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SERUM AND CEREBROSPINAL FLUID CREATINE PHOSPHOKINASE ENZYME AND ISOENZYMES LEVELS IN CREBROVASCULER PATIENTS.

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Although, after the acute brain injuries serum and cerebrospinal fluid samples show changes of creatine phosphokinase enzyme activity and existence of creatine phosphokinase isoenzymes, correlation between these changes and the severity of the brain injury isn't well determined (6,8,10,11,17). These enzymatic changes aren't solely depend on the severity and the degree of the brain injury, it also depends on the time of the sample is taken (9,12). In CSF samples, CPK BB isoenzyme activity can be detected six hours later after the onset of brain injury and nearly persists for a week (1,4,5,16). In serum CPK BB isoenzyme activity reaches at the highest levels in the first few hours and disappears within 24-48 hours (14,15).

It is accepted that the existence of CPK BB isoenzyme in CSF and its high level are more important than the changes of serum isoenzymes and also CSF CPK BB isoenzyme has more reliable evidences about the prognosis and the severity of the lesion (3,7,13). It is known that CPK BB isoenzyme which exists in CSF originates from brain but serum CPK BB isoenzyme has no definite origin (3,6,11,13).

MATERİALS AND METHODS

The biochemical assesments were done 30 patients who had hospitalized duiring first twenty-four hours of their cerebrovasculer disease. Sixteen of them were cerebral hemorrhages an fourteen were cerebral ischemic infarcts.

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Samples of blood and CSF were frozen immediatly. Bloody CSF samples from patients with cerebral hemorrhages were santrifuged before frozen. After total CPK determination of CSF and blood samples, the isoenzyme separation were done seven cases of the high CPK values. In two cases isoenzyme studies were performed both in serum and CSF, in four cases of serum and one case of CSF.

CSF and blood samples of the patients with herniate disk disease used as control group.

The CPK activity determined with method of Huges. which is modified by Menache and Gaist (2).

Isoenzyme determinations were done by colon chromatography with DEAE-Sefadeks A-50. Different ion concentrations used to separate three kind of isoenzymes. Brain type eluted with 100 mmole NaCL heart type with 200 mmole NaCL and muscle type with 500 mmole NaCL.

CPK activity were determined with the same method after elution of each type. Mann-Whitney test used for statistical data.

RESULTS

Serum and CSF CPK enzymes levels were studied in all the patients. But CPK enzyme activity couldn't be detected in serum samples of two patients and in CSF of ten patients (Table I).

As control group, in ten cases with disk disease serum CPK levels were studied and in eighteen cases with disk disease CSF CPK values also were studied In the later group nine patients showed no CPK activity in CSF. (Table II).

In control group, mean serum CPK value was 35,80 IU, mean CSF CPK value was 1,23 IU. In patients group, mean serum CPK value was 28,3 IU and mean CSF CPK value was 10,74 IU. In patients group the highest serum CPK value was 113,7 IU, the highest CSF CPK value was 80,5 IU. There was no correlation between the total CPK values in serum and CSF. We had some cases which showed high levels of CPK activities in serum but no activity in CSF. Isoenzymes studies could be achived only seven cases which had high levels of total CPK enzyme activities. In two of the seven cases, isoenzymes studies were performed both in serum and CSF, in four cases in serum and in one case only in the CSF.

