

Seizures; A Pediatrics Emergency in Maternity and Children's Hospital, Arar, Northern Saudi Arabia

Omar Tabaan Alenezi¹, Yusef Muhana Alenezi², Nagah Mohamed Abo el-Fetoh², Aledeilah, Rawan Deham I³, Basel Waleed Khurfan⁴, Badar Abdulrahman Almuahaya⁵, Abdullah Tban Alanazi¹, Raghad Aladham Alanazi¹

¹ Faculty of Medicine, Northern Border University, ² Family and Community Medicine Department, Faculty of Medicine, Northern Border University, ³ Primary Health Care Center, Arar, ⁴ Surgery Department, Specialized Medical Center, ⁵ Faculty of Medicine, Alfaisal University, Riyadh, KSA.

ABSTRACT

Background: seizures are the most common neurologic emergency in pediatrics and can be terrifying for patients and families. **Aim of the work:** this study aimed to determine the etiologies and sex distribution of seizure in children admitted to Emergency Department of Maternity and Children's Hospital in Arar city, Northern Saudi Arabia, during the period from 1 January to 30 July 2017. **Methods:** this was a descriptive hospital-based study conducted in the Department of Pediatrics Emergency, Maternal and Child Hospital of Arar City during the period from 1 January to 30 July 2017. All the children below 12 years of age who were hospitalized at emergency department were enrolled in this study. The final diagnosis of seizure was made by a pediatric neurologist. The age, sex, type of seizure, associated fever, history of head trauma and other variables related to seizure in pediatric group were reviewed from the medical records. **Results:** a total of 158 children with diagnosis of seizures were included in this study. The proportion of male to female was about 2:1 as the percentage of males was 65.8% of patients. All patients up to 12 years were included with a mean age of 26.3±15.8 months. Less than quarter (16.5%) of the patients had focal seizures, while 83.5% had generalized seizures. Family history of seizures disorders were noted in only 15.2% patients. A previous history of seizure was mentioned in 19% patients. Febrile seizure was the most common etiology (72.2% of patients). Epilepsy in 17.7% and vaccine-associated seizure in 5.1% of the patients. Hypoglycemia, intracranial hemorrhage, encephalitis and hyponatremia were reported 2(1.3%) for each of them. **Conclusion and recommendations:** as this is the first study conducted in Arar maternity and children's hospital to differentiate of the etiology of seizure in children attending the emergency department. Indeed, we suggested other researchers to follow the patients to show the repetitions of seizure and the prognosis in them especially those with dangerous etiologies as epilepsy, diabetes, encephalitis and intracranial hemorrhage. Fever coexistence, seizure type, physical and neurological examinations and history of head injury and measurement of serum blood sugar level may provide important information for primary emergency physicians when evaluating children with attack of seizures.

INTRODUCTION

Seizures are common conditions attending the emergency departments so they are distressing to the physicians and staff. There is associated morbidity and mortality with seizures, and it should not be considered as routine cases⁽¹⁾. Seizures occur in about 4-10% of children and constitute 1% of all emergency department visits⁽²⁾. The most common etiologies of attacks of seizures in children included infection with fever, developmental and neurological problems, traumatic head injuries and metabolic disorders⁽³⁾. Important conditions of patients who present to the emergency department included those with non generalized seizures, and those with status epilepticus⁽¹⁾. While, some types of seizure as simple febrile seizures are not dangerous and self-limited in nature⁽⁴⁾, others can cause brain

damage or death. Furthermore, in the management of children with seizure, it is very importance to investigate the etiologic profile of it⁽³⁾.

