Original Article

WHICH CASES OF GASTROENTERITIS WILL TEND TO GET INTO CONVULSION?

Shahnaz Armin[1], Farhad Mahvelati[2], Mohammad Reza Khalilian[3]

ABSTRACT

Objective: To identify risk factors for seizures in-patient with gastroenteritis.

Methodology: It is a match case control study of children who were admitted from March 2004 to February 2005 at Mofid Children's Hospital affiliated to Shaheed Beheshti University of Medical Science in Tehran, Iran. Paraclinical investigations including serum electrolytes, blood culture, stool smear and culture were performed in all patients. Hundred patients were studied, 50 patients with gastroenteritis and convulsion (the case group) with 50 cases as control group (gastroenteritis but without convulsion).

Results: The comparison between case and control groups demonstrated that fever and shigellosis were related to convulsion, while the relation of inflammatory gastroenteritis is not quite significant and electrolyte imbalance and dehydration are not related to the incidence of convulsion.

Conclusions: Reduction of fever and appropriate drug treatment are important for shigellosis in the prevention of convulsion.

KEY WORDS: Gastroenteritis, Convulsion, Shigellosis.

Pak J Med Sci July - September 2007 Vol. 23 No. 4 637-640

INTRODUCTION

Gastrointestinal infections are caused by a wide variety of pathogens. Diarrheal diseases are one of the leading causes of morbidity and mortality in children and convulsion is one of the complications. With regard to the facts that convulsions associated with gastroenteritis may be attributable to fever, the type of bacteria, dehydration, or electrolyte imbalance, we planed this study to evaluate the relation between some paraclinical and clinical findings and convulsion, to estimate the risk of convulsion and assist in quick diagnosis and preventive measures.

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* Received for Publication: January 10, 2007

* Revision Received: May 24, 2007

* Accepted: June 4, 2007

PATIENTS AND METHODS

This match case control study included all patients with gastroenteritis and convulsion who were admitted to Mofid Children's Hospital, Tehran, Iran, from March 2004 to Feb. 2005 (including patients who were admitted with gastroenteritis and convulsion, those who were admitted with gastroenteritis and had a convulsion during their hospitalization and those who were admitted with febrile convulsion and presented with gastroenteritis during the first 48 hours). Patients with underlying diseases who had a high risk of convulsion

(such as cerebral palsy, metabolic diseases, etc.) were excluded from the study. One hundred patients were studied, 50 patients with gastroenteritis and convulsion (the case group) were matched for age, sex and date of visit (±2 weeks) with 50 patients as control group (gastroenteritis but without convulsion). Illness characteristics examined included temperature, electrolyte imbalances, type of gastroenteritis (based on stool examination: *inflammatory*- more than 5WBCs, and *non-inflammatory*- less than 5WBCs; *stool culture*: shigella, no growth), Family history of febrile and afebrile seizures was studied. Their parents signed informed consent for inclusion. The data was gathered by special checklists. First, the data was categorized and the frequency of each of the variables was determined, then the variables and findings were evaluated individually. The statistical significance of associations was determined by McNemar and regression Conditional test (stepwise model). Soft ware of STATA/ SE 0.8 used for these calculations. Factors independently predictive of a documented seizure were determined by using a multiple logistic regression analysis.

RESULTS

During the study, 50 children, 28 (56%) males and 22 females (44%), aged 8 to 96 months (median 36 months) were admitted to hospital for gastroenteritis in association with seizure. All had normal development milestones. 42% of patients had fever before or during the seizure, which accelerated admission although 36% of control group had fever. Figure-1 shows temperature differences in case and control group. Familial history of convulsion with or without fever is shown in Figure-2.

There was a marked seasonal distribution of the cases between the months of July and October. Seizure occurred either the same day or preceded it by a median of one day as the diarrhea in 5(10%) children, all the patients had generalized convulsion. The number of seizures per child ranged from 1 to 3(6% more than one episode). Most convulsions were short with 80% of children having seizure not longer than 5 minutes. The longest duration for a seizure was 5-15 minutes and occurred in 5(10%) children. History of convulsion with fever was positive in two cases. None of the patients in case and control group had history of previous afebrile convulsion. Six cases (12%) had clinical signs of exceeding 5% dehydration at presentation and it was 18(36%) in control group. All children had normal serum urea, creatinine, glucose, calcium and magnesium levels. Electrolyte imbalances were seen in six cases (12%), which all were hyponatremia ranging from 125 to 130meq/lit and in control group 4 patients (8%) had electrolyte imbalances, three of which had hyponatremia ranging between 125-130meq/lit and one of which had hypokalemia. The stools of all children were tested for pathogenic bacteria but no salmonella, or campylobacter but 11 shigella species were grown. In all cases of positive

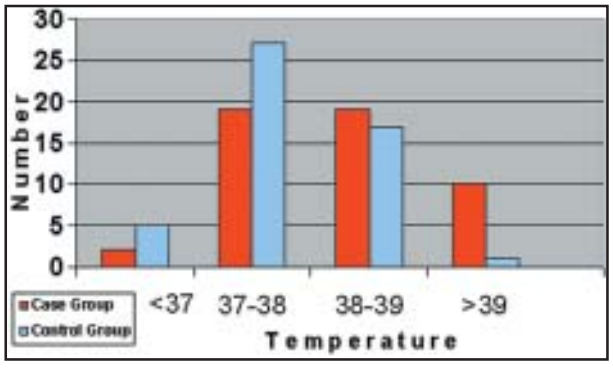

Fig-1: Temperatures in case and cantrol groups.

