CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187
http://doi.org/10.5281/zenodo.4267855

Avalable online at: http://www.iajps.com *Research Article*

CONVULSIONS IN INFANTS AND CHILDREN: PREVALENCE, CAUSES AND PROVIDED MANAGEMENT IN ARAR, NORTHERN SAUDI ARABIA

Dr. Mariam Mohammed Alrsheedy [1], Dr. Hoda Jehad Abousada[2], Taif Shayish Alanazi [3], Reem Meshal Almijlad [3], Almagd Mtap Alanzai [3], Rasha Zaki Alruwaili [3], Rasil Naif Alanazi [4], Dhuha Faisal Alotaibi [4], Dalal Farhan Alanazi [4], Mathayil Nazal Alruwaili [4]

[1] Assistant professor of pediatrics at the Pediatric Nephrology Department in East Jeddah General Hospital, KSA.

[2] KSA (postal address: Jjeddah, Al-Thaghr neighbourhood., 22338, email: dr.huda1992@outlook.com , telephone number: 00966545551291).
ORCID ID: https://orcid.org/0000-0002-4938-0601

[3] Medical intern Northern Borders University, KSA.

[4]Medical Student Northern Borders University, KSA.

Article Received: September 2020 **Accepted:** October 2020 **Published: November** 2020

Abstract

Objectives: *This study aims to assess the prevalence of convulsions in children attending Pediatrics Emergency, Maternity and Children's Hospital of Arar City, and etiologies behind them in relation to demographical and clinical properties of the sample.*

Methods: *A cross-sectional study on 243 convulsive cases whose data was derived from the hospital records. The data was collected in the form of a checklist including age, sex, nature of seizure, fever, history of head trauma, epilepsy, infectious diseases, previous history and family history of seizures and the final diagnosis was fulfilled.*

Results: *Over half of the cases (51.9%) were males with continuing predominance in all relevant causes except in cases pertaining to elevated blood glucose and cerebral atrophy (100% females). FS (febrile seizure) was found to be the most common cause (76.1%) followed by epilepsy (17.3%), and then vaccine-associated convulsions in 5.1%. There was a strong significant correlation between convulsions and age group (P<0.05) with the majority of the cases in the range of 0-3 years. No significant association was found between family history of convulsions and receiving the diagnosis.*

Conclusion: *Our study places emphasis on the results presented by their precedent literature in Arar; it found high prevalence of convulsions among children aged up to 3 years old with FS (Febrile seizures) being the most common cause out of all.*

Corresponding author:

Dr. Hoda Jehad Abousada,

KSA (postal address: Jjeddah, Al-Thaghr neighbourhood., 22338,
email: dr.huda1992@outlook.com ,
telephone number: 00966545551291).
ORCID ID: https://orcid.org/0000-0002-4938-0601

QR code

Please cite this article in press Hoda Jehad Abousada et al, ***Convulsions In Infants And Children: Prevalence, Causes And Provided Management In Arar, Northern Saudi Arabia.,*** *Indo Am. J. P. Sci, 2020; 07(11).*

BACKGROUND:

A convulsion is a physiological disorder in which the muscles of the body contract and relax rapidly and regularly resulting in uncontrolled body behavior [1]. Acute seizure etiology in infants and children may range from infectious (neurocysticercosis, tuberculoma, meningoencephalitis, and brain abscess), traumatic (intracranial bleeding due to recent or past head trauma), vascular (hemorrhage, infarction), metabolic (hypoglycemia, dyslectrolytemia, hypoxic ischemia, and inborn metabolism errors); structural cause (congenital malformation) or toxic (drug or toxin induced) causes [2, 3].

Various studies have observed a higher risk of acute seizures in children living in developing countries compared to those in developed ones. Reasons for the elevated burden include parasites and other infections, head trauma and poor perinatal care [4, 5].

Most seizures are brief, meaning less than five minutes in duration. Seizures longer than five minutes are considered prolonged. Status epilepticus, a life-threatening condition, occurs when a prolonged seizure lasts more than 30 min or when two or more seizures occur sequentially without return to consciousness between seizures [6].