Table I - CPK enzyme and isoenzyme values in patients

Case No.	Sex/Age	Hemorrhage	Infarct	CPK (IU)		CPK Isoenzyme (IU)					
						Serum			CSF		
				Serum	CSF	BB	MB	MM	BB	MB	MM
1.	W49/		+	33.3	2.8						
2.	M/66		+	113.7	x	56.80	20.30	35.93			
3.	M/67		+	22.2	7.02						
4.	W/75	+		60.6	x	x	x	19.6			
5.	M/53		+	x	5.8						
6.	W/72	+		4.16	7.41						
7.	M/55		+	42.1	7.4	x	x	38.8			
8.	W/65		+	6.35	x				6.2	5.6	1.57
9.	W/55		+	32.01	12.12						
10.	M/66	+		76.2	80.5	16.94	55.20	14.28	45.40	10.23	24.33
11.	W/48	+		36.3	9.0						
12.	W/50		+	46.17	7.2	x	x	20.60			
13.	W/53		+	12.12	x						
14.	M/57		+	24.57	6.35						
15.	M/62	+		33.35	x						
16.	W/57		+	30.02	x						
17.	W/57	+		38.62	x						
18.	M/70	+		40.02	x						
19.	M/49		+	18.68	10.76						
20.	W/52	+		10.42	3.10						
21.	M/48	+		45.36	9.81	25.8	4.6	30.3	6.15	x	13.25
22.	W/49	+		23.5	2.2						
23.	M/58		+	21.2	x						
24.	M/52	+		5.1	50.82						
25.	W/62	+		15.69	x						
26.	W/55		+	17.79	75.80						
27.	M/75	+		12.8	2.5						
28.	M/48		+	12.1	5.13						
29.	W/82	+		x	6.06						
30.	W/50	+		15.2	11.1						
Mean			=	28.381	10.745						
Standart Error			=	4.388	3.757						

(x) No Activation

Table II - CPK values in control cases

	Serum-CPK (IU)	CSF-CPK (IU
	32.0	2.02
	22.0	x
	20.0	x
	35.0	x
	34.0	2.05
	47.0	1.45
	55.0	x
	56.0	x
	36.0	0.72
	21.0	x
Mean =	35.800	x
Standart errer =	4.189	1.12
		x
		7.85
		1.1
		2.0
		3.9
		x
		Mean = 1.234
		Standart errer = 0.467

(x) No activation

Serum creatine phosphokinase levels have revealed no meningful differences between the patients and control group ($P > 0,05$). Also serum CPK values have revealed no meningful differences between the patients with cerebral hemorrhage and cerebral infarct ($P > 0,05$).

CSF CPK levels have revealed considerable differences between the patient and control group ($P < 0,01$).

In alive patients, mean serum CPK value was 20,76 IU, mean CSF CPK value was 8,60 IU. In dead patients, mean serum CPK value was 35,87 (IU), mean CSF CPK value was 12,88 IU. They aren't any meaningful differences between dead and alive patients in terms of serum and CSF levels ($P > 0,05$).

Isoenzymes studies were performed in serum of four cases. In three of them only CPK MM isoenzyme was found and in one case

three isoenzymes (CPK MM, CPK MB, CPK BB) could be detected. In two cases isoenzyme studies were performed both in serum and CSF. In one of these, three types of isoenzymes were found in serum and CSF and in one case CPK BB, CPK MB, CPK BB were found in serum, CPK BB, CPK MM, were found in CSF. In one case, three isoenzymes were found in CSF (Table III).

