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CAUSES OF SEIZURES IN CHILDREN

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ABSTRACT

OBJECTIVE: *To determine the causes of seizures in children*
DESIGN: *An observational, cross-sectional study.*
PLACE & DURATION OF STUDY: *Paediatrics Ward of Civil Hospital Karachi; January 2004 to December 2006*
PATIENT AND METHODS: *Children ages of 2 months to 15 yrs, had seizures were enrolled. A detailed history and complete systemic examination, especially nervous system was done. Initial work-up like complete blood pictures, blood culture, CSF analysis and culture, blood sugar, calcium, alkaline phosphatase, creatinine and electrolytes were done. While other specialized investigations were performed as per specific scenario.*
RESULTS: *Total of 283 children, in which male 54% and female 46% were seen. Seventy nine percent were less than five years of aged. The most frequent causes of seizures were metabolic (30%), nervous system infection (29%), febrile seizures (18.7%) and the other causes of seizures were idiopathic epilepsy (7.8%), cerebral palsy (7.4%), neurodegenerative disorders (3.5%) and sequelae of CNS infections (2.5%) were seen. Seizures due to metabolic causes, about 84 percent had hypocalcaemic with or without rickets. While seizures as a result of nervous system infection like meningitis or encephalitis were 65 percent and cerebral malaria (25%).*
CONCLUSION: *In children under five years of age, seizures due to metabolic, nervous system infection and febrile are most frequent events.*

KEY WORDS: Metabolic seizures, brain infections, cerebral malaria, febrile seizures, idiopathic epilepsy, children.

INTRODUCTION:

Seizure is a non-specific symptom of an underlying brain disorder and frightening experience for parents or family members. Seizures are common in children and occur in about ten percent[1]. Insult to the brain is the primary factor responsible for occurrence of seizures. Most seizures in children are stimulated by somatic disorder originating outside the brain such as the high fever, infections, head trauma, hypoxia, toxins or cardiac arrhythmias[2]. About 2-4 percent of all children in Europe and USA experience at least one seizure associated with febrile illness before the age of five years[3]. Children with epilepsy group are the once with the greatest long term morbidity. A serious concern to the child is the unpredictability of seizures, they may at occur any time like play, or in social setting. The prevalence is reported to be 5 to 8 per 1,000 (or 0.5 to 0.8%). The seizures may occur repeatedly with or without provocations[4]. Seizure may signal a potentially serious underlying systemic or central nervous system disorder that requires thorough investigation and management. If seizures are not managed appropriately, it may have its serious immediate sequelae as death or end up with long term consequences in the form of variety of disabilities. Knowledge about common reasons of seizures in children shall help in designing appropriate management plan and their evaluation. This study has been conducted to determine the causes of seizures in children in our pediatrics population coming to community cum teaching hospital.

MATERIAL AND METHODS:

Children admitted in pediatrics unit-II, Civil Hospital Karachi during the period of thirty six months (January 2004 to December 2006) age between two months to 15 years. Children less then two months or above 15 years, history of head trauma either due to fall or accident and thus shifted to neurosurgery unit and children having seizures with

fever whose parents or family refused admission or investigation like lumber puncture were excluded in study .Children with repeated / recurrent seizures attacks in conditions like cerebral palsy(CP), neurodegenerative or febrile convulsion were enrolled once only even visit due to seizures again. A detail history of the patient including birth and developmental milestone was taken and complete systemic examination especially CNS was done. Relevant investigation like complete blood picture, blood culture, blood sugar, calcium, alkaline phosphatase, serum creatinine, electrolytes and serum magnesium, CSF analyses with culture, X-ray chest/ wrist were done according to the scenario. While serum ammonia, arterial blood gases, urinary electrolytes, C.T Scan/ MRI of brain, EEG, were ordered as per specific scenario. All details were recorded on a Performa. Patients were treated according to the standard protocol and guidelines as per situations.

RESULTS:

Total of 283 patients were enrolled during January 2004 to December 2006, with gender distribution of 153 (54%) being male and 130 (46%) were females children. Seventy nine percent were under 5 years of age while 21% of children were between five to fifteen years of age. The most common causes of seizures were metabolic (30%), CNS infections (29%) and febrile seizures (18.7%). Other causes of seizures were idiopathic epilepsy (7.8%), cerebral palsy (7.4%) neurodegenerative disorders (3.5%) and sequelae of CNS infections (2.5%) were seen. Among metabolic cause approximately 84 percent had hypocalcaemia with or without rickets as shown in table-2. In children which had seizures secondary to underlying CNS infections were pyogenic meningitis (34%), cerebral malaria (25%), encephalitic (19%) and tuberculous meningitis (12%), as shown in table-3. The number of deaths were 15 (5.3%) out of 283 enrolled seizure patients.

