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Efficacy of Routine Serum Laboratory Tests in Seizures of Children.

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ABSTRACT

Fifty epileptic patients and Fifty normal healthy individuals as a control were recruited in this study. Spectrophotometric technique was used to determine all the parameters in this study. Data were expressed as mean \pm SD. Statistical comparison among different groups was performed by using ANOVA tests. Statistical significance was defined. The treated group (particularly with valproate), show increases in the levels of sodium and potassium with no difference in calcium. However, among untreated epileptics. The above parameters differ in epileptics comparable to controls and hence their correlation to seizures pathophysiology and their degree of control or resistance to antiepileptic drug therapy.

Keywords: seizures, Sodium, Potassium, Calcium.

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INTRODUCTION

Seizures are the most common paediatric neurologic disorder, with 4% to 10% of children suffering at least one seizure in the first 16 years of life [1]. The incidence is highest in children younger than 3 years of age, with a decreasing frequency in older children [2]. Epidemiologic studies reveal that approximately 150,000 children will sustain a first- time, unprovoked seizure each year, and of those, 30,000 will develop epilepsy [1]. Indeed , it is one of the main reasons for presentation in the emergency departments. When confronted with a paediatric patient presenting with seizure, it is vital to stabilize the child and then to determine whether a real seizure has occurred. Moreover, it is critical to find the precipitating factor. A detail history and medical examination are beneficial in providing adequate information regarding the probable cause of the seizure[3].

A neurons[4]. The tendency to have recurrent, unprovoked seizures occurs with a prevalence of about 0.5%, and a cumulative lifetime prevalence of 3%. It covers a range of different conditions with varying etiology[5]. Certain minerals balance is crucial for a healthy nervous system and neuronal susceptibility to excitability. In the paediatric word, the commonest neurological disorder encountered is seizure. When a child presents with recurrent seizures, a series of investigation would be carried out to elicit the underlying cause.

Several reports suggested that the body electrolytes (sodium (Na⁺), potassium (K⁺) and calcium (Ca⁺) play a vital role in seizure condition to develop [6,7].

The determination of serum electrolytes and calcium screens may not be necessary in a child who is alert and has returned to a baseline level of function and should be based on clinical suspicion [8]. In patients who have no identifiable risk factors, an accurate and thorough history and physical examination have been shown to yield more diagnostic information than a laboratory evaluation [9]. So we planned to estimate the levels of minerals in seizure patients.

MATERIALS AND METHODS

Our study is a retrospective, cross sectional study on children who admitted with febrile convulsions (FC) in Bharati Vidyapeeth Deemed University Medical College and Hospital, Sangli. The project was approved by the ethical committees of B.V.D.U Dental College and Hospital, Sangli.

We enrolled 50 patients in an age group of 1 years to 14 years with febrile seizure. Patients with a history of illnesses that effect serum electrolytes. Collected data included age, gender, type of convulsions (simple or complex), recurrence of seizures (more than one time FC during the life of the patient), family history of FC and epilepsy in first and second relatives.

In this study a total number of 100 subjects between age 1 yrs to 14 yrs matched with age and sex were included. They were distributed in 50 healthy children without seizures and 50 seizure patients.

From each case, five ml venous blood was collected. the blood sample was allowed to clot at room temperature and centrifuged at 3000 rpm for 10 min and the serum was collected, and aliquots of this serum was kept frozen at 20°C until they were used to assay of serum electrolytes (Ca⁺, Na⁺, and K⁺). Spectrophotometric technique was used to determine all the parameters in this study.

Data were expressed as mean ± SD. statistical comparison among different groups was performed by using anova tests.

RESULTS

Table 1 Showing Mean and SD of Electrolyte (Na⁺, K⁺) and Sr Ca concentration in seizure patients and Control Group

Parameters	Groups	Mean ± S.D	t test	P value
Sodium , Na ⁺ (mmol/L)	seizure patients (n=50)	141.86 ± 5.159	5.888	0.000*
	Control group (n= 50)	136.54 ± 3.770		
Potassium K ⁺ (mmol/L)	seizure patients (n=50)	4.080 ± 0.6506	4.965	0.000*
	Control group (n= 50)	3.518 ± 0.4663		

Calcium Ca (mg/dl)	seizure patients (n=50)	8.872 ± 0.5817	1.193	0.236 NS
	Control group (n= 50)	8.740 ± 0.5233		

* - Significant , NS- Not Significant

There was significant increase in mean values of ,Na⁺and K⁺ level in seizure patient as compared to control (p>0.000). Also the mean values of Ca⁺in seizure patients was increased but it was not found to be statistically significant. (P> 0.236)

Table 2 Age Wise Distribution of electrolyte and Calcium concentration in Study and Control Group By Using ANOVA.