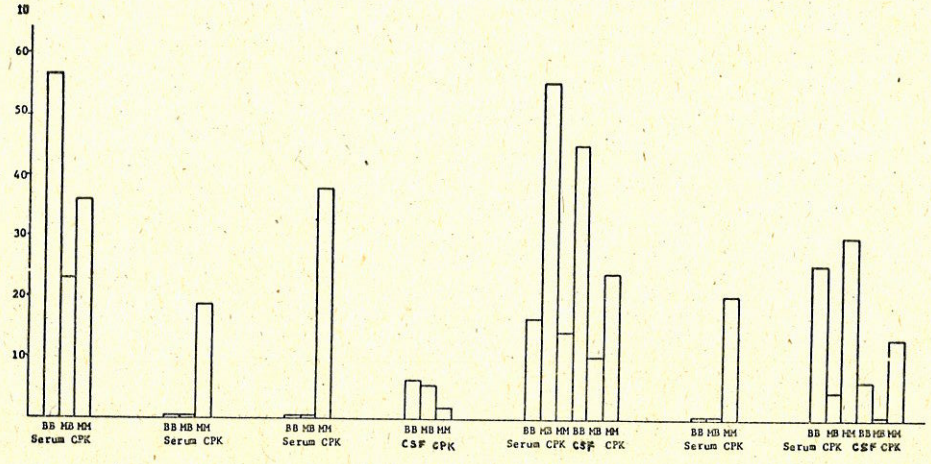

Table III -Isoenzyme values in CSF and Serum

DİSCUSSİON

Florez et al (6) 1976), Maas (12) 1977 reported that after the acute brain injury CPK activity increased in CSF. Maas also reported that increased CSF CPK enzyme activity had prognostic value. We have found the higher CSF CPK enzyme activity in cases in cerebrovasculer patients than in control cases. But both of changes in CSF and serum haven't revealed much about prognosis.

Longstreth et al (11) 1981 suggested that level of CSF CPK BB isoenzyme activity may be useful predictors of neurologic outcome in patients resuscitated out of the hospital cardiac arrest. We also have found that in cases in which CSF CPK BB was available and was especially in high level prognosis seemed to be worse.

Florez (6) 1976, Maas (12,13) 1977, Longstreth (11) 1981 reported that after the brain injury increased CSF CPK BB isoenzyme acti-

vity was due to the demaged blood brain barrier. But it is not likely for serum CPK activity, it comes from the brain across the demaged blood brain barrier and also can originate from extraserebral sources. We agree with the data, We haven't found firm evidence about the origin of the serum CSF CPK BB activity but we have appreciated that CSF CPK BB isoenzyme comes from the brain across the demeged blood brain barrier.

As a result CSF CPK levels have revealed considerable differences between the patients and control group ($p<0,01$). Serum and CSF CPK values haven't revealed much about prognosis but in cases in which CSF CPK BB isoenzyme was available and was especially in high levels the prognosis seemed to be worse. (Table IV).

Table IV - Relationship Between Mortality and Occurence of Brain type Creatine Kinase isoenzyme in CSF of patients With Acute Cerebral Disorders.

	Patient Mortality	
	BB-CPK-Positive	BB-CPK-Negative
Cerebral Hemorrhages	2/3	1/3
Cerebral Thrombus (ischemic brain infarction)	1/2	1/2
Total	3/5	2/5

ÖZET

Serebrovasküler hastalık tanısı almış 30 hastanın serum ve BOS numunelerinde CPK enzimi ve izoenzimleri araştırılmıştır. Serum CPK seviyeleri kontrol grubu ile hasta grubu arasında anlamlı bir farklılık göstermemiştir ($p>0,05$), fakat BOS CPK seviyeleri kontrol grubu ile hasta grubu arasında anlamlı bir farklılık göstermiştir ($p<0,01$).

Yaşıyan ve vefat eden hastaların serum ve BOS CPK değerleri arasında anlamlı bir farklılık yoktur ($p>0,05$). Serum ve BOS CPK değerleri prognoz hakkında bilgi vermemiş olmasına rağmen BOS'da CPK BB izoenziminin bulunuşu ve özellikle yüksek oluşunun kötü prognozu gösterebileceğini tespit ettik.

SUMMARY

Serum and cerebrospinal fluid creatine phosphokinase enzyme and isoenzyme levels in cerebrovascular patients.

Serum and cerebrospinal fluid creatine phosphokinase enzyme and isoenzyme levels were investigated in thirty cerebrovasculer patients. Serum creatine phosphokinase levels have revealed no meaningful differences between the patients and the control group ($p>0,05$). But cerebrospinal fluid creatine phosphokinase levels have revealed considerable differences between the former and control group ($p<0,01$). There aren't any meaningful differences between dead and alive patients in terms of serum and cerebrospinal fluid levels ($p>0,05$). Although serum and cerebrospinal fluid creatine phosphokinase values haven't revealed much about prognosis, in cases in which cerebrobrospinal fluid creatine phosphokinase BB was available and was especially in high levels prognosis seemed to be worse.

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