ORIGINAL ARTICLE

Serum IgG, and IgM Levels in Children with Febrile Convulsions

by

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Abstract

At the Dr. Sami Ulus Children's Hospital Ankara, Turkiye, 20 patients, twelve being between 6 months-2 year old and eight being between 2-4 years, with their first febrile convulsions (FC) were examined for serum IgG, IgA, IgM levels during the period of March 1989-July 1989. Twenty healthy children were used as controls, seven being between 6 months-2 years old and thirteen being between 2-6 years. The serum IgG, IgA and IgM levels of the patients between 6 months-2 years were 805.000 + 307.8984 mg./dl., 49.7167 + 27.9807 mg./dl and 155.1833 + 62.9696 mg./dl respectivelly.

The serum IgG, IgA and IgM levels of the patients between 2-4 years were : 989.1250 ± 314.5359 mg/dl., 92.6125 ± 34.5663 mg./dl. and 159.8750 ± 45.6647 mg./dl respectivelly. The mean IgA levels of the 12 FC patients between 6 months-2years were 49.7167 ± 27.9807 mg./dl. and the mean level of IgA in the age matched control group was 81.0427 ± 31.3551 mg./dl. and the difference between them was statistically significant ($p < 0.005$).

We conclude that FC under 2 years of age is associated with low serum IgA levels.

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Introduction

Febrile convlusion (FC) is a type of convulsion that can be seen in children between 6 months and 5 years of age without any acute intracranial infection, meningitis or chronic brain diseases [1.2].

The incidence of FC is 3-4% [2.3.4.5.6.7]. FC is predominantly seen in boys and the ratio of boys to girls is 1.4 1.6/1 [3.7].

2-4% of children who experience FC may later develop epilepsy [7]. The type of epilepsy that develops after FC is usually of the generalized type [8].

In 1975, Seager et al. discussed the relationship between low serum IgA levels and FC [9]. Ariizumi et al. in 1980 detected low serum IgA levels in 33% of patients with FC and in 57% of epileptic patients who had had FC [10].

We studied the serum IgG, IgA and IgM levels in 20 patients with febrile convulsions, 12 being between 0-2 years and 8 being between 2-4 years of age, using age-matched controls.

Materials and Methods

This study carried out in 20 children with their first FC between March and June 1989 at Dr. Sami Ulus Children's Hospital. The age of the cases ranged between 6 months and 4 years.

The quantitative levels of serum IgG, IgA and IgM on the first or second day were measured in 20 children with FC but we were able to examine IgG, IgA and IgM levels in only 5 patients who came for their follow up examimination. Three cc of venous blood was taken and centrifuged for 1 minute at 3000 rpm. The sera were kept at -20 C. We used Behring Institute Hoechst Nor-Partigen plaques for the quantitative measurement of serum IgG, IgA and IgM levels using radial immuno-diffusion method. The measured values were converted to mg./dl. using Nor-Partigen Reference Value Calculators [11].

The serum IgG, IgA and IgM level measured on the first or second day of FC were compared statistically with values for the age-matched control group using the Chi-Square method [12].

Results

Of the 20 FC patients 7 were girls (35%) and 13 (65%) were boys. Their ages ranged between 6 months and 48 months with the mean of 25.16 ± 14.61 months.

For the purpose of the research the patients must not have had any previous FC. The duration of the FC varied between 1 and 20 minutes with the mean of 7.33 ± 7.35 minutes.

The patients temperature just before or after FC could only be measured in 14 children .The temperature range was 38-41 C with a mean of 39.4 ± 0.96 C.

According to their neurologic examinations all the patients had normal status.

The serum IgG, IgA and IgM lavels on the first or second day of FC between 6 months-2 years of age were : 805.0000 ± 307.8984 mg./dl., 49.7167 ± 27.9807 mg./dl. and 155.1833 ± 62.9696 mg./dl, while between 2-4 years of age the serum IgG, IgA and IgM levels were 989.1250 ± 314.5339 mg./dl, 92.6125 ± 34.5663 mg./dl and 159.8750 ± 45.6647 mg./dl. (Tabel I).

Table I. *Mean IgG, IgA and IgM levels of patients with FC between 6 months-2 years of age and the age-matched control*

Patients with FC	Control Group	P
IgG (mg./dl.) 805.0000 ± 397.8984	958.4286 ± 305.5448	> 0.005
IgA (mg./dl.) 49.7167 ± 27.9807	81.0429 ± 31.3551	< 0.005
IgM (mg./dl.) 155.1833 ± 62.9696	158.1571 ± 36.3420	> 0.005

The serum IgG, IgA and IgM levels of the age-matched control group between 6 months-2 years were : 958.4286 ± 305.5448 mg./dl., 81.0429 ± 31.3551 mg./dl and 158.1571 ± 36.3420 mg./dl whereas between 2-6 years were : 1117.3846 ± 246.1194 mg./dl., 94.2692 ± 30.1359 mg./dl. and 148.0769 ± 40.0260 md./dl.

