

The incidence and prevalence of epilepsy

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### **The incidence and prevalence of epilepsy**

#### *Methodological problems in epidemiological studies*

Epilepsy is the most common serious neurological condition: despite this, incidence and prevalence figures have varied considerably in different studies. This is mainly due to differences in inclusion criteria, classification, diagnosis and case ascertainment methods. If febrile seizures, neonatal seizures, single seizures or seizures in acute illnesses are included the figures may be elevated several fold. If only active epilepsies are counted in prevalence studies, a figure several times lower than the lifetime prevalence will be found. Differences in diagnostic criteria and in classification may also have a marked impact on statistics<sup>1</sup>. Methodological differences in case ascertainment are also important, and retrospective surveys based on hospital records may significantly underestimate the number of cases in a community<sup>2</sup>.

Some patients are unaware that they have seizures: in a survey in London less than 20% of patients presenting with epileptic seizures suspected the diagnosis. In a community survey in Warsaw, one-third of cases identified had never been treated, and one-quarter had not consulted a doctor. It is clear therefore that the evaluation of any epidemiological figures requires a detailed understanding of the study methodology<sup>3</sup>.

#### *Incidence and prevalence figures*

In most studies, the overall incidence of epilepsy (excluding febrile convulsions and single seizures) in developed societies has been found to be around 50 cases per 100,000 persons per year (with a range of 40–70/100,000/year)<sup>3–6</sup>. The figures for developing countries are generally higher, in the range of 100–190/100,000/year<sup>1</sup>. The reasons for this are not entirely clear but suggestions have been made that this is due to social deprivation<sup>7</sup>. Interestingly, recent data suggest that people from socioeconomically deprived backgrounds in developed countries are more likely to develop epilepsy<sup>8</sup>.

The usual prevalence figure quoted is about 5–10 cases per 1000 persons, excluding febrile convulsions, single seizures and inactive cases<sup>3–6</sup>; this seems to be the case independent of location. The lifetime prevalence of seizures (the risk of having a non-febrile epileptic seizure at some point in an average lifetime) is between 2 and 5%. From the difference between lifetime prevalence and the prevalence of active epilepsy, it is obvious that in most patients developing epilepsy either the condition remits or the patient dies. In recent community-based studies, it has been shown that for most patients epilepsy is relatively short-lived: over two-thirds enter long-term remission and once remission has occurred, subsequent relapses are uncommon. The course of the condition in its early years is an

important predictor of prognosis; the longer epilepsy remains active the poorer the long-term prognosis. Table I shows the prevalence rates found in a survey in Kent<sup>4</sup>.

The cumulative incidence of febrile seizures –the risk of having a febrile seizure before the age of five –is about 5%. Febrile seizures account for a substantial proportion of seizures in children under five.

#### *Factors influencing incidence and prevalence*

Incidence rates vary considerably at different ages. Those from a community-based study in Rochester, Minnesota, are shown in Table II, and age-specific incidence, prevalence and cumulative incidence rates from the same study in Figure 1<sup>6,9</sup>. In the past, it has been noted that around half of people developing epilepsy do so before the age of 15 years. Recent epidemiological evidence suggests, however, that increasing numbers of patients are developing epilepsy in old age: this is partly because of demographic changes in the population (with an increasing proportion of the population in the elderly age range) and also due to an increasing incidence of degenerative cerebrovascular disease. Most, but not all, studies have found a slight male preponderance.

Epilepsy is widespread throughout the world, but higher incidence figures are generally found in studies in developing countries. A comprehensive study of epilepsy in Ecuador, with case ascertainment by a house-to-house survey and with stringent methodology applied, found an incidence rate of 122 per 100,000 per year<sup>1</sup>. Geographic variation has been hard to assess because of a lack of standard techniques but a consistent finding is that prevalence rates are higher in rural than in urban areas<sup>1</sup>. The reasons for this are unclear.

Aetiological differences have only a small effect on prevalence rates, perhaps because the majority of cases of epilepsy are ‘cryptogenic’, but higher incidence rates in parts of the tropical belt may reflect a high local prevalence of neurocysticercosis<sup>10</sup>. No consistent racial differences have been found, although several studies from the United States show higher incidence and prevalence figures in Afro-Americans than in white Americans –this may reflect a poorer standard of perinatal and other health care. The prevalence of epilepsy is usually found to be slightly higher in the lower socio-economic groups.

#### **Characteristics of epilepsy in a general population**

Epilepsy is a very variable condition, and a description of its characteristics in a population is as important as simple prevalence and incidence figures. Based on a prevalence rate of 10/1000, it has been estimated that in the United Kingdom there are about 160,000 people with epilepsy who require continuing hospital-based medical treatment. Of those, 25,000 will have more than one major seizure a month and 60,000 more than one minor attack a month. It has also been estimated that there will be 20,000 patients with severe epilepsy and additional handicaps who may require institutional care (Table III).

Since the aetiology of epilepsy is frequently multifactorial the exact attribution of cause in the general population is often impossible. It has traditionally been said that about 60–70% of all epilepsies have no clear cause and these are best referred to as cryptogenic epilepsies. In a community-based survey of epilepsy in the United Kingdom (the National General Practice Study of Epilepsy, NGPSE)<sup>11</sup>, aetiologies were as follows: cerebrovascular disease 15%, cerebral tumours 6%, alcohol-related seizures 6%, post-traumatic seizures 2%. Other causes were rare.