Febrile seizures are the most common type of childhood seizures, occurring in 2 to 5 percent of children six months to five years of age⁽⁵⁾. Although febrile seizure has a good prognosis, the presence of fever and seizure together is also seen in bacterial meningitis which may have bad outcomes⁽⁶⁾. Due to different etiologies, first attack of a non-febrile seizure often has a great diagnostic challenge to physicians and staff. Sever electrolyte imbalance, as hypocalcaemia or hyponatremia and hypoglycemia were found to be the etiology of seizure in less than 1% of children⁽⁷⁾. In a study conducted in Taiwan by **Chen et al.** on patients with first attack of

seizure, they reported that 68% of cases presented to emergency department with fever and about 62% of all cases were finally diagnosed as febrile seizure⁽⁸⁾. In community based study by **Al Rajeh et al.** in Saudi Arabia, it was found that, Twenty-eight percent of the patients had partial seizures, 21% generalized seizures and in 51%, pre or perinatal encephalopathy 23%, head injury 4%, childhood neurological infection 4% and stroke 1%. Febrile convulsions PR was 0.35%⁽⁹⁾. In Iranian study⁽¹⁰⁾, the etiologies of seizures were; febrile seizure (82%), vaccine-associated seizures (3%), hypoglycemia (6%), hypocalcaemia (2%), hyponatremia (2%), encephalopathy (2%), hyperglycemia (1%), epilepsy (1%) and intracranial hemorrhage (1%). Acute seizures are common in meningitis, viral encephalitis and in most cases were associated with increased mortality and morbidity, including subsequent epilepsy⁽¹¹⁾.

For children with seizures who were seen in the emergency department, those with febrile convulsions or any seizure disorder as epilepsy, recognizing, diagnosing and treating these conditions and preventing complications must be considered in the provided care in the emergency departments. This study aimed to determine the etiologies of seizures in attendees of the Emergency Department of Maternity and Children's Hospital in Arar City, Northern Saudi Arabia. To our knowledge, no similar research was carried out in the Northern area in Kingdom of Saudi Arabia.

PARTICIPANTS AND METHODS

Type and period of the study: this was a descriptive hospital-based study conducted in the Department of Pediatrics Emergency, Maternity and Children's Hospital of Arar City during 6 months from 1 January to 30 July 2017. All children 2 months to 12 years of age who were hospitalized at the emergency department with seizures were included in this study.

For each case a checklist including the needed data, age, sex, nature of seizure, fever, history of head trauma, epilepsy, infectious diseases, previous history and family history of seizures, results of laboratory tests as serum electrolytes and blood sugar and the final diagnosis was fulfilled.

Ethical considerations

This study was reviewed for seeking approval of the Research Ethics Committee of Faculty of Medicine, Northern Border University. Parents of

the included children informed that participation is completely voluntary. Written consent obtained from each participant before being subjective with them. No names recorded on the questionnaires. All questionnaires had kept safe.

Statistical analysis

Descriptive statistics and testing of hypothesis were used for the analysis. The data was analyzed using SPSS V.16.0 (SPSS Inc; Chicago, IL, USA). The Chi-square test was used to examine the association between different variables. $P < 0.05$ was considered as statistically significant.

RESULTS

Table 1 illustrated sex, age, type of seizure, etiology of seizure, family history and previous history of seizure in the studied children, Arar, 2017. A total of 158 child presented to the emergency department with attack of seizure were included in this study. The mean age of participants was 26.3 ± 15.8 months and 65.8% of them were males. In this study, 72 (45.6%) of the children who presented with attack of seizure were between 1-3 years old.

Table 2 illustrated the relationship between sex of patients with attack of seizure disorder and age, type of seizure, etiology of seizure, family history and past history of seizure in the studied children, Arar, 2017. The prevalence of seizure was higher (51.9%) in males compared to females in 1-3 years old age group. Among the patients enrolled in this study, 132 (83.5%) presented with generalized seizure and 26 (16.5%) had focal seizure. No difference was observed between the prevalence of type of seizure between males and females. Family history of seizure-related disorders was noted in only 24 (15.2%) patients. A previous history of seizure was mentioned in 30 (19%) patients. Febrile seizure was the most common etiology of seizure in this study (72.2% of patients). There was a significant difference in the prevalence of seizure between males and females ($P=0.02$). Epilepsy (17.7% of the patients) and vaccine-associated seizure (5.1% of the patients) were the second and third common etiologies of seizure in our study participants.

Table 3 illustrated the distribution of the etiologies of seizure based on the age groups. Except the patients aged 7-12 years old, febrile seizure was the most common etiology of seizure. Epilepsy was most common in the 1-3 years age group.