Initial stabilization, diagnostic and therapeutic interventions all go hand in hand when treating an acutely seizure infant. Initial stabilization steps include airway cleaning, respiration, and ventilation. Hypoxia is detrimental to seizures. Vital signs including pulse rate, respiratory rate, blood pressure, and oxygen saturation need to be monitored. Indications for endotracheal intubation includes those with persistent desaturation (SPo2 <92%), increased work of breathing, refractory status epilepticus or presence of clinical features of raised intracranial pressure [7, 8].

A previous study in Arar found that; among the studied children presented to the emergency department with attack of convulsions 72.2% of cases had febrile convulsions and 27.8% of cases had convulsions due to other causes. The majority (49.1%) of cases were 1-3 years old. Most (87.7%) of the cases of febrile convulsions had generalized convulsions and in 84.2% it was the first attack but there was a history of repeated attacks in 15.8%. Family history of febrile convulsions was found in 15.8% of the cases [9].

In Iran, Taherian et al. reported that febrile seizure was the most common etiology of seizure in all age groups. No sex difference was observed in the prevalence of etiology of seizure between males and females. Majority of the patients in this study were male (59%) [10].

Objective of the study:

To determine the percentage of convulsions in Pediatrics Emergency, Maternity and Children's Hospital of Arar City and to study some of the clinical and demographic characteristics of those children.

PARTICIPANTS AND METHODS

This is a cross-sectional study conducted at the Department of Pediatrics Emergency, Maternity and Children's Hospital of Arar City. All admitted cases (0–12 years) presenting with seizures, both unprovoked and symptomatic (acute and remote), was enrolled.

All children 0 to 12 years of age who were hospitalized at the emergency department with seizures were included in this study.

Data was collected by checklist from the records of the past 6 months of the Department of Pediatrics Emergency, Maternity and Children's Hospital of Arar City

Checklist including questions about age, sex, nature of seizure, fever, history of head trauma, epilepsy, infectious diseases, previous history and family history of seizures and the final diagnosis was fulfilled.

Data management and Statistical analysis:

The collected data was entered and analyzed using the Statistical Package for the Social Science (SPSS Inc. Chicago, IL, USA) version 23. Descriptive statistics was performed. Percentages were given for qualitative variables. The determinant factors have been determined using the Chi-square test. P-value was considered significant if $P < 0.05$.

Ethical considerations:

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

RESULTS:

The study included 243 convulsion cases, over a half of which (51.9%) were males. It is notable that most

of the cases were 1-3 years (46.9%), < 1 year (37.4%), and only 8.6% were 4-8 year. Convulsions were generalized in 71.2%, while 28.8% had focal or partial convulsions. Family history of convulsions was found in 6.6%. The most common causes detected were febrile convulsions (76.1%) and epilepsy (17.3%), followed by vaccine-associated convulsions in 5.1%, among 2.5% was due to decreased blood glucose level, in 2.1% was due to decreased Na+ level (hyponatremia) while cerebral hemorrhage was detected as a cause of convulsions in 0.8%. (Table 1)

Table 2 illustrates the relationship between epilepsy and gender, age and family history of convulsions among the studied cases. No significant relation was found between epileptic convulsions and each of gender (convulsions was more frequent in males) and family history of convulsions (P>0.05), although there was a strongly significant correlation between epileptic convulsions and age group (P=0.001).

Table 3 shows the relationship between febrile convulsions with gender, age and family history of convulsions among the studied cases. There was a significant association between febrile convulsions and child age group (P<0.05). However, there was no statistically significant relationship between febrile convulsions and gender and family history of convulsions (P>0.05).

Table 4 illustrates the cause of convulsions in relation to gender among the studied children. There was a difference between the prevalence of etiology of seizure among males and females as the results show that epilepsy, febrile convulsions, encephalitis and decreased blood glucose level were more frequent among males than females (59.5%, 52.1%, 62.5% and 66.7% respectively). The 2 (100%) cases of cerebral hemorrhage were males, while the 2 (100%) cases of elevated blood glucose level and the 2 (100%) cases of cerebral atrophy were females. Convulsions due to vaccination and decreased Na^+ level (hyponatremia) was more observed in females (76.9% and 60%, respectively).