Discussion

Twenty patients with FC were examined at the Department of Pediatric Neurology at the Dr. Sami Ulus Children's Hospital between March and June 1989. Their ages ranged between 6 months and 48 months (mean 25.16 ± 14.61 months). Thirteen (65%) of these 20 children were boys, 7 (35%) of these were girls. In recent reports it was found that boys had FC more than girls and the ratio was 1.4-1.6/1 [3.7]. In our study the ratio of boys to girls was 1.8/1.

The mean fever temperature in our patients that could be measured at the time of FC was 39.4± 0.96 C. It is said that one of the predicting factors for FC to develop into afebrile convulsion is the fever temperature. If the fever temperature is under 38.4 C during FC the patient will develope afebrile convulsions later in his life [13]. In our series the mean fever temperature was 39.4 ± 0.96 C during FC. We can say that most of our patients will not have this risk, except the one whose fever temperature was 38 ^{o}C.

In 18 patients the duration of the convulsion was less than 15 minutes and in 2 patients it was 20 minutes. The mean duration of the FC was 7.33 ± 7.35 minutes. In some litteratures it is said that FC usually lasts less than 15 minutes. If it is longer than 15 minutes the risk of recurrences and epilepsy increase [4.13.14.15].

We found that 5 of our patient's parents were related (26.3%). Three were first degree relatives (15.7%) and two were second degree relatives (10.5%). One patient had a brother with a history of FC and the parents were not related. In 2 of our patients families there was a history of epilepsy. Although there are many reports of genetic transmission of FC, the most common mode is the polygenic transmission [14.16].

The mean serum IgG, IgA and IgM levels in FC patients between 6 months-2 years were 805.0000 ± 307.8984 mg./dl., 49.7167 ± 27.9807 mg./dl and 155.1833 ± 62.9696 mg./dl. (Table I) while between 2-4 years were : 989.1250 ± 314.5339 mg./dl., 92.6125 ± 34.5663 mg./dl. and 159.8750 ± 45.6647 mg./dl.

The mean serum IgG, IgA and IgM levels age-matched controls between 6 months-2 years were 958.4286 ± 305.5448 mg./dl., 81.0429 ± 31.3551 mg./dl. and

158.1571 ± 36.3420 mg./dl. while between 2-6 years were : 1117.3846 ± 246.1194 mg./dl, 94.2692 ± 30.1359 mg./dl. and 148.0769 ± 40.0260 mg./dl.

We still do not know much about the causes of FC. The immune mechanism may be involved, but this is still not clearly understood.

Seager et al (1975) and Oloffson et al (1982) reported the probable connection between low serum IgA levels and FC [9.17]. Ariizumi et al (1980) and Bibus & Aarli (1981) reported that 33% of patients with FC had low serum IgA levels and a 57% of epileptic patients who had had FC had low serum IgA levels [10.18].

However Isaacs et al. (1984) reported that 47 FC patients had normal serum IgG, IgA and IgM levels [19].

In our study the mean IgA level of FC patients between 6 months-2 years were 49.7167 ± 27.9807 mg./dl. and the mean level of IgA in the age-matched control groups was 81.0429 ± 31.3551 mg./dl. and the difference between them was statistically significant ($p<0.005$).

Only 5 of the 20 came for their follow-up examinations after 3 weeks and serum IgG, IgA and IgM levels were measured in these patients. Four of these 5 patients were on phenobarbital prophylaxis (5 mg./kg./day). The IgA levels of these 4 patients were lower than their first IgA levels but the results were not compared statistically. One patient who did not have phenobarbital prophylaxis had the same serum IgA level as before.

It is well known that some anticonvulsant drugs have immunosuppressive effects. Phenytoin in particular suppresses IgA [19.20]. In one of their studies, Tartara et al. found that patients who were using phenobarbital had low serum IgA levels, while those using phenytoin had normal serum IgA levels [20].

In our study serum IgG and IgM levels were normal in children with FC when compared with the age-matched controls. FC patients between 2-4 years of age also had normal IgA levels when compared with the age-matched controls.

It was concluded that FC under 2 years of age is associated with low serum IgA levels.

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