Table 1: sex, age, type of seizure, etiology of seizure, family history and previous history of seizure in the studied children, Arar, 2017

Sex	Frequency (n=158)	Percent
Female	54	34.2
Males	104	65.8
Age (in years)		
<1	28	17.7
1-3	72	45.6
4-6	36	22.8
7-12	22	13.9
Mean (\pm SD) of age	26.3 \pm 15.8 months	
Type of seizures		
Generalized	132	83.5
Focal	26	16.5
Past history of seizure		
No	128	81.0
Yes	30	19.0
Family history of seizure		
No	134	84.8
Yes	24	15.2
Etiology of seizure		
Febrile	114	72.2
Epilepsy	28	17.7
Vaccine-associated	8	5.1
Hypoglycemia	2	1.3
Intracranial hemorrhage	2	1.3
Encephalitis	2	1.3
Hyponatremia	2	1.3

Table 2: the relationship between sex of patients with attack of seizure disorder and age, type of seizure, etiology of seizure, family history and past history of seizure in the studied children, Arar, 2017.

Age (in years)	Sex		Total	P value
	Female (n=54)	Male (n=104)		
<1	14	14	28	1.000
	25.9%	13.5%	17.7%	
1-3	18	54	72	0.015
	33.3%	51.9%	45.6%	
4-6	10	26	36	0.024
	18.5%	25.0%	22.8%	
7-12	12	10	22	0.313
	22.2%	9.6%	13.9%	
Type of seizure				
Generalized	46	86	132	0.017
	85.2%	82.7%	83.5%	
Focal	8	18	26	0.022
	14.8%	17.3%	16.5%	
Etiology of seizure				
Febrile	36	78	114	0.042
	66.7%	75.0%	72.2%	
Epilepsy	12	16	28	0.773
	22.2%	15.4%	17.7%	
Vaccine-associated	2	6	8	0.172
	3.7%	5.8%	5.1%	
Hypoglycemia	2	0	2	0.440
	3.7%	.0%	1.3%	
Intracranial hemorrhage	0	2	2	0.257
	.0%	1.9%	1.3%	
Encephalitis	0	2	2	0.442
	.0%	1.9%	1.3%	
Hyponatremia	2	0	2	0.392
	3.7%	.0%	1.3%	
Family history of seizure				
	10	14	24	0.626
	18.5%	13.5%	15.2%	
Previous history of seizure				
	8	22	30	0.103
	14.8%	21.2%	19.0%	

Table 3: distribution of the etiologies of seizure based on the age groups.

Etiology of seizure	Age (in years)				Total (n=158)
	<1 (n=28)	1-3 (n=72)	4-6 (n=36)	7-12 (n=22)	
Febrile	22	56	26	10	114
	78.6%	77.8%	72.2%	45.5%	72.2%
Epilepsy	2	8	10	8	28
	7.1%	11.1%	27.8%	36.4%	17.7%
Vaccine-associated	4	4	0	0	8
	14.3%	5.6%	.0%	.0%	5.1%
Hypoglycemia	0	0	0	2	2
	.0%	.0%	.0%	9.1%	1.3%
Intracranial hemorrhage	0	2	0	0	2
	.0%	2.8%	.0%	.0%	1.3%
Encephalitis	0	2	0	0	2
	.0%	2.8%	.0%	.0%	1.3%
Hyponatremia	0	0	0	2	2
	.0%	.0%	.0%	9.1%	1.3%

DISCUSSION

Seizures account for 1% of all pediatric emergency department (ED) visits. Primary care pediatricians should evaluate children presenting to the ED with seizure for age, coexistence of fever, seizure type, associated symptoms and history of head injury⁽⁸⁾. This was a hospital based cross-sectional study of children admitted with acute attack of seizure in the Emergency Department of Maternity and Children's Hospital in Arar city, Northern Saudi Arabia, during the period from 1 January to 30 July 2017. This study aimed to determine the etiologies and sex distribution of seizure in children admitted to emergency department.

