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Incidence of epilepsy and predictive factors of epileptic and non-epileptic seizures

Irene Kotsopoulos [a,*], Marc de Krom [a], Fons Kessels [b], Jan Lodder [a], Jaap Troost [a], Mascha Twellaar [c], Tiny van Merode [c], André Knottnerus [c]

[a] *Department of Neurology, University Hospital Maastricht, P.O. Box 5800, 6202 AZ, Maastricht, The Netherlands*
[b] *Department of Clinical Epidemiology and Medical Technology Assessment, University Hospital Maastricht, P.O. Box 5800, 6202 AZ, Maastricht, The Netherlands*
[c] *Department of General Practice, University of Maastricht, P.O. Box 616, 6200 MD, Maastricht, The Netherlands*

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Summary

Purpose: To estimate the incidence of unprovoked seizures (US) and epilepsy in a general population from the southern part of the Netherlands, in relation to age, sex, etiology and seizure type, and to identify predictive factors of the epileptic and non-epileptic seizures.
Methods: All patients aged $\geq$14 years with a first seizure or who had undiagnosed seizures before the study period were included. Patients were identified from different sources and were independently evaluated and classified by a team of neurologists. A predictive profile for the occurrence of epileptic and non-epileptic seizures was obtained by stepwise logistic regression analysis.
Results: The overall annual incidence was 55/100,000 and 30/100,000 for US and epilepsy, respectively. The age-specific annual incidence of US and epilepsy increased with age and reached 120/100,000 and 62/100,000 for the $\geq$65 years of age group, respectively. The incidence of epilepsy and US in males was higher than in females and partial seizures prevailed over generalized seizures (40 versus 9/100,000). In up to 35% of the cases with US or epilepsy, the etiology was mainly cerebrovascular disease and brain tumors. Predictors for epileptic versus non-epileptic seizures of organic origin were an epileptiform EEG pattern (OR = 0.06) versus a history of hypertension (OR = 2.8) or cardiovascular disease (OR = 5.4). Strong predictors for seizures of non-organic origin were female sex (OR = 2.2) and head injury (OR = 2.4).

* Corresponding author. Tel.: +31 43 387 5059; fax: +31 43 387 7055.
E-mail addresses: iko@sneu.azm.nl (I. Kotsopoulos), mdk@sneu.azm.nl (M. de Krom), akes@aozg.azm.nl (F. Kessels), jdl@sneu.azm.nl (J. Lodder), jtr@sneu.azm.nl (J. Troost), Mascha.Twellaar@hag.unimaas.nl (M. Twellaar), Tiny.vanMerode@hag.unimaas.nl (T. van Merode), Andre.Knottnerus@hag.unimaas.nl (A. Knottnerus).

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Conclusions: The incidence of US and epilepsy (overall, and age-, sex-, seizure-specific) was similar to those reported by other developed countries. The predictive factors found in this study may assist in the early diagnosis of seizures.

Introduction

Prospective population-based studies of epilepsy provide information regarding the incidence, natural history, associated mortality and risk factors for epilepsy. Furthermore, these studies have the advantage to provide a representative sample to allow unbiased evaluations of several variables of interest.[1,2]

In several countries the incidence of epilepsy has been studied but only a few of these studies had a prospective population-based approach. In the Netherlands, so far, no incidence study of epilepsy has been performed.

The purpose of the presented prospective population-based study was to estimate the incidence of unprovoked seizures and epilepsy in a well-defined population in relation to age, sex, etiology and seizure type, and to compare the results with that of incidence studies in other countries. It also focused on the characteristics of the cohort with epileptic and non-epileptic seizures with the aim to identify predictive factors which can enable an early diagnosis of these seizures.

This study was conducted as part of an epidemiological project of seizure disorders in Dutch adolescents and adults in Maastricht and its surroundings, which is a well circumscribed area located in the southern part of the Netherlands.

Methods

Study population

The baseline survey was conducted from October 1, 1998 to September 30, 2000 in the area of Maastricht. Its total population on December 31, 1999 was 190,860. 83.4% of the population was aged $\geq$14 years old and comprised of 48.5% males and 51.5% females (Central Bureau of Statistics, the Netherlands). The health facilities in this area, which lies within the zip-code areas 6200 to 6299, consist of 90 general practitioners, three nursing homes and one hospital, the Maastricht University Hospital.

Case ascertainment

Multiple overlapping strategies were used to identify cases. All general practitioners, residents of neurology, neurologists and child neurologists in the study area were asked to refer patients with newly diagnosed seizures (epileptic and non-epileptic) directly to the investigators. They all agreed to participate in this study. In addition, we surveyed all EEGs and neuroradiology reports performed during the study and the clinical files of all the individuals who had received the diagnoses syncope, convulsion, epilepsy or attacks of unknown type during the inclusion period of the study in order to find patients who had not been reported through other sources. All identified cases were evaluated and their data were recorded in a systematic way. Whenever possible, the patients were also (re-)examined in a standardized manner by one of the authors (I.K.) (medical history, physical and neurological examination). Blood screening tests and an ECG were performed in all cases. EEG (standard and/or sleep deprived), neuroradiological examinations (CT or MRI), and video EEG were performed if indicated for a more precise diagnosis.

Inclusion and exclusion criteria

All individuals aged $\geq$14 years who were residents in the investigated area at the time of their first seizure were included. Included were also patients who had undiagnosed seizures before the study period and had not received any antiepileptic drugs yet. Children with seizures aged between 0 and 13 years were not included in our study since we had not the possibility to (re)examine these cases (these children are referred to pediatricians and child neurologists). Excluded were all patients who had an acute symptomatic seizure.

Nursing homes

During 1 year, the nurses in the nursing homes provided monthly reports of all residents with seizures and their possible cause. They also reported the age and sex of these patients and if they had been treated with antiepileptic drugs before the study period. Some of these elderly patients had not been referred to the Department of Neurology and, therefore, were not examined by one of the authors and did not have any EEG or neuroradiological investigation. For reasons of confidentiality we could not define the number of these patients and we were not able to review the medical files of the