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Antipyretic effectiveness of acetaminophen in febrile seizures: ongoing prophylaxis versus sporadic usage

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Abstract. A controlled clinical study compared the antipyretic effectiveness of acetaminophen administered at regular 4 h intervals (group 1, $n = 53$) versus sproadic usage contingent upon a body temperature above 37.9°C (group 2, $n = 51$) in 104 children presenting with simple febrile convulsions. The incidence of febrile episodes or temperature values were similar in spite of significantly larger amounts of acetaminophen administered to patients in group 1. Four and 4 children in groups 1 and 2, respectively, had a second episode of febrile seizures, in all of them within the first 24 h of admission. We conclude that the prophylactic administration of acetaminophen in children with febrile seizures is not effective in the prevention of fever, the reduction of its degree, or in preventing the early recurrence of febrile seizures.

Key words: Febrile seizures – Acetaminophen

Introduction

The problem of the child with fever-associated convulsions continues to harass the paediatrician as he seeks as safe and effective method to alleviate this symptom. The incidence of febrile seizures (FS) ranges between 2% and 5% [4, 9, 14]. Recurrence is common [5, 9, 10] and is inversely correlated with age of appearance [1, 9, 11]. Their aetiology is still unclear. Genetic [2, 4], viral [8, 10] or bacterial [7, 13] factors have been suggested. Although temperature associated, the exact relation between FS and fever is still unclear [3].

The prophylactic use of anticonvulsive agents in recurrent FS, frequently advocated in the past, is rarely practiced nowadays [5, 6]. Prompt temperature lowering with antipyretic agents, mainly acetaminophen, and/or cooling with sponging or tepid water baths is considered a logical therapeutic approach [5, 12]. Rationally, antipyretics should be administered as soon as possible and prophylaxis should be maintained at least during the early phase of the febrile disease, if FS are to be prevented.

The aim of this study was to evaluate the effectiveness of prophylactic use of acetaminophen on both fever and early recurrence of febrile seizures.

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Abbreviation: FS = febrile seizures

Patients and methods

One hundred and four consecutive children between 6 months and 5 years of age admitted to the paediatric department of the Assaf Harofeh Medical Centre, between 1 January 1989 and 1 July 1990, with an episode of simple febrile convulsions were studied. Patients were randomly allocated two treatment regimens. Four hourly prophylactic usage of acetaminophen syrup, 15–20 mg/kg body weight per dose, (group 1, $n = 53$), or sporadic administration of a similar dose contingent upon body temperature above 37.9°C (group 2, $n = 51$). Rectal temperature was monitored routinely at 4 h intervals, or every 30 min whenever temperature exceeded 37.9°C. The same thermometer was used for all children. Parents were also encouraged to check temperature whenever they felt that the child may be febrile.

The prophylactic, 4-h administered acetaminophen was discontinued either following 12–18 h of normal temperature, or on the 4th day of admission after which the drug was given sporadically contingent upon body temperature.

Children with neurological handicaps, developmental delay, focal or prolonged seizures of more than 20 min were excluded. No difference in mean age or sex distribution was observed between the two groups. Seventeen and 11 children in groups 1 and 2, respectively, had previous episodes of FS, the difference was not

Table 1. Clinical and epidemiological characteristics of children in the two groups

	Group 1 ($n = 53$)	Group 2 ($n = 51$)	P
Mean age (years)	1.9 ± 0.2	1.9 ± 0.2	NS
Sex (male/female)	28/25	27/24	NS
Previous episodes of FS	17	11	NS
Family history of FS	10	9	NS
Family history of epilepsy	4	5	NS
Additional FS during hospitalization	4	5	NS

Table 2. Clinical diagnosis in the two groups (number of children)

	Group 1 ($n = 53$)	Group 2 ($n = 51$)
Upper airway tract infection	19	16
Otitis media	15	12
Bronchopneumonia	7	9
Tonsillitis	5	8
Urinary tract infection	1	1
Following vaccination (DTP or MMR)	1	3
Gastro-enteritis	1	1
Roseola Infantum	1	0
Mumps	1	0
Chicken pox	1	0
Cellulitis	1	0
Laryngitis	0	1

statistically significant. Family history of FS or epilepsy was also similar in both groups (Table 1).

The primary diagnoses are given in Table 2. The majority of them probably due to viral infections. No significant difference in this aspect was observed.

Leucocyte counts and erythrocyte sedimentation rates in the two groups were similar.

Serum electrolyte and glucose concentrations were normal in all children. Blood culture was poisitive for *Haemophylus influenza* B in 1 child with bronchopneumonia belonging to group 1. A mild and transient elevation of liver enzymes was observed in 1 child belonging to group 2.

Data were analysed by the Student's *t*- and chi-square tests and presented as mean ± SEM.

