

Clinical pattern of seizures in hospitalized children

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ABSTRACT

Objective: Seizures continue to be a major problem in the pediatric age group. The cause and clinical presentation of these seizures are vast and variable. This is a prospective study, conducted with the aim of assessing the magnitude and presentation of this problem in the region of Al-Madina Al-Munawara, Kingdom of Saudi Arabia.

Methods: All the cases of seizures admitted to Madina Maternity & Children's Hospital, Al-Madina Al-Munawara, Kingdom of Saudi Arabia from April 2000 to July 2000 were included in the study. The age groups studied were from 8 days old to 14 years.

Results: Out of 1593 patients admitted to the Pediatric Department, 138 (8.7%) were admitted with seizures. Fifty-

one (37%) cases were of established epilepsy, 42 (30.4%) of febrile convulsions and 27 (19.6%) of hypocalcemic convulsions. The rest of the total includes first attack of non-febrile seizure, neonatal seizures, encephalitis and drug toxicity.

Conclusion: We observed and concluded that seizures due to epilepsy remain the most common cause, with febrile convulsion and hypocalcemic convulsion a second and third major causes. As observed, we also recommend further studies into the association of hypocalcemic seizures with underlying active rickets in the pediatric age group.

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Seizures are the major paroxysmal disorder in children¹ and occur with a frequency of 4-6 cases/1,000 children.² The challenge is for the clinicians to differentiate seizure activity from normal or other pathological movements caused by other mechanisms. Seizures and epilepsy are clinical phenomena resulting from abnormal and excessive excitability of neurons of the cerebral hemispheres which lead to an intermittent, paroxysmal, stereotype disturbance of consciousness, behavior, emotion, motor function, perception or sensation which may occur singly or in any combination.³ The clinical presentations of seizures in children are very variable. According to age groups, it may be subtle seizures or an apneic attack in neonatal age groups or tonic, clonic, tonic-clonic, atonic, absence, abnormal sensation or behavior abnormalities in older

pediatric age groups. Seizures may be focal in origin or generalized, as well as focal with secondary generalization. Causes of seizures in children are many. It can be primary idiopathic cerebral neuronal disorders or secondarily provoked by other causes such as fever, infections, metabolic, and electrolyte imbalance or developmental brain abnormalities. The cause of the seizure also depends on the age group. Seizures occurring in the neonatal age group are symptomatic or cryptogenic, very few are idiopathic (5%) such as benign (familial) neonatal convulsions.^{4,5} The symptomatic causes are due to hypoglycemia, hypocalcemia, acidosis, congenital metabolic diseases such as ketotic hyperglycinemia, galactosemia, or aminoacidopathies, pyridoxine dependency, or maternal drug withdrawal, cerebral malformation and dysgenesis,

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hypoxic ischemic encephalopathy as birth complication or prematurity sequelae such as periventricular hemorrhage as well as congenital infections. In toddlers and young children febrile convulsion is the most common cause of seizures and accounts for approximately 3-5% of this age group.⁶ Meningitis, encephalitis (+/-herpes) and brain abscess should always be considered in any febrile patient presenting with seizures.¹³ Epilepsy is the most common cause of chronic seizures in children as well as in adolescents and the adult age group, and the causes can be idiopathic, cryptogenic or symptomatic.⁷ This study was conducted to assess the causes and magnitude of seizures in Al-Madina Region, Kingdom of Saudi Arabia (KSA).

Methods. Madina Maternity & Children's Hospital, with 200 beds in the pediatric section is the main referral hospital in the Al-Madina Region of KSA, including the private sector, serving a population of 1000,000. The study time was from April 1, 2000 to the end of July 2000. All the patients presenting to the Emergency Department with seizures requiring admission to the intensive care unit or general wards in the hospital were included. The age limit was from 8 days of life to 14 years, early neonatal age groups requiring admission to nursery or the neonatal intensive care unit were excluded. Any patients with seizures requiring only a few hours of observation in the Emergency Department and discharged were not included in the study. A structured data collection sheet was used for all included patients, and completed during hospitalization. The data considered for analysis included; age and sex of the patients, type of seizures, focal, generalized or focal with secondary generalization; underlying causes of the seizures, laboratory investigations and associated diseases. All patients were treated according to the causes of their presentations and diseases and discharged with good general condition and no mortality.

