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## Incidence of Febrile Seizures in The Netherlands

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### Key Words

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### Abstract

To assess the incidence of febrile seizures in The Netherlands, we analyzed data from a population-based study carried out in 161 Dutch general practices. The overall incidence rate was 4.8/1,000 person-years. Considerable age and seasonal variation was found. The chance of a child suffering a febrile seizure in the course of the relevant age period (3-72 months) is 2.7%. One out of 3 children was referred to hospital. This is considerably less than in other countries. The incidence rates are similar to those found in the United States, England and Sweden, but differ from Asian studies.

### Introduction

In an attempt to reach general agreement on several aspects of the subject a consensus development conference on febrile seizures was held at the National Institutes of Health in the United States in 1980. A febrile seizure was defined as '...an event in infancy or childhood, usually occurring between three months and five years of age, associated with fever, but without evidence of intracranial infection or defined cause' [1]. Febrile seizures must be dis-

tinguished from epilepsy. Seizures with fever in children who have suffered a previous non-febrile convulsion are therefore excluded. Although it is a benign event, many parents think that their child is dying when a first febrile convulsion occurs [2].

The reported prevalence of febrile seizures in the United States in children under 5 years of age is between 2 and 4%, which is half the number of all convulsions occurring at that age [3-5]. These results are comparable to European data [6, 7]. The Japanese preva-

lence for children up to 3 years of age is about 9% [8]. Occurrence figures recently calculated for The Netherlands were based on retrospective data [9].

Most studies on incidence, management and outcome of febrile convulsions have been performed in a clinical setting. The purpose of our study was to gain insight into the extent to which this pediatric disorder is present in general practices in The Netherlands.

We studied the incidence rate and some of its correlates, such as age, sex, season and time of occurrence of the seizures. Furthermore, we wanted to assess the probability of a child ever suffering a febrile convulsion. Finally we studied the general practitioner's management.

### Subjects and Methods

In this study morbidity data were obtained from the Dutch National Survey of General Practice, carried out by The Netherlands Institute of Primary Health Care (NIVEL) [10]. This survey covered a whole year (1 April 1987 to 31 March 1988), divided into four consecutive periods of 3 months each. During each period a different group of about 40 general practitioners was involved, from a stratified sample of the Dutch general practitioners. Census data were gathered in advance in all the practices which cooperated, to assess the study population. During the registration period details of every patient contact were recorded, including type of contact, associated illnesses, diagnostic and therapeutic procedures. Thorough quality checks of the registration forms were carried out. In the event of a child being admitted to hospital, follow-up data were collected.

To assess the occurrence of febrile seizures, we confined ourselves to the contacts between the general practitioners and patients aged between 3 months and 5 years (inclusive) in whom a convulsion with fever had been diagnosed. These features could be searched for in the survey data by means of their International Classification of Primary Care (ICPC) code [11].

The original forms were checked to exclude children with a nonfebrile convulsion (epilepsy) or an intracranial infection. In the case of children who had a febrile seizure, subsequent contacts with the general practitioner were also investigated.

Table 1. Age-specific incidence rates

Age months	Number of convulsions	Number of person-years	Incidence rates/1,000 person-years
3-12	3	982	3.1
13-24	12	1,119	10.8
25-36	7	1,071	6.5
37-48	3	1,070	2.8
49-60	4	1,054	3.8
61-72	1	899	1.1
Total	30	6,195	4.8

Age-specific incidence rates were calculated by dividing the number of new cases by the total number of person-years, i.e. the period during which the children were within the age group at risk times their number.

The probability of a child developing a first febrile seizure between the age of 3 and 72 months was calculated by conversion of the age-specific incidence rates to the cumulative incidence for the relevant age span (5 years and 9 months). The underlying assumption is that incidence rates are constant over time within each age category [12].

