SERUM CPK LEVELS IN SCHIZOPHRENICS AND THEIR FIRST DEGREE RELATIVES*

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Summary : Blood samples of 20 schizophrenic patients, 20 of their first degree relatives and 43 normal subjects, both male and female, were taken and serum CPK estimation was done by using colorimetric sigma procedure. The schizophrenics and their 1st degree relatives had shown a significantly higher mean$\pm$S.D. CPK levels of 31.25$\pm$21.6 and 16.15$\pm$4.7 Sigma Units respectively as compared to 11.16$\pm$3.38 Sigma Units in normals (Cal. t=5.73, tab. t=1.65 at df=61 and P<05) A significant difference between the CPK levels of male and female of the three groups was found (P<.05). The males of normal, Schizophrenics and Ist degree relatives had significantly higher mean$\pm$S.D. CPK levels of 12.65$\pm$3.05, 47.4$\pm$18.73 and 19.5$\pm$1.93 Sigma Units respectively as compared to levels of 9.45$\pm$2.94, 15.10$\pm$4.33 and 12.71 $\pm$2.47 sigma units in females of the corresponding three groups (P<.05). Males of the patients and 1st degree relatives had shown higher levels than the females. A highly significant and positive correlation was found between the mean serum CPK levels of Schizophrenic patients and their 1st degree relatives (Correlation coefficient (γ_{yx})=0.79).

Key words : serum CPK schizophrenics

INTRODUCTION

Mean serum CPK levels were found to be elevated during acute psychiatric episodes by Meltzer (5, 6) and by other workers (1, 12, 13). Recently (2, 16) the isoenzymes of CPK in serum and CSF of schizophrenics and in acute psychotic states have been investigated. CPK isoenzymes have been found to increase in other conditions like brain damage and heart damage, alcoholism and muscular diseases (15). Several investigators have suggested that motor activity was the main reason for increased CPK levels during acute psychotic episodes. According to Meltzer (7, 8) the increased motor activity is one of the main contributing factor for the raised level, but observed that the CPK levels in functional psychotic patients are still higher even after the motor activity was controlled. Serum CPK activity has been tested in patients with progressive muscular dystrophy and their relatives for the detection of genetic carriers (4).

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We have investigated serum CPK levels in relation to male and female of schizophrenic patients in acute phase of illness and their 1st degree relatives and these results are given below.

MATERIAL AND METHOD

Patients diagnosed as schizophrenic in acute phase of illness and their first degree relatives have been studied. Serum CPK levels were determined by Sigma method vide Sigma Technical Bulletin No. 520(10). Patients and their first degree relatives were interviewed for other factors that might influence the CPK levels Only those patients and relatives, who had not received the intramuscular injection suffered the seizure disorder/brain trauma or other brain damage were included in the present work. History of muscle damage or heart ailment was also taken into consideration and only those subjects who were sound in health and mind and devoid of above disorders were included in the present study in order to know the normal level of serum CPK.

Assay : Colorimetric sigma method of serum CPK estimation was carried out within an hour of the blood collection in schizophrenic patients, their 1st degree relatives and no mal subjects. The method was slightly modified where one *mg* reduced glutathione, found to be optimum for enzyme activity, was added in incubation mixture before ADP. The solutions of phosphocreatine, reduced glutathione and ADP were kept frozen at –10°C when these are not used.

The assay system adopted was as follows : substrate 0.5 *ml*, 1.5 *mg* creatine phosphate in 0.1 M Tris buffer pH 7.5 containing 1.5 *mg* $MgCl_2$. $6H_2O$ then added 0.1 *ml*, 1.0 *mg* reduced glutathione, pH 7.0 and 10 μl serum in the test only and was preincubated for 2 or 3 min at 37°C. The reaction was started by the addition of 0.1 *ml*, 0.82 *mg* ADP, pH 7.0. After 30 min of incubation at 37°C the reaction was terminated by the addition of 0.2 *ml*, 3.6 *mg* p-OH mercuric benzoate, then added 10 μl serum in the control. In order, 1.0 *ml*, 20 *mg* α-naphthol (prepared in stock alkali – 6 *g* NaOH and 12.8 *g* Na_2CO_3/100 *ml* distilled water). 1.0 *ml*, 0.05% freshly prepared diacetyl and 7.0 *ml* distilled water, was added and content of centrifuge tubes were mixed thoroughly. Tubes were incubated for 15 min at 37°C for final color development then centrifuged for 5 min at 2,000 *g*. Pink colour developed is directly proportional to the CPK activity. Readings of Test control and standard was taken at 530 *nm* (green filter) in a colorimeter by setting instrument at zero O.D. with the blank.