Groups	Parameters	1 to 5 Years Mean ± S.D	6 to 10 Years Mean ± S.D	More than 10 Years Mean ± S.D	F value	P value
Seizure patients	Sodium Na+(mmol/L)	141.59 ± 4.426	139.92 ± 5.760	143.69 ± 5.338	1.959	0.152 NS
	Potassium K+(mmol/L)	4.164 ± 0.6751	4.308 ± 0.4033	3.794 ± 0.6971	2.634	0.082 NS
	Calcium Ca (mg/dl)	8.755 ± 0.6300	8.817 ± 0.4260	9.075 ± 0.5916	1.508	0.232 NS
Control Group	Sodium Na+(mmol/L)	137.09 ± 3.930	136.42 ± 3.919	135.80 ± 3.509	0.527	0.594 NS
	Potassium K+(mmol/L)	3.604 ± 0.4311	3.575 ± 0.4309	3.340 ± 0.5235	1.617	0.209 NS
	Calcium Ca (mg/dl)	8.82 ± 0.627	8.52 ± 0.449	8.80 ± 0.355	1.470	0.240 NS

According to age wise distribution, there was no statistically significant change observed in mean values of electrolyte Na⁺, K⁺ and Ca⁺ level in seizure patient as compared to control.

DISCUSSION

Febrile convulsion (FS) is the most common cause of seizures among children. It has been known since ancient times that seizures frequently accompany fever in young children [10]. FC is a terrifying event for the parents, which seeks emergent medical attention. Attempts have been made to identify predisposing risk factors and predictors of seizure recurrence. This knowledge has a practical value whether to admit the child and advising parents of a repeated convulsion [11]. In the present study, we investigated the levels of major element concentrations among children with FS.

The mechanisms of epileptogenesis are not well established. several studies in the last years suggested that the body electrolytes and the activities of antioxidant defense mechanisms may be causally involved in some forms of epilepsies and also to increase the recurrence of seizures[12-14].

Several studies suggested that the body electrolytes play a vital role for enabling seizure conditions to develop; and routine laboratory estimation of serum na⁺, k⁺, and ca 2⁺ are essential for the rational understanding and management of epileptic patients [15].

The present study reported high Na levels in seizures patients. Reported hypernatremia in seizure children. white et al [16] Reported elevation of Na levels during periods of intense seizure activity. In contrast, natelson et al. and shah et al [17].

Unlike other electrolyte alterations, hypokalemia or hyperkalemia rarely causes symptoms in the CNS, and seizures do not occur. Changes in the extracellular potassium level (serum levels) have predominant and profound effects on the function of the cardiovascular and neuromuscular systems. Thus severe potassium abnormality may provoke fatal arrhythmias or muscle paralysis before central nervous system CNS symptoms appear. In summary, seizures often represent an important clinical manifestation of electrolyte disturbances. Seizures are more common in patients with sodium disorders,. Successful management of patient seizures begins with the establishment of an accurate diagnosis of the underlying electrolyte disturbances. For that reason, complete serum chemistry, including measurements of electrolytes, especially sodium, calcium, and magnesium, should be part of the initial diagnostic workup in adult patients with seizures. Early identification and correction of these disturbances are necessary to control seizures and prevent permanent brain damage, as Antiepileptic drugs AEDs alone are generally ineffective. All physicians should be aware of these clinical conditions and have an understanding of the underlying medical disorders, for this may provide the means of controlling the disease and initiate a rapid and appropriate therapy [18].

We reported high Na⁺ levels in epileptics. Biochonski et al. [19] reported hypernatremia and hypokalemia in epileptic children. White et al. [20] reported elevation of Na⁺ levels during periods of intense seizure activity. In contrast, Natelson et al. [21] and Shah et al. [22] reported unaffected serum Na⁺ during and after seizure activity in their untreated patients.

Some study reported hypokalemia that is observed in epileptics may be expressed as an increase in the ratio of interacellular to extracellular K⁺ concentrations, which may result into serious neurological symptoms. Hamed et al [23] In our study K⁺ levels was significantly increased as compared to controls. White et al. [20] Reported elevation of K levels during periods of intense seizure activity.

It is well documented that alterations in the levels of serum Ca are responsible for initiation of convulsions [24,25]. Neonatal hypocalcaemia have also been reported to be the cause of convulsions [26,27]. Serum Ca levels were reported to be unaltered in generalized and unspecified seizures [28]. Rutter et al. [29] reported normal serum levels in children with febrile conversion. Hamed et al.[23] reported no difference in the levels of Ca among the group of patients and the normal healthy group. In our study no difference in the levels of Ca among the group of patients and the normal healthy control group.

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