### Results

The population aged 3-72 months consisted of 23,801 children, of whom 12,139 (51%) were male and 11,662 (49%) were female. Thirty (30) of them suffered a first febrile convulsion during the registration period. The group of patients consisted of 17 (57%) boys and 13 (43%) girls. In addition, febrile seizures occurred in 4 boys and 2 girls who had already suffered a febrile seizure prior to the registration period.

The ages at which the febrile convulsions occurred varied from 4 to 70 months, with an average of 28 months, the latter being equal for boys and girls. The overall incidence rate was 4.8/1,000 person-years. Age-specific incidence rates are shown in table 1. The highest

**Table 2.** Season-specific incidence rates

Months	Number of convulsions	Number of person-years	Incidence rates/1,000 person-years
January–March	5	1,464	3.4
April–June	6	1,734	3.5
July–September	3	1,353	2.2
October–December	16	1,644	9.7
Total	30	6,195	4.8

age-specific rate (10.8/1,000 person-years) was found in the 2nd year of life. There was a marked seasonal variation in incidence rates, with a peak rate in autumn (table 2).

The probability of a child suffering a first febrile seizure between the ages of 3 months and 5 years was estimated to be 2.7%.

If all febrile convulsions are taken into account and assuming that the standard size of a Dutch practice is 2,800 patients [13, 14] (with 193 children aged 3–71 months), approximately one febrile seizure a year may be expected to be presented to the general practitioner.

Of the 30 cases, visits were made by the general practitioner in 21 cases, of which 18 were emergency visits. Visits to the general practitioner were made by appointment in 4, 1 contact took place in the surgery without appointment, 1 by telephone and 3 were unknown. Twelve of the emergency visits took place during the daytime and 6 in the evening or at night. The majority of associated illnesses consisted of viral upper respiratory tract infections and otitis media. One febrile seizure occurred 7 days after a measles-mumps-rubella vaccination.

The children were physically examined by the general practitioner and the parents were given information and set at ease. Eighteen children received a prescription for drugs: antipyretics in 5 cases, anticonvulsants in 3 and

a combination of the two in 8 cases. Two children were given antibiotics. Eight children were referred to hospital for further evaluation. No intracranial infections or cerebral abnormalities were diagnosed. Admission took place in only 4 cases.

## Discussion

This study was based on all the recorded contacts between 161 general practitioners and their patients in order to give a reliable picture of the occurrence of febrile seizures in The Netherlands. Because of the nature of the event and the fact that in the Dutch primary care system the general practitioner is the first person to see a patient, not many cases will have escaped notice.

We assume that the general practitioner correctly diagnosed the febrile convulsions and that all diagnoses of febrile seizures were correctly classified. Furthermore, we assume that the practice population of this age is stable, i.e. that the children moving out will balance the group moving in.

Given the small number of febrile seizures found, some caution regarding the conclusions is warranted. To illustrate this point, the 95% confidence interval of the incidence rate of 4.8/1,000 person-years was 3.1–6.6/1,000 person-years.

This population-based study enabled us to calculate a cumulative incidence for children aged between 3 and 72 months, a figure which was unavailable until now. The cumulative incidence of 2.7% which we found in this study for The Netherlands is comparable to epidemiologic data from other studies [3, 4]. As in other studies [3, 7] there is a slightly higher incidence in boys than in girls, although numbers were small.

The age-specific incidence rates were similar to previously published data. The peaks in December–January and June–August found by Tsuboi and Okada [15] in the Fuchu-Tokyo area are not supported by our results. This may be explained by geographical and racial differences. Forsgren et al. [6] recently found a peak somewhat earlier in autumn (August–October) than this study. The in-

creased incidence in autumn might be related to the more frequent occurrence of febrile illnesses at this time of year, especially upper respiratory tract infections.

The number of children who came to the attention of a consultant pediatrician is considerably smaller than in studies performed in other countries [4, 7, 16]. The explanation may be found in differences in health care systems. This again lends support to the warning that we should be careful about generalizing the results of hospital-based studies to whole populations [17].

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