable by this technique or showed only an insignificant increase.

The Standard Deviation (SD) of the schizophrenic copper level was 28·5, that of the controls was 20·15. Therefore the difference in variability was a very slight and insignificant one.

Although this pilot study includes only a relatively small number of cases, we are inclined to believe, as other authors lately, that there is no significant hypercupraemia to be found in schizophrenics. Therefore, the copper level, cannot be used as an auxilliary diagnostic test, nor does it seem to show any connection with aberrant epinephrine metabolism, as far as the latter is concerned with the enzymatic breakdown by the amine oxidase coeruloplasmin.

Summary

Blood samples of 20 acute cases of Schizophrenics were examined for their copper content. No significant increase in serum-copper level as compared with normal controls could be found by this method.

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