Results. Out of 1593 patients admitted to the pediatric section, 138 (8.7%) patients were admitted with seizures. The age groups were divided into 3 categories, infants (<1 year) 54 (39.1%), 25.5% of which were neonates, children ≥ 1 -<6 years comprised 56 (40.6%), and children ≥ 6 years comprised 28 (20.3%). The male to female ratio was 1.6:1. The most common causes of seizure in our study group were established epilepsy 51 (37%), febrile convulsion 42 (30.4%) and strangely enough, hypocalcemic seizures (serum calcium 1.7 mmol/L or less) in 27 (19.6%) as a third common cause, see **Table 1**. The other rare causes included are seizures with encephalitis, seizures with drug toxicity and breath holding seizures. The most common underlying causes of epilepsy were, idiopathic epilepsy 22 (42.3%), epilepsy with cerebral palsy and mental retardation 13 (25%), epileptic syndrome 7 (13.5%), central nervous system malformation 3 (5.8%), neurodegenerative brain disease 2 (3.8%), and post traumatic epilepsy and

Table 1 - Serum calcium levels and age group.

Age category	Age	Serium calcium levels
Neonate	8 days	1.7 mmol/L
Neonate	9 days	1.5 mmol/L
Neonate	11 days	1.6 mmol/L
Neonate	15 days	1.6 mmol/L
Neonate	15 days	1.3 mmol/L
Infant	45 days	1.6 mmol/L
Infant	47 days	1.5 mmol/L
Infant	2 months	1.6 mmol/L
Infant	2 months	1.6 mmol/L
Infant	2 months	1.4 mmol/L
Infant	2 months	1.4 mmol/L
Infant	3 months	1.4 mmol/L
Infant	3 months	1.7 mmol/L
Infant	4 months	1.7 mmol/L
Infant	5 months	1.6 mmol/L
Infant	5 months	1.4 mmol/L
Infant	6 months	1.7 mmol/L
Infant	7 months	1.6 mmol/L
Infant	8 months	1.4 mmol/L
Infant	9 months	1.7 mmol/L
Infant	9 months	1.1 mmol/L
Infant	10 months	1.6 mmol/L
Infant	10 months	1.3 mmol/L
Infant	12 months	1.7 mmol/L
Infant	12 months	1.7 mmol/L
Infant	13 months	1.3 mmol/L

chromosome 18 deletion. The main seizure types were generalized in 80 (58%), focal in 37 (26.8%), focal with secondary generalization in 12 (9%) and undetermined in 9 (6.5%).

Discussion. Our study shows the seizures constituted 138 (8.7%) of pediatric patients (1593) admitted to the hospital. Among the causes, seizure due to epileptic disorders were 51 (37%) and it was the most common cause, similar to another local study.⁸ Among epileptic disorders, 42.3% were idiopathic, 25% were due to cerebral palsy and hypoxic ischemic encephalopathy, comparable to other local studies.^{8,14} 13.5% were due to epilepsy syndrome or epilepsy associated with syndromes such as Rett's Syndrome. Lastly 5.8% were due to CNS malformation such as absence of corpus callosum (Aicardi syndrome). Febrile convulsions 42 (30%) constitute the second most common cause, again similar to the study quoted above.⁸ Among febrile convulsion patients, 69% were the first attack, 19% were the second attack, and the rest were third or fourth. Hypocalcemic seizure can be a manifestation of vitamin D deficiency rickets especially with breast-fed infants,¹⁵ and in our study it was the third common cause of seizures, accounting for 27 (19%) seizure cases, out of these 48% were due to active florid rickets, a common nutritional disorder, second to iron deficiency anemia in our community which requires further studies.⁹⁻¹¹ Transient hypoparathyroidism was the cause in 11.5% and 7.7% were due to hypocalcemia secondary to Sanjad Sakkati syndrome.¹² First isolated attack of non-febrile seizure was found in 8.9% of

patients, and they are under follow-up. The rest of the cases included breath holding attacks, drug intoxication, neonatal sepsis, seizure with meningitis, Sturge-Weber syndrome, Charge syndrome and hydrocephalus with ventriculoperitoneal shunt and others.

In light of the above observations, we conclude that seizure due to epilepsy remains the most common cause of admitted children with seizure, comparable to other studies, followed by febrile convulsion and hypocalcemic convulsion. We also recommend further study of hypocalcemic convulsion associated with active florid rickets in our sunny community, in which health education regarding nutrition and sun exposure plays a very important role in the prevention of rickets.

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