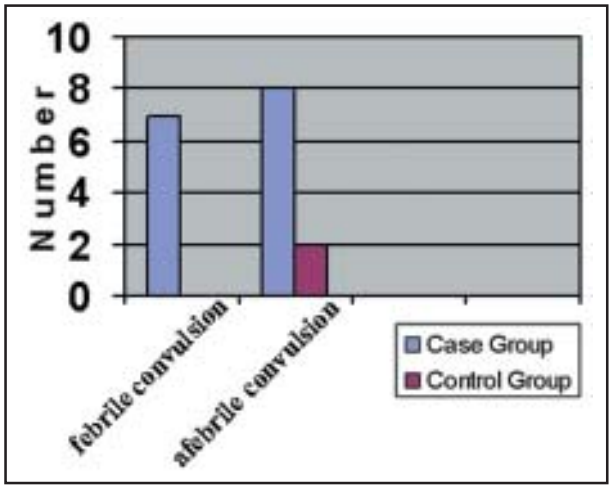

Fig-2: Family history of febrile convulsion in case and control groups.

Table-I: Stool exam and culture results in case and control group.

	Stool exam		*Stool culture*	
	Inflammatory	*Non inflammatory*	*Shigella*	*No organism*
Case	31 (62%)	19 (38%)	11(22%)	39(78%)
Control	21(42%)	29(58%)	2(4%)	48(96%)

cultures for shigella, the stool examination demonstrated inflammatory gastroenteritis. Table-I shows characteristic of stool in patients.

The role of patients' temperature in the occurrence of convulsion was also investigated. There was a positive association between fever and convulsion (OR=2.41, p Value= 0.008).

There was no association between past history of febrile and afebrile convulsion in children and incidence of convulsion ($p < 0.05$). We found the family history of febrile convulsion had significant association with convulsion. Role of electrolyte imbalances in the occurrence of convulsion was investigated and no significant relation existed between them (P value of 0.72, OR 1.7). As regards the relation between the type of gastroenteritis (inflammatory or non-inflammatory) and convulsion, with P value of 0.07 and an OR= 2.25, these were not quite significant. A significant relation between positive Shigellosis and occurrence of convulsion in gastroenteritis was detected (P value of 0.01 and OR= 7.7).

There was reverse association between the amount of dehydration and seizures (P 0.03, OR=3.8). On multivariable analysis, significant independent risk factors were dehydration (reverse relation, Pseudo oR^2), fever (P Value 0.02) and shigellosis (P Value 0.05).

DISCUSSION

Convulsion may occur during a diarrhoeal illness. Children may develop febrile seizures if fever accompanies the diarrhea.[1] Sometimes afebrile seizures may occur in association with dehydration, electrolyte imbalance, hypoglycemia or hypocalcaemia and complicate acute gastroenteritis. In contrast, the occurrence of afebrile seizures during viral gastroenteritis without dehydration or electrolyte imbalance is known.[2] Study by Wasif A. Khan et al showed gastroenteritis as the underlying illness had a significant inverse (i.e., protective) association with febrile seizures.[3] In our study, high fever statistically had a significant association with convulsion. Other studies have also showed that fever is an important factor for convulsion occurrence in gastroenteritis, especially in shigellosis.[3,4] Although we couldn't exactly separate febrile convulsion from other type of convulsions in diarrhea patients, but we feel, fever control can reduce the risk of convulsion during gastroenteritis. In other studies, researchers conclude prompt attention to fever reduction and metabolic alterations may help reduce this potentially lethal complications.[3]

There is no association between history of febrile and afebrile convulsion in children and convulsion during gastroenteritis ($p < 0.05$). On

Table-II: Association of convulsion with different risk factors.

Association of convulsion with	*Odds ratio (Exact 95% CI of OR)*	*P-Value (Exact McNemar significance)*
History of febrile convulsion	0 (0-2.4)	0.25
History of convulsion	0 (0-39)	1.0
Family history of febrile convulsion	0 (0-0.7)	0.01
Family history of convulsion	0.25(0.025-1.25)	0.11
Dehydration (1-2 vs. 3-4)	1.7(0.32-10.7)	0.72
Electrolyte imbalance	0.6 (0.09- 3.08)	0.72
Type of gastroenteritis	0.44 (0.16-1.07)	0.07
Shigella	10 (1.4-43.4)	0.01

multivariable analysis, significant independent risk factors for first febrile convulsion were increase in temperature, history of febrile seizures in a first- or in a higher degree relative.[5] We think our result were influenced from effect of simple febrile convulsion and it may occur in every disease and not due to effect of gastroenteritis.

Although electrolyte imbalance is a known etiology for convulsion during gastroenteritis, in this study, the comparison of the two groups demonstrated no significant relation between electrolyte imbalances and the incidence of convulsion statistically. It may be due to small number of our patients and it needs to be followed in another study.

Our patients showed reverse association between the amount of dehydration and occurrence of seizures. It may be due to the fact that patients with seizure had higher temperature, poor condition and occurrence of seizure cause early admition in hospital so they took appropriate hydration therapy which resulted in reverse association. Inflammatory gastroenteritis did not have a very significant association with convulsion (borderline significance). Positive stool culture for shigella had a significant association with convulsion in gastroenteritis; other studies have showed similar results.[6-8]

CONCLUSION

This study statistically demonstrated a significant relation between high fever and a positive stool culture for shigella and occurrence of convulsion in gastroenteritis, but inflammatory gastroenteritis did not have a very significant relation to convulsion and electrolyte imbalances had no relation. Other para clinical investigations like lumbar puncture are not necessary in patients with gastroenteritis and convulsion and should be done individually. Therefore a risk of convulsion must be considered in gastroenteritis with high fever and shigellosis.

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