ORIGINAL ARTICLE

Correlation between Acetaminophen Consumption and CSF Glucose Level in Febrile Convulsion

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Abstract

Hyperglycemia and hyperglycorrhagia common occur in children with febrile seizures. Rapid release of cortisol and adrenaline after seizures as a stress reaction induce elevated glucose concentration in Cerebral Spinal Fluid (CSF). The purpose of this study was to assess the correlation between acetaminophen consumption and CSF glucose level in children with febrile convulsion.This cross- sectional study was performed over 3-18 months old children who were admitted at pediatric section of teaching hospital during 7 years. Comparisons between the mean CSF glucose concentrations in the children who taken and no taken acetaminophen during 6 hours before convulsion was performed using Student's t-test and Mann-Whitney test.The glucose level in the CSF of children who no taken acetaminophen (82±8 mg/dl) was significantly higher than children taken acetaminophen (53±4 mg/dl). (P=0.0001).The use of acetaminophen before convulsion decrease CSF glucose concentration in febrile convulsive children.

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Key Words

Acetaminophen, CSF Glucose, Febrile Convulsion

Introduction

Febrile convulsion occurs in 3-4% of children (1). In these situations, lumbar puncture (LP) is recommended to rule out central nervous system (CNS) infection, especially in first attacks of febrile convulsion. The presence of bacteria reduction in glucose levels and elevated protein levels are considerable in CSF analysis. Raised blood and CSF glucose levels occurs usually in febrile convulsion (2,3). Rapid release of cortisol and adrenaline secondary to stress induced by febrile convulsion and due to it, glucose concentrations increase (3). Release of interleukin 1 (IL1) during fever motivates rises in CSF glucose levels. IL 1 is an endogenous cytokine which increases CSF glucose levels by inhibiting insulin (4,5) and stimulating cortisol secretion (6). Some clinical trials demonstrates that fever intensity and high CSF glucose levels are concomitant (7). Since febrile children usually take acetaminophen to control fever, it's important to evaluate its effect over CSF glucose levels. Just one trial performed on this subject in Iran and no other studies have been done yet. This cross- sectional analytic study was performed with the aim of studying the effect of acetaminophen over CSF glucose levels.

Material and Methods

This cross- sectional study was performed over 3-18 months old infants who were admitted at pediatric section of teaching hospital during 7 years. All of our cases

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Table 1.The Comparison of Mean of CSF Glucose Levels in Children Received with no History of Using Acetaminophen During 6 hours before Convulsion

Age (months)	Received acetaminophen Yes(Y), No(N)	Mean CSF glucose levels (mg/dl)	P value
3-8	Y	54.7	0.133
	N	72	
9-13	Y	54.6	0.0001
	N	83.2	
14-18	Y	57.08	0.0001
	N	81.75	

Table 2. Mean CSF Glucose levels for Gender

Received acetaminophen Yes(Y), No(N)	Gender	mean CSF glucose levels mg/dl	P value
Y	boy	56.27	0.196
	girl	54.4	N.S
N	boy	82	0.823
	girl	82	N.S

hospitalized with the first attack of simple febrile convulsion. Data was collected from all infants with febrile convulsion who had the criteria to be included in the study. These data included age, gender, CSF glucose levels (mg/dl) and history of taking or no taking acetaminophen 6 hours before seizure. Exclusion criteria were: CSF pleocytosis, positive CSF smear or culture, history of recent trauma, metabolic diseases, history of previous seizure, malnutrition, history of taking any drug except acetaminophen in the last 6 hours and complex seizure. Children were categorized into two groups. Group I included children who hadn't taken acetaminophen during the 6 hours before seizure and group II included children who had taken acetaminophen during the last 6 hours before seizure. CSF sampling was done after about 2 hours of hospital admission. CSF glucose concentration was measured using o-toluidine method.

Statistical Analysis

Data analysis: Numeric data described by mean±sd. T-test, chi^2 test and Mann-Whitney test used. Statistical significance was set at $P > 0.05$. All analyses performed by SPSS.16 which was available commercially.

Results

Overall, 63 infants were included in this study, 27(42.0%) were girls and 36(58.1%) were boys. The mean of age was 11±4 months. Patients were categorized into 3 age groups: A (3-8 months), B (9-13 months), and C (14-18 months). The number of cases in each group was respectively: A: 15(23.8%), B: 28(44.4%) and C: 20(31.7%). The mean of CSF glucose concentration was 63.4±13.5 mg/dl in all patients. The comparison of the mean of CSF glucose levels in two groups (having received acetaminophen with no history of using acetaminophen during 6 hours before convulsion) are shown in *table.1*.Concerning age, CSF glucose level did not show any difference in two groups of patients (P>0.05). CSF glucose levels did not show any difference in two groups of patients (p=0.0001). Regarding to gender, there were no significant differences between boys and girls(P>0.05). (*Table2*)

Discussion

CSF glucose levels are an important value in analyzing and interpreting CSF. Glucose enters CSF by simple diffusion through choroid plexus (8, 9). Various studies demonstrate seizure gives rise to CSF glucose levels via increase in crotisol and adrenaline(2) and also fever could rise CSF glucose levels(4) by stimulating the release of IL1. Since CSF glucose levels are important and most patients usually take acetaminophen to control fever, then its effect over CSF glucose levels is of great concern. Unfortunately just one study had been performed on this subject by Dr. Mahmudi and colleagues in 2003 in Iran. In Dr. Mahmudi's study 83 children hadn't taken acetaminophen in 6 hours before seizure and 34 children had taken acetaminophen in the last 6 hours before seizure. The study demonstrates that in children without history of taking acetaminophen, CSF glucose levels were significantly higher than those who hadn't taken acetaminophen (75.32±2.94 and 66.15±6.02 respectively) (10). In our study mean CSF glucose levels in group I (no history of taking acetaminophen) were 82±8 mg/dl and 53±4 mg/dl in group II (who had taken acetaminophen), and differences were significant. Considering age- in all age groups except group A- groups who had taken acetaminophen had lower levels of CSF glucose. Also in group A (3-8 months) CSF glucose levels were lower in those who had taken acetaminophen, but it wasn't statistically significant which could be due to lower number of patients in this group, however, further studies are recommended. No recordings of blood glucose levels before LP was a limitation on our study but it wasn't mandatory as two groups were compared according to their history of acetaminophen use.

Conclusion

Based on our results, the use of acetaminophen before convulsion decrease CSF glucose concentration in febrile convulsive children.

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