One Sigma unit is defined as that amount of enzyme which will liberate 1 milli micromole creatine per minute at 37°C from phosphocreatine per *ml* of Serum.

RESULTS

As can be seen in Table I the schizophrenic patients and their 1st degree relatives had shown a significantly higher mean±SD CPK levels of 31.25±21.6 and 16.15±4.7 Sigma units (respectively as compared to 11.16±3.38 units in normals (Cal. t=5.73, tab. t=1.65 at df=61 and P<.05).

TABLE I : Serum CPK levels in different categories of either sex.

Category	*Age (years)*	*Number of cases*			*C.P.K. levels (Mean±S.D.) (Sigma units)*		
		Male	*Female*	*Total*	*Male*	*Female*	*Total*
Normal	16–42	23	20	43	12.65 ±3.05	9.45 ±2.94	11.16 ±3.38
First degree relatives	18–30	12	8	20	19.5 ±1.93	12.71 ±2.47	16.15 ±4.70
Schizophrenia	16–35	10	10	20	47.4 ±18.73	15.10 ±4.33	31.25 ±21.6

There was a significant difference between the CPK levels of male and female of the three groups (P<.05). The males of normal, schizophrenics and their first degree relatives had significantly higher mean±S.D. CPK levels of 12.65±3.05, 47.4±18.73 and 19.5±1.93 Sigma units respectively as compared to levels of 9.45±2.94, 15.10±4.33 and 12.71±2.47 Sigma units in females of the corresponding three groups. Although significant increase (P<.05) in serum CPK level was observed for both male and female schizophrenic and their 1st degree relatives, the increase in case of female was less in comparison to males of the two groups and almost four fold increase was obtained for male schizophrenic patients.

The mean serum CPK levels in schizophrenic patients and their 1st degree relatives were statistically found to be highly significant and positively correlated (correlation-coefficient (γ_{YX})=0.79).

DISCUSSION

Our findings are in agreement to the earlier reports that schizophrenic patients in acute phase of illness have higher mean serum CPK levels than those of the normal subjects. The increase in CPK level was found for both male and female of the patients

and their relatives. But males had shown significantly higher ($P<.05$) levels than the females of all the three categories. And almost four fold increase in the CPK level was observed for male schizophrenics. It is reported that normal male showed higher CPK levels than the females (9) and enzyme activity is influenced by musculature and muscle activity in the subject (3). In light of the reports (3, 9) it is possible that male patients may have more increase in serum CPK than the females. The same trend of sharp rise in CPK level of male 1st degree relatives of the patients was also observed. It may be possible that factors responsible for elevation of serum CPK are more aggrevated in males than the females. The artifacts in the technique of estimation seems to be quite unlikely. Recently (14), serum and CSF enzymes have been estimated in acute psychotics and contrary to the reports of Meltzer they have not found significant increase in mean serum CPK levels. In our findings the male patients in acute phase of illness had shown a substantial increase in CPK levels. Whereas only 60% female petients had a slight but significant increase in enzyme level. It is of interest for future investigations in iCPK level of male and female schizophrenics.

First degree relatives of the patients have shown the tendency to have raised levels of the serum CPK than the normal subjects. It seems that possibly some common factor exist which tend to raise the levels in the schizophrenics and their relatives. It can be of significance for the hereditory role in schizophrenic illness.

Several factors have been attributed for the increase in CPK levels in acute psychotic patients and brain dysfunctions. It is believed that due to cell membrane permeability, increased efflux of enzyme from the skeletal muscle occurred and was possible cause for raised CPK levels (5 to 8). Schizophrenics have been shown to possess the generalised increase in metabolic activity (11). These factcrs may be regarded as possible explanation for raised CPK levels in schizophrenia.

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