Table 5 shows the cause of convulsions in relation to the child age of convulsions among the studied children. Concerning the different age groups, children less than one year, and 1-3 years old had higher rate of febrile convulsions, epilepsy, convulsions due to vaccination, encephalitis and decreased blood glucose level than the other groups.

Table (1): Characteristics of the studied convulsions cases. (N=243)

Parameter	Frequency (N)	Percent (%)
Gender		
Male	126	51.9
Female	117	48.1
Child age during the attack of convulsions:		
< 1 year	91	37.4
1 – 3 years	114	46.9
4 – 8 years	21	8.6
9 – 12 years	8	3.3
13 years and above	9	3.7
Type of convulsions:		
Generalized	173	71.2
Focal or partial	70	28.8
Previous occurrence of convulsions:		
Yes	55	22.6
No	188	77.4
Family history of convulsions6.6:		
Yes	16	6.6
No	227	93.4
Convulsions diagnosis:		
Yes	173	71.2
No	70	28.8

Cause of convulsions:		
Febrile convulsions	163	67.1
Epilepsy	42	17.3
Convulsions due to vaccination	13	5.3
Elevated blood glucose level	2	.8
Encephalitis	8	3.3
Decreased Na^+ level (hyponatremia)	5	2.1
Cerebral atrophy	2	.8
Decreased blood glucose level	6	2.5
Cerebral hemorrhage	2	.8
Medication prescription:		
Yes	175	72.0
No	68	28.0
Improvement after hospital management:		
Yes	218	89.7
No	25	10.3

Table 2: relationship between epilepsy and gender, age and family history of convulsions among the studied cases

Parameter	Responses	Epilepsy		Total (N=243)	P value
		Yes (N=42)	No (N=201)		
Gender	Male	25	101	126	0.274
		19.8%	80.2%	100.0%	
	Female	17	100	117	
		14.5%	85.5%	100.0%	
Age group	< 1 year	12	79	91	0.001
		13.2%	86.8%	100.0%	
	1 – 3 years	13	101	114	
		11.4%	88.6%	100.0%	
	4 – 8 years	9	12	21	
		42.9%	57.1%	100.0%	
	9 – 12 years	5	3	8	
		62.5%	37.5%	100.0%	
	13 years and above	3	6	9	
		33.3%	66.7%	100.0%	
Family history of convulsions	Yes	4	12	16	0.398
		25.0%	75.0%	100.0%	
	No	38	189	227	
		16.7%	83.3%	100.0%	

Table 3: relationship between febrile convulsions and gender, age and family history of convulsions among the studied cases

Parameter	Responses	Febrile convulsions		Total (N=243)	P value
		Yes (N=163)	No (N=80)		
Gender	Male	85	41	85	0.502
		52.1%	51.2%	52.1%	
	Female	78	39	78	
		47.9%	48.8%	47.9%	
Age group	< 1 year	57	34	91	0.001
		35.0%	42.5%	37.4%	
	1 – 3 years	92	22	114	
		56.4%	27.5%	46.9%	
	4 – 8 years	9	12	21	
		5.5%	15.0%	8.6%	
	9 – 12 years	2	6	8	
		1.2%	7.5%	3.3%	
	13 years and above	3	6	9	
		1.8%	7.5%	3.7%	
Family history of convulsions	Yes	11	5	16	0.562
		6.7%	6.3%	6.6%	
	No	152	75	227	
		93.3%	93.8%	93.4%	