Our results showed that febrile seizure is the most common etiology of seizure in all age groups. There was a sex difference between the prevalence of etiology of seizure in males and females. Majority of the patients in this study were male (65.8%) . This is in agreement with a study done by **Taherian *et al.*** where they reported that febrile seizure was the most common etiology of seizure in all age groups. No sex difference was observed between the prevalence of etiology of seizure in males and females. Majority of the patients in this study were male (59%)⁽¹⁰⁾. Also, our results are in agreement with a study done by **Al Sulaiman *et al.*** where they had 153 males out of 263 children⁽¹²⁾. It is notable that most of the patients were between 1-3 years old (45.6%) and 4-6 years old (22.8%) and <1 year old (17.7%), respectively.

These results are in agreement with findings of previous studies which showed a low prevalence of seizure in children aged >6 years old^(14,15). This result is related to the high prevalence of patients with febrile seizure in these age groups. Febrile seizures have been reported as one of the most common cause of seizure attack in children⁽¹⁴⁾. Our results showed that febrile seizure (72.2%) was the main etiology of seizure in patients admitted to emergency department. Our results are consistent with Iranian study⁽¹⁰⁾ which showed that febrile seizure (82%) was the main etiology of seizure in patients admitted to emergency department. In Tanzania, overall, 160 children between 2 months and 7 years with a prevalence rate of 2.05% met the criteria for febrile seizures. The average age at onset was 2.2±1.8 months⁽¹⁷⁾. Interestingly, a study in Nepal showed that the most common cause of seizure in their patients was seizure disorder (33.4%) which was followed by febrile seizures (30.7%)⁽¹⁴⁾. This showed that the

etiology of seizure differs in different populations and in different places.

In our study, febrile seizures was 66.7% in females and 75.0% in males. In other studies the male to female ratios range from 1:1⁽¹⁵⁾ to 3.75:1⁽¹⁶⁾ indicating that male children may be more susceptible to febrile seizures.

Epilepsy was the second most common etiology of seizure in our study (17.7%), followed by vaccine-associated seizure in 5.1% and hypoglycemia was found in 1.3%. Although in the Iranian study⁽¹⁰⁾, hypoglycemia was the second most common etiology of seizure (6%), vaccine-associated seizure was found in 3% and epilepsy associated seizure was found in only 1% of children . But, in a study by **Chen *et al.*** in Taiwan⁽⁸⁾ hypoglycemia was an infrequent cause of seizure, which support our results.

Diphtheria and tetanus toxoids and whole-cell pertussis (DTP) vaccine and measles, mumps and rubella (MMR) vaccine were found to be associated with seizures. **Barlow *et al.*** reported significantly elevated risks of febrile seizures on the day of receipt of DTP vaccine and 8 to 14 days after the receipt of MMR vaccine^(19,20)

However, our results considered valuable in reassurance of parents of children who had seizures within few days after vaccination, and they should support the public in vaccination orientation programs. In the present study, generalized seizure was the most common type of seizure which accounted 83.5%. Also in the Iranian by **Taherian *et al.*** study⁽¹⁰⁾ and study by **Adhikari⁽¹⁴⁾** and others^(8,21) revealed that majority of seizures as generalized one.

While, in the community based study by **Al Rajeh *et al.*** the majority of seizures were focal in nature⁽⁹⁾. This can be explained as most of the patients had febrile seizure which mainly generalized in nature⁽⁴⁾. In our study, only 15.2% of the patients had a family history of seizure. This supports that no family history of seizure is not in exclusion of seizure or diagnosing its etiology.

Consistently, previous studies reported that family history of seizures was noted in only 8% and 8.2% of children presented to pediatrics emergency with new onset seizures^(8,10)

CONCLUSION AND RECOMMENDATIONS

As this was the first study conducted in Arar Maternity and Children's Hospital to differentiate the etiology of seizure in children attending the

emergency department. Indeed, we suggested other researchers to follow the patients to show the repetitions of seizure and the prognosis in them especially those with dangerous etiologies as epilepsy, diabetes, encephalitis and Intracranial hemorrhage. Fever coexistence, seizure type, physical and neurological examinations, and history of head injury and measurement of serum blood sugar level may provide important information for primary emergency physicians when evaluating children with attack of seizures.

Limitations of the study

The details of causes of seizures could not be specified due lack of investigations. Large wide scale study is needed to find the details of the causes.

Conflict of interest: No

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