DISCUSSION:

The male children were predominantly brought for care with seizures disorder. Several authors have found higher incidences in males[5,6], while some others found higher rate among females, hence clear conformity is not visible[7]. About 80 percent of children had seizures who were less than five years. Different kind of injuries to the developing brain may cause seizures. The organization of the nervous system occurs from six months of gestation to the postnatal age of several years when dendritic and axonal ramifications occur and synaptic contacts

Table-1:
Causes of Seizures (n=283)

S. No.	Causes	Number of patient and percent	02 months to 05 years	Above 5 years
	A) Non-EpilepticSeizures (n=221,78%)			
1.	Metabolic Seizures	86 (30%)	80	06
2.	CNS Infections	82 (29%)	57	25
3.	Febrile Convulsions	53 (18.7%)	53	0
	B. Epileptic Seizures (n=62, 22%)			
4.	Idiopathic Epilepsy	22 (07.8%)	09	13
5.	Cerebral Palsy	21 (07.4%)	16	05
6.	Neurodegenerative disorders	10 (3.5%)	03	07
7.	Post-meningitis / Encephalitis sequelae	07 (2.5%)	05	02
8.	Inborn Error of metabolism	02 (0.8%)	02	0
	Total	**283 (100%)**	**225 (79.5%)**	**58 (20.5%)**

Table-2:
Causes of Metabolic Seizures (n=86)

S No.	Causes	Number with Percent	02 months to 5 years	Above 5 years
1.	Hypocalcaemia with Rickets	50 (58%)	50	0
2.	Hypocalcaemia without Rickets	22 (25.6%)	19	03
3.	Hyponatremia	06 (7.0%)	05	01
4.	Hypoglycemia	04 (5.0%)	02	02
5.	Renal Tubular Acidosis	02 (2.3%)	02	0
6.	Hypernatremia	01 (1%)	01	0
7.	Hypomagnesaemia	01 (1%)	01	0
	Total	**86 (100%)**	**80 (93 %)**	**06 (7 %)**

Table-3:
CNS Infections (n=82)

S No.	Causes	Number of percent	02 Months to 5 years	Above 5 years
1.	Pyogenic Meningitis	28 (34%)	21	07
2.	Cerebral Malaria	21 (25.6%)	13	08
3.	Encephalitis	16 (19.5%)	12	04
4.	Tuberculous Meningitis	10 (12.2%)	05	05
5.	Sepsis	07 (8.5%)	06	01
	Total	**82 (100%)**	**57 (69.5%)**	**25 (30.5%)**

are established[8].

Seizures due to metabolic causes account for 30 percent among which hypocalcaemia with rickets (58%) or without rickets (26%) being most dominant situation, cumulatively contributing 84 percent and almost all children were between two months to five years of age. Rickets is nutritional health problem in children caused by insufficient dietary intake of vitamin-D, or decreased production due to lack of sunlight exposure by being indoor or excessively covered when in sunshine, dietary food taboos, rapid growth along with prematurity, IUGR and LBW[9,10]. Mothers possibly observing purdah dress code requiring cover to all the body parts. Seizures secondary to central nervous system (CNS) infections were 29 percent leading causes in order of decreasing frequency were pyogenic meningitis, cerebral malaria, encephalitis, tuberculous meningitis, septicemia and enteric encephalopathy are of great significance. A high index of suspicion is necessary for condition like cerebral malaria one of most serious complication of infection with plasmodium falciparum among young children[11]. If these conditions are recognized earlier and treated promptly, severe morbidity, mortality as well as sequelae can be prevented.

Febrile seizures occur in approximately 19 percent of children. Febrile seizures are frequent and relatively benign. However risk of recurrence being up to 40 percent. The chances of a subsequent epilepsy range 2 to 5%. A consensus conference of the National Institutes of Health (NIH) defines febrile seizure as an event habitually occurring in a baby or infant between 3 months and 5 years in association with fever, excluding signs of intracranial infection or other defined cause and excluding convulsions in an infant had convulsions without fever[12]. The international league against Epilepsy (ILAE) recommended the similar definition but with the exception of lowering the possible age of onset upto 1 month[12]. In febrile convulsion, one of the possibilities of meningitis, encephalitis or other CNS infections must be excluded. A lumber puncture may be needed based on presence of signs of meningeal irritation and child age[13,14,15]. The younger the infant, greater the justification of lumber puncture even without any suggestive signs.

In this study overall epileptic seizures constituted 22 percent, in which idiopathic epilepsy was about 8 percent. A single seizure is not usually sufficient for diagnosis of epilepsy[16] but it may herald the onset of epilepsy. The epilepsy affecting 0.5 - 1% of general population[4]. The incidence is highest among the children especially in the first decade of life[2]. This may of various prenatal, postnatal and childhood diseases and injuries to the brain[4]. A significant number of children had seizures with fever and suspect as possibly meningitis case or encephalitis but lumber puncture was refused even after counseling because of “fear” that it is injurious and causes weakness of legs or misbelieved and thus sought help of faith healer. There were fifteen deaths which included pyogenic meningitis, encephalitis, and cerebral palsy with aspiration pneumonia, neurodegenerative disorders and post meningitic sequelae.

CONCLUSION AND RECOMMENDATION:

Metabolic seizures are a common entity under five year of age, among which rickets being commonest. CNS infection and Febrile seizure are also common and should be recognized earlier and managed properly can avoid morbidity, mortality and awareness of common causes of seizures can help to adequately plan management and better outcome. Infant/children diets enrich with inexpensive, locally acceptable food sources like dairy products and sun shine may prevent rickets in children.

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