SERUM IRON, TOTAL IRON-BINDING CAPACITY, TRANSFERRIN AND HAPTOGLOBIN CONCENTRATION IN SCHIZOPHRENIC PATIENTS

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SYNOPSIS

Serum transferrin, haptoglobin, iron concentrations and total iron-binding capacity were measured in 40 hospitalized schizophrenic patients and 42 healthy control subjects. Transferrin and haptoglobin levels were assayed by immunoelectrophoretic methods while serum iron and total iron-binding capacity were determined chemically. There were no significant differences in any of the parameters investigated between the schizophrenic and healthy individuals. Analysis of the results also showed that the length of illness did not have any effect on these parameters.

INTRODUCTION

A number of reports of changes in levels of various serum proteins in schizophrenic patients have been made (1). Among the proteins measured were pre-albumin, albumin, alpha$_1$-antitrypsin, haptoglobin, ceruloplasmin, hemopexin, transferrin, fibrinogen and the different immunoglobulins. However, conflicting results were obtained. These may have been caused in certain cases by different criteria of diagnosis of illness, the effect of drugs that the patients were taking but not taken into account, as well as the effect of hospital diet on the parameters investigated. The present report is based on a preliminary investigation of the effects of schizophrenia on serum transferrin, haptoglobin and iron concentrations in a group of Chinese patients in Singapore.

MATERIAL AND METHOD

All patients were male Chinese suffering from schizophrenia with age ranging from 28 to 54 years, hospitalized in Woodbridge Hospital, Singapore. The duration of illness of 35 of the patients in the group ranged from 10 to 400 months, with a mean of 185 months (S.D = 83 months). The length of illness of five patients was not known. The control population samples were healthy male blood donors comprising 28 Chinese, 11 Malays and 3 Indians, with ages ranging from 18 to 56 years.

All serum samples were stored at -20°C before use. Transferrin and haptoglobin concentrations were measured using a quantitative electroimmunoassay method (2), in 1.5% agarose gel. Specific antibodies to human transferrin and haptoglobin as well as standard serum were obtained from Behringwerke AG (Germany). Serum iron and total iron-binding capacity of the samples were measured chemically using the methods recommended by the International Committee of Standardization in Haematology (3, 4).

RESULTS AND DISCUSSION

The concentrations of serum transferrin, haptoglobin, iron and total iron-binding capacity (TIBC) in schizophrenic patients and healthy subjects are shown in Table 1. There was no significant differences between the two populations in any of the parameters measured. These results suggest that schizophrenic patients had normal levels of serum transferrin, haptoglobin and iron and TIBC.

Table 1
Comparison of serum transferrin, haptoglobin and iron concentrations and total iron-binding capacity (TIBC) in 42 control and 40 schizophrenic subjects.

	Schizophrenic		Control	
	Mean	S.D.	Mean	S.D.
Transferrin*	268.6	19.4	262.4	26.0
TIBC**	91.1	17.9	89.7	17.1
Serum iron**	24.6	8.01	29.5	9.57
Haptoglobin*	214.3	78.3	180.0	60.1
Age (yrs)	37.7	5.92	26.9	8.37

* Values are given as mg/dL
** Values are given as μmol/L

Frohman *et al* (5) reported lowered levels of transferrin and iron in the serum of schizophrenic patients when compared to normal subjects. However, both schizophrenic and normal samples were relatively small, 16 and 11 respectively. These parameters were also measured in non-schizophrenic patients of the same hospital and were found to be significantly reduced when compared to both normal subjects and schizophrenic patients. Thus, the reduction in these two parameters in the schizophrenic patients might have been due partly to the hospital diet. Two later reports (6, 7) failed to show any significant difference in transferrin concentrations between schizophrenic patients and normal controls.

Conflicting data on the influence of schizophrenia on serum haptoglobin concentration had also been reported in the literature. An increase was observed by Gammack & Hector (8) in a group of 10 acutely-ill schizophrenic subjects compared to a control group matched for sex, age, weight and general standard of nutrition. Similar increases in haptoglobin concentrations were observed when 60 recently admitted male schizophrenic patients were compared to normal subjects working in the same hospital (9). However, Clarke *et al.* (6) failed to show any increase in haptoglobin concentration in chronically ill schizophrenic patients. A suggested explanation for the differences in observation may lie in the samples of the first two reports. The results of the first two papers were obtained from either acutely-ill or recently admitted patients. Haptoglobin concentrations had been reported to be increased in a variety of other diseases associated with inflammation, infection, or neoplasia (10) and may be considered as a non-specific reaction protein or acute-phase protein. Thus the increased haptoglobin concentrations in the patients in these two reports might have been due to stress and not related to schizophrenia *per se*.

The effects of the length of illness on the serum transferrin, haptoglobin and iron levels were also investigated in this study (Table 2). No significant differences were observed in these parameters in patients whose length of illness were lesser or greater than 200 months. This suggests that there was no change in concentration in transferrin, haptoglobin or iron occurred as illness progressed.

Table 2
Serum transferrin, haptoglobin and iron concentrations and total iron-binding capacity (TIBC) according to duration of illness.

	Length of Illness (months)			
	<200		>200	
	Mean	S.D.	Mean	S.D.
Number of samples	20		15	
Transferrin*	265.9	19.1	270.7	21.6
TIBC**	86.8	19.8	95.5	16.6
Serum iron**	25.2	8.16	23.6	7.93
Haptoglobin*	209.2	78.4	206.7	81.7
Age (yrs)	35.2	5.51	41.3	5.15

* Values are given as mg/dL
** Values are given as μ mol/L

In the present study, the control population was made up of three races. It is possible that the parameters measured may be different for the different races and combining them would affect the results. However, results in Table 3 showed that there was no significant differences between Chinese and Malay subjects in any of the parameters measured. None of these parameters in Chinese schizophrenic patients differed significantly from Chinese healthy subjects.

Table 3
Comparison of serum transferrin, haptoglobin and iron concentrations and total iron-binding capacity (TIBC) in Chinese and Malay healthy subjects (control).

	Chinese		Malay	
	Mean	S.D.	Mean	S.D.
Number of samples	38		11	
Transferrin*	257.2	26.1	270.2	22.3
TIBC**	86.7	18.4	95.5	12.0
Serum iron**	29.9	9.43	25.9	7.62
Haptoglobin*	172.0	55.9	215.8	63.6
Age (yrs)	27.8	7.79	26.3	10.6

* Values are given as mg/dL
** Values are given as μ mol/L

In conclusion, the results presented here indicate that there was no change in serum transferrin, haptoglobin, iron and total iron-binding capacity in schizophrenic patients compared to a normal control. However, it must be pointed out that this report did not take into account a variety of conditions which might influence these parameters. Some of the patients were under drug treatment and no attempt could be made to investigate their effects on the parameters measured due to the small size of the sample. The sample size needs to be greatly increased before sub-division of the patients into the various categories of drugs taken is feasible. The effect of the duration of hospitalization on these parameters was also not examined. A sample of non-schizophrenic patients from the same hospital may be a better control for comparison.

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