Table 4: Cause of convulsions in relation to gender among the studied children

Cause of convulsions	Gender		Total (N=243)
	Male (N=126)	Female (N=117)	
Elevated blood glucose level	0	2	2
	0.0%	100.0%	100.0%
Encephalitis	5	3	8
	62.5%	37.5%	100.0%
Decreased Na^+ level (hyponatremia)	2	3	5
	40.0%	60.0%	100.0%
Convulsions due to vaccination	3	10	13
	23.1%	76.9%	100.0%
Febrile convulsions	85	78	163
	52.1%	47.9%	100.0%
Epilepsy	25	17	42
	59.5%	40.5%	100.0%
Cerebral atrophy	0	2	2
	0.0%	100.0%	100.0%
Decreased blood glucose level	4	2	6
	66.7%	33.3%	100.0%
Cerebral hemorrhage	2	0	2
	100.0%	0.0%	100.0%

Table 5: Cause of convulsions in relation to child age at convulsions among the studied children

Parameter	Child age at convulsions					Total (N=243)
Cause of convulsions	< 1 year	1 – 3 years	4 – 8 years	9 – 12 years	13 years and above	
Elevated blood glucose level	1	0	1	0	0	2
	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%
Encephalitis	4	3	0	0	1	8
	50.0%	37.5%	0.0%	0.0%	12.5%	100.0%
Decreased Na^+ level (hyponatremia)	4	0	1	0	0	5
	80.0%	0.0%	20.0%	0.0%	0.0%	100.0%
Convulsions due to vaccination	7	4	0	1	1	13
	53.8%	30.8%	0.0%	7.7%	7.7%	100.0%
Febrile convulsions	57	92	9	2	3	163
	35.0%	56.4%	5.5%	1.2%	1.8%	100.0%
Epilepsy	12	13	9	5	3	42
	28.6%	31.0%	21.4%	11.9%	7.1%	100.0%
Cerebral atrophy	2	0	0	0	0	2
	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Decreased blood glucose level	2	2	1	0	1	6
	33.3%	33.3%	16.7%	0.0%	16.7%	100.0%
Cerebral hemorrhage	2	0	0	0	0	2
	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%

DISCUSSION:

This was a cross-sectional study conducted at the Department of Pediatrics Emergency, Maternity and Children's Hospital of Arar City on 243 patients that aims to determine prevalence and causes of seizures in admitted children below 13 years of age.

Our results appear to support the previously established information indicating the prevalence of FS (febrile seizure) (76.1%) as the leading cause of seizures among children (11, 9). Febrile seizures can occur as a result of several underlying diagnoses including viral infections (13) or can accompany certain events as in vaccination (14). However, in this study there was no assessment of the underlying causes behind it and their prevalence in relation to age and sex. Vaccination was instead assessed on its own to be found contributing to 5.3% of all cases, almost identical to the previous finding by ***Alenezi et al***. (5.1%).

As observed in a study from Kenya by ***Idro R et al.*** endemic infections contribute significantly to etiologies- over 80% of seizures recorded were related to infections, with malaria being the predominant infection.

In our study we found males (51.9%) to be more affected with seizures than females, only with females predominating in cases of elevated blood glucose level (100%) and cerebral atrophy (100%). This agrees with the previous study conducted in Arar by ***Alenezi et al.*** which found males (65.8%) almost twice as much as female. On the other hand, there was no significant association found between

gender and the percentage of people suffering from convulsions (P>0.05).

According to our findings, epilepsy comes second in the causative conditions with a percentage of 17.3%. This also supports the previously stated percentage by ***Alenezi et al.*** of 17.7%. It was also stated in the literature that, despite being quite improbable, epilepsy can happen as a result of FS, with a risk of 2-3% (15) which raises the need for a prospective study in the future to get as precise results as possible. Also underscores the interest to be given to FS cases. In a large population-based study conducted in South Korea, it was found that an increase in the number of febrile seizure than three was associated with diagnosis of afebrile seizures within a year.(20)

In a study conducted in Iran by ***Taherian et al.*** on a population of 200 hypoglycemia was the second most common cause of seizure, however, in another study conducted in Taiwan by ***Chen et al.*** hypoglycemia was noted in three patients only out of 319. While in the current study hypoglycemia accounts for only 2.5% which calls for future studies on a larger population to better estimate the role of hypoglycemia. By any means, we suggest that a routinely blood glucose measure be given to any admitted case with convulsions.

