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Lactate dehydrogenase and transaminase activities in the cerebrospinal fluid of protein-energy malnourished children

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With 2 tables

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Neurological disorders are commonly recorded in cases suffering from protein-energy malnutrition (PEM). These disorders are reflected in the form of apathy, dullness, and mental retardation, which are among the clinical features of the disease (1). Several studies denoting deficits in peripheral nervous system in nutritional disorders are available (2). Abnormal EEG in cases suffering from PEM among Egyptian children were reported by *Awwaad* (3) and *Elwaan* (4). At the same time, significant variations in both blood serum and cerebrospinal fluid (CSF) lactate dehydrogenase (LDH) as well as glutamic-oxalacetic transaminase (GOT) were observed in patients suffering from cerebrovascular disease, head injury, degenerative diseases of the central nervous system, and convulsive disorders (5).

Because of the relative inaccessibility of the brain tissues, the concentrations of certain metabolites and activities of some enzymes in the CSF may, however, provide an index for the metabolism of these substances in the brain.

The aim of the present work is to explore whether there are variations in the LDH and GOT of the CSF of these children suffering from PEM and the significance of these variations if present.

Material and methods

The material of the present study comprises thirteen cases suffering from kwashiorkor of moderate severity and ten normal cases of the same age group and socioeconomic status serving as controls for comparison.

Fasting blood samples were taken, sera were separated and enzyme activities were immediately carried out. CSF samples were gained by lumbar puncture.

LDH activities were determined according to the colorimetric method described by *Wootton* (6). GOT activities were assayed according to the method described by *Frankel* and *Reitman* (7). Activity units were expressed in mU per ml. Data obtained were statistically analysed using the *Student* t test.

Results and discussion

The results of the present work were presented in the accompanying tables.

Table 1. Lactate dehydrogenase and glutamic oxalacetic transaminase activities in blood serum and CSF of normal controls (mU/100 ml).

	Serum		CSF	
	GOT	LDH	GOT	LDH
A. N.	5	149	0	5
N. H.	8	170	2	3
A. O.	10	159	0	13
L. M.	6	163	3	18
Z. I.	9	150	3	22
S. M.	11	112	0	10
T. H.	12	130	3	12
B. E.	14	117	2	24
M. H.	10	126	0	14
S. S.	6	153	0	8
Mean	9.10	143	1.30	12.90
SE ±	0.80	5.50	0.24	2.17

Table 2. Lactate dehydrogenase and glutamic-oxalacetic transaminase activities in blood serum and CSF of PEM children (mU/100 ml).

	Serum		CSF	
	GOT	LDH	GOT	LDH
A. S.	29	260	10	20
B. I.	38	180	12	13
S. K.	20	158	10	20
A. H.	45	106	23	15
S. A.	12	195	17	22
S. M.	20	300	12	18
M. L.	42	248	10	10
Z. M.	37	185	15	38
H. K.	22	121	8	42
S. R.	17	165	10	25
F. L.	35	132	9	45
M. M.	21	170	7	38
M. G.	19	148	9	59
Mean	27.40	173	12	27
SE ±	3.16	15.49	1.18	4.36
$p <$	0.005	0.10	0.005	0.01

CSF-GOT showed negligeable activities in normal cases, and about fifty per cent of the normal cases studied failed to show any appreciable enzyme activities. This finding may agree, in part, with that reported by *Abbassy* (8) during his study on transaminase activity in paralytic polyomyelitis. This author failed to show any appreciable GOT activity in normal children. Several workers (9, 10) have reported that transaminase activities could not be detected in the CSF of infants and children contrary to healthy adults, who showed values up to 40 units per ml. The variation in enzyme activity with age may be attributed to the virgin nature of the nervous tissue in infants and children.

In PEM cases studied, CSF-GOT activities showed relatively higher values if compared with normal controls, and these differences are statistically significant. Increased activities of CSF-GOT have been reported to occur in a number of neurological disorders such as cerebro-vascular disease, degenerative diseases of the central nervous system and convulsive disorders (5).

CSF-LDH showed lower activities in normal children than that reported for adults (11). PEM cases studied showed a mean value of 27 mU per ml, which is about twice its corresponding value for the normal controls. Thus LDH agreed with GOT in these increased values of CSF enzyme activities.

Serum enzymes, S-GOT, and S-LDH showed a statistically significant increase in PEM children, but no correlation could be deduced between serum and CSF enzyme activities. This finding agreed with that reported by *Green* (12) in this respect, and this is persumed to be due to blood brain barriers.

Variations in CSF enzyme activities in various neurological disorders have been ascribed variously to either release of enzymes from destroyed tissues, alterations in intracellular metabolism, difference in cell permeability, or decreased elimination of these enzymes from the CSF (13).

On the light of the above-mentioned suggestions, increased activities of CSF enzymes in PEM reflect some alterations in the intracellular metabolism of the brain in these cases. This suggestion can be supported by mental retardation and apathy among these children. This can also be evidenced by the occurrence of oedema and congestion of brain tissues in PEM (14) as well as the differences reported in the brain weight and head circumferences which are lesser than normal (15).

Decreased elimination of these enzymes from CSF can also be expected since even blood serum contains relatively higher amounts of these enzymes in PEM cases if compared with normals. These increased serum enzyme activities render the liver, which is the main site for such elimination processes, unable to eliminate these increased amounts of enzymes from CSF of PEM cases. This can be suggested if blood brain barriers are affected in these cases.

Summary

The present study is aiming to assess whether there are variations in the activities of the enzymes glutamic-oxalacetic transaminase (GOT) and lactate dehydrogenase (LDH) in the cerebrospinal fluid (CSF) of children suffering from protein-energy malnutrition (PEM). In this respect, serum and CSF activities of GOT and LDH were assayed in thirteen cases suffering from kwashiorkor and ten normal cases serving as controls. Increased activities of both enzymes in sera and CSF of PEM children compared with normals were observed. The significance of these variations was discussed.

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