Results

Four (7.5%) children is group 1 and 5 (9.8%) in group 2 had a second episode of FS, all within the first 24 h of admission. In group 1, 3 children had an upper airway tract infection and 1 had otitis. In group 2, 3 had an upper airway tract infection, 1 otitis and 1 bronchopneumonia. The duration of recurrent seizures was 2.7 ± 1.3 and 2.5 ± 1.1 min for groups 1 and 2, respectively. Temperature recorded during the second episode of FS was 38.7 ± 0.2°C in group 1, and 38.8 ± 0.3°C in group 2.

The overall number of febrile episodes and their relative distribution among the various temperature ranges were similar in both groups. Mean duration of fever was also not significantly different (Table 3).

Table 3. Number of elevated measurements in the two groups

Temperature	Group 1 ($n = 53$)	Group 2 ($n = 51$)	P
38°C–39°C	225	207	NS
39.1°C–40°C	71	57	NS
40.1°C–41°C	6	8	NS
> 41.1°C	1	0	NS
Total number of febrile episodes	303	272	NS
Mean duration of fever (days)	2.01 ± 0.15	2.23 ± 0.19	NS

Table 4. Mean daily dose of administered acetaminophen (mg/kg body weight) in the two groups

Day of admission	Group 1	Group 2
1	73.9 ± 5.7 ($n = 53$)	44.1 ± 3.6* ($n = 51$)
2	105.9 ± 5.1 ($n = 49$)	59.4 ± 5.5* ($n = 35$)
3	96.4 ± 7.1 ($n = 38$)	46.8 ± 7.6* ($n = 23$)

* $P > 0.001$
n, number of patients

Daily amounts of acetaminophen used during the 3 days of the study are presented in Table 4. As expected, children in group 1 received significantly larger amounts of acetaminophen.

Discussion

In this study, rigorous prophylactic antipyretic therapy did not prevent temperature elevations and was not superior, when judged by febrile episodes and degrees of temperature, to the conventional approach based on sporadic usage of acetaminophen. Early recurrence of febrile seizures was also similar in both groups and in the range of previously reported data [3, 9]. We selected the cut-off point for giving acetaminophen were body temperature was 37.9°C. It can be argued that choosing a higher degree of temperature as occasionally practiced may have resulted in a higher recurrence rate of FS in group 2. The lack of difference between the two groups in any of the evaluated parameters during the second episode, suggests that prophylactic therapy would have been probably of no benefit.

In a child with a history of FS, fever is often treated quite aggressively, and at a relatively low temperature, frequently without taking into consideration the general condition of the child. This approach is based on the assumption that fever and convulsions may be causally related. Recently, it has been suggested that convulsions occurring during a febrile disease may be due to various viral [10] or bacterial [7, 13] antigens affecting the central nervous system. The high incidence of FS, focal motor or Rolandic seizures in siblings of children presenting with FS or other seizure types reported recently is suggestive of genetic factors [2]. Thus, convulsions may be purely coincidental and independent from temperature elevations in which case the excessive use of antipyretic agents in children with FS could be reduced, and instead, whenever clinically indicated, tepid water baths shown previously to be as effective as acetaminophen [14] could be used.

References

1. Berg AT, Shinnar S, Hauswer WA, Leventhal JM (1990) Predictors of recurrent febrile seizures: a meta-analytic review. J Pediatr 116:329–337
2. Boose H (1989) Symptomatology in children with focal sharp waves of genetic origin. Eur J Pediatr 149:210–215

3. ElO-Radhi AS, Banajeh S (1989) Effect of fever on recurrence rate of febrile convulsions. Arch Dis Child 64:869–870
4. Franzten E, Lennox-Buchthal M, Nygaard A, Stene J (1970) A genetic study of febrile convulsions. Neurology 20:909–917
5. Freeman JM (1980) Febrile seizures. A consensus of their significance, evaluation and treatment. Pediatrics 66:1109–1012
6. Freeman JM (1990) Just say NO! Drugs and febrile seizures. Pediatrics 86:624
7. Lahat E, Katz Y, Bistritzer T, Eshel G, Aladjem M (1990) The incidence of febrile and non-febrile seizures in young children with shigella-associated convulsions. Ann Neurol 28:393–395
8. Lewis HM, Parry JV, Parry RP, et al (1979) Role of viruses in febrile convulsions. Arch Dis Child 54:869–879
9. Nelson KB, Ellenberg JA (1978) Prognosis in children with febrile seizures. Pediatrics 61:720–727
10. Rantala H, Uhair M, Tuokko H (1990) Viral infections and recurrences of febrile convulsions. J Pediatr 116:195–199
11. Shirts SB, Hauser WA, Annegers JF (1987) Risk of recurrence of febrile seizures in a population based cohort of children. Neurology 37 [Suppl 1]:149
12. Steele WR, Tanaka TP, Lara PR, Bass WJ (1970) Evaluation of sponging and oral antipyretic therapy to reduce fever. J Pediatr 77:824–829
13. Torphy DE (1989) Occult bacteremia in children with simple febrile seizures. Am J Dis Child 143:273
14. Van Den Berg BJ, Yerushalmy J (1969) Studies on convulsive disorders in young children. Incidence of febrile and nonfebrile convulsions by age and other factors. Pediatr Res 3:298–304

Announcement

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