Age is evident to be the most statistically significant when it comes to convulsions in general (p<0.05) down to both febrile and epileptic conditions in particular; with the majority of the cases being located between 0-3 years (84.3%). This goes hand in hand with what ***Alenezi et al.*** has previously introduced. Furthermore, the age range expands to 6 years in the latter with about 86.1% of the cases being located in this range. We notice that the percentage of patients aged 4-6 in ***Alenezi et al.*** (22.8%) is way greater compared with what we found (8.6%) aged 4-8. This drop in the mean age of cases questions the effect of the sample size on the results and calls for a larger study in the future. A study in Nepal by ***Sudhir Adhikari et al.*** found that seizures were more common in females in age group 11 to 15 years.

The etiology behind seizures can also differ demographically. In ***Sudhir Adhikari et al.*** (Nepal) the most common cause of seizure is childhood seizure disorder (33.6%) followed by FS (30.5%), with neurocysticercosis coming third (12%). In ***Taherian et al.*** (Iran), FS came first (82%), however, hypoglycemia came second (6%), and vaccine-associated seizure came third with only 3%. Etiological variations can also be noticed regionally. As indicated in a study conducted in India by ***Pradnya Gadgil et al.*** some regions had more prevalent causes apart from FS; for example we find Neurocysticercosis (NCC) which is highly endemic in northern India, or hot water epilepsy in southern India.

Several studies noted a higher risk for acute seizures in patients living in the developing countries (16, 17). It is also noted that even among similar studies, the prevalence of etiologies remains different.

The data presents us with only small portion (6.6%) of cases having had family history of convulsions, whereas in ***Alenezi et al.*** the percentage is higher with 15.2%. In other previous studies, the estimated percentage was closer to ours with 8% and 8.2% (18, 10). There is also no significant association between family history and either FS or epileptic convulsions.

In terms of the type of convulsions, both this study and ***Alenezi et al.*** agree on the prevalence of generalized convulsions to focal or partial. However, this study, which was done on a relatively larger sample, presents a higher percentage of cases with focal convulsion (28.8%) in comparison to only (16.5%). Despite not being significantly different, the variance in percentage suggests probable different results with larger samples.
It is important to take into consideration that 28.8% presented cases didn't receive a proper diagnosis in the present study, unlike in ***Alenezi et al.*** where there was no mention of undiagnosed cases. It is suggested to contemplate other possible neurological causes of seizures in upcoming studies. Diagnosis of which might require the routinely use of MRI (Magnetic Resonance Imaging) and EEG (electroencephalographic) (19).

CONCLUSION:

Our study places emphasis on the results presented by their precedent literature in Arar; it found high prevalence of convulsions among children aged up to 3 years old with FS (Febrile seizures) being the most common cause out of all. **Suggestions:** Current data suggests better planning of health activities provided for the population; the establishment of appropriate programs for prevention of causes of convulsions (especially in developing countries) and for the associated factors, and improvement of the services aimed at reducing the severity of convulsions and management of the attacks.

Limitations:

Among the possible limitations of the study, the study is a hospital-based study and therefore outcomes cannot be applied for the general population and an estimate of the prevalence of convulsions among the general population was not possible. Another possible limitation could be that 28.8% of the cases was not diagnosed for the reason of the convulsions, which could attribute to inaccurate associations and findings.

REFERENCES:

1. Felipe L, Siqueira M. febrile seizures: update on diagnosis and management. Siqueira LFM. 2010;56(4):489–92.
2. Shi X, Lin Z, Ye X, Hu Y, Zheng F, Hu H. An epidemiological survey of febrile convulsions among pupils in the Wenzhou region. Zhongguo Dang Dai Er Ke Za Zhi. 2012 ;14(2):128–30.
3. Bettis DB, Ater SB. Febrile seizures: Emergency department diagnosis and treatment. The Journal of Emergency Medicine. 1985;2(5):341–8.
4. Ba-Diop A., Marin B., Druet-Cabanac M. Epidemiology, causes, and treatment of epilepsy in sub-Saharan Africa. Lancet Neurol. 2014;13(10):1029–1044.
5. Wagner R.G., Bottomley C., Ngugi A.K. Incidence, remission and mortality of convulsive epilepsy in rural northeast South Africa. PLoS One. 2015;10(6) e0129097.
6. Mwipopo E.E., Akhatar S., Fan P. Profile and clinical characterization of seizures in hospitalized children. Pan Afr Med J. 2016;24:313..
7. Tasker RC. Emergency treatment of acute seizures and status epilepticus. Arch Dis Child. 1998;79:78–83.
8. Sasidaran K, Singhi S, Singhi P. Management of acute seizure and status epilepticus in pediatric emergency. Indian J Pediatr. 2012;79:510–7.
9. Ahmed, Alaa & Alenezi, Turki & Alanazi, Areej. (2018). Febrile Convulsions in Children, Arar, Northern Saudi Arabia. The Egyptian Journal of Hospital Medicine. 71. 2738-2741. 10.12816/0045837.
10. Taherian R, Feshangchi-Bonab M, Rezayi A et al.(2017):The etiologic profile of the pediatric seizure: an epidemiological study from Iran. International Clinical Neuroscience Journal, 4(3) 110-119.
11. Syndi Seinfeld D, Pellock JM. Recent Research on Febrile Seizures: A Review. J Neurol Neurophysiol. 2013;4(165):19519. doi:10.4172/2155-9562.1000165
12. Chen CY, Chang YJ, Wu HP. New-onset seizures in pediatric emergency. Pediatr Neonatol. 2010 Apr;51(2):103-11. doi: 10.1016/S1875-9572(10)60019-8. PMID: 20417461.
13. Chung B, Wong V. Relationship between five common viruses and febrile seizure in children. Arch Dis Child. 2007;92(7):589-593. doi:10.1136/adc.2006.110221
14. Jonathan Duffy, Eric Weintraub, Simon J. Hambidge, Lisa A. Jackson, Elyse O. Kharbanda, Nicola P. Klein, Grace M. Lee, S. Michael Marcy, Cynthia C. Nakasato, Allison Naleway, Saad B. Omer, Claudia Vellozzi, Frank DeStefano, on behalf of the Vaccine Safety Datalink
Pediatrics Jul 2016, 138 (1) e20160320; DOI: 10.1542/peds.2016-0320
15. Camfield P, Camfield C. Are febrile seizures an indication for intermittent benzodiazepine treatment, and if so, in which cases? Epileptic Disord. 2014;16:S84–S88
16. Birbeck GL. Epilepsy care in developing countries: part I of II. Epilepsy Curr. 2010;10(4):75-79. doi:10.1111/j.1535-7511.2010.01362.x
17. Farghaly, W., Abd Elhamed, M.A., Hassan, E. et al. Prevalence of childhood and adolescence epilepsy in Upper Egypt (desert areas). Egypt J Neurol Psychiatry Neurosurg 54, 34 (2018). https://doi.org/10.1186/s41983-018-0032-0
18. Huguenard AL, Miller BA, Sarda S, Capasse M, Reisner and Chern JJ (2016): Mild traumatic brain injury in children is associated with a low risk for posttraumatic seizures. Journal of Neurosurgery Pediatrics,17(4):476-482.
19. Doescher, J. S. et al. (2006) 'Magnetic Resonance Imaging (MRI)and Electroencephalographic (EEG) Findings in a Cohort of Normal Children With Newly Diagnosed Seizures', Journal of Child Neurology, 21(6), pp. 490–495. doi: 10.1177/08830738060210061901.
20. Choi YJ, Jung JY, Kim JH, et al. Febrile seizures: Are they truly benign? Longitudinal analysis of risk factors and future risk of afebrile epileptic seizure based on the national sample cohort in South Korea, 2002-2013 [published correction appears in Seizure. 2019 Dec;73:88]. Seizure. 2019;64:77-83. doi:10.1016/j.seizure.2018.12.004