Advances in neuroimaging by MRI have, however, increased the number of patients in whom a putative positive aetiological diagnosis is possible. Experience in clinic-based populations suggests that at least half of patients would demonstrate evidence of hippocampal sclerosis, cortical dysgenesis or small foreign tissue lesions. Furthermore, between 5 and 10% of cases classified as cryptogenic epilepsy in many studies do, in fact, conform to the definition of the syndrome of 'idiopathic generalised epilepsy'. This is a genetically determined syndrome and should not be mixed in with other 'cryptogenic' cases. The contribution of perinatal damage to the development of epilepsy is difficult to assess, but case-control studies suggest this is less important than is often assumed. In developing countries, infective conditions (e.g. parasitic infestation, malaria, tuberculosis) are an important cause of epilepsy. In all regions, however, cryptogenic cases predominate, and the aetiology of epilepsy in these cases remains a key issue for future research and for any attempt at prevention.

In all comprehensive surveys, partial seizures account for most cases; complex partial and secondarily generalised seizures comprise 60% of prevalent cases, primary generalised tonic-clonic seizures about 30%, and generalised absence and myoclonus less than 5%. Other seizure types are rare. In the NGPSE cohort of new cases, the seizure type initiating diagnosis was a secondarily generalised seizure in 36%, complex partial seizures in 16%, primarily generalised tonic-clonic seizures in 33%, simple partial seizures in 4%, and generalised absence and myoclonus in 1% each.

The use of medical services over a 12-month period has been studied in a series of 1628 prevalent cases identified randomly in a population-based survey (the cases ascertained being those on antiepileptic drug (AED) therapy)<sup>12</sup>. In the prior 12-month period 28% had been seen by a specialist (and 81% had been seen by a specialist at some point), 87% had been seen by their general practitioner for epilepsy, and 9% had been seen by no doctor. In the previous 12 months 18% had attended an accident and emergency department and 9% had been admitted to a hospital. A total of 43% had ever attended an accident and emergency department and 47% had ever been admitted to hospital, 2% more than ten times. Most (65%) were on antiepileptic monotherapy, with 35% on polytherapy.

AED therapy is widely available; despite this many patients with active epilepsy, particularly in the developing world, are untreated. It has, for instance, been estimated that only 6% of people with epilepsy in the Philippines or Pakistan and 20% of those in Ecuador are receiving treatment at any one time. Again, there may be variation within a country, and in rural areas of Pakistan, a recent house-to-house survey found that none of the cases identified with active epilepsy was on treatment.

**Figure 1.** Age-specific incidence rate, cumulative incidence rate and prevalence rate of epilepsy in Rochester, Minnesota (1935-1974).  
From: HAUSER et al, 1983<sup>9</sup>

Table I. Prevalence findings in a survey of epilepsy amongst 6000 persons in a single general practice in Tonbridge, Kent.

	Prevalence per 1000 persons
Lifetime prevalence*	20.3
Recurrent seizures**	17.0
Active epilepsy*** and/or on treatment	10.5
Active epilepsy***	5.3

\* Number of persons who had ever had a non-febrile seizure

\*\* Lifetime prevalence of those having recurrent seizures

\*\*\* Active epilepsy defined as those who had had a seizure within the previous 24 months

From: GOODRIDGE and SHORVON, 1983<sup>4</sup>

Table II. Age-specific incidence rates of epilepsy in Rochester, Minnesota.

Age group (years)	Cases/100,000/year	
	Cause not identified	Cause identified
0-1	43.6	29.1
1-9	65.8	3.5
10-19	36.6	
20-39	28.4	10.3
40-59	8.5	4.0
60+	56.8	25.2
Total	37.8	8.6

From: HAUSER and KURLAND, 1975<sup>6</sup>

Table III. The characteristics of epilepsy and medical manpower in a typical British region of 1,000,000 persons.

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**Prevalence and incidence of seizure disorders**

New cases of epilepsy each year (incidence 50/100,000)	500
New cases of febrile seizures (incidence 50/100,000)	500
New cases of single seizures (incidence 20/100,000)	200
Cases of active epilepsy (prevalence 5/1000)	5000
Cases who have ever had a seizure (lifetime prevalence 20/1000)	20000

**Requirement for medical care**

Group 1: Cases in institutions (0.4/1000)	400
Group 2: Residential equivalent (0.3/1000)	300
Group 3: Cases requiring continuing medical attention (3.3/1000)	3300
Group 4: Cases requiring occasional medical attention (2.6/1000)	2600

**Characteristics of the epilepsy** (for the 3600 persons in the community under active medical care, groups 2 and 3)

*Seizure type and aetiology*

Generalised seizures only	2000
Partial seizures only	700
Mixed partial and generalised seizures	700
Others	200

*Seizure frequency (seizures/year)*

	<i>Generalised</i>	<i>Partial</i>
One or less a year	450	50
Between one a month and one a year	1650	400
More than one a month	600	950

*Associated neurological or psychiatric disorders*

Epilepsy only	900
Intellectual disability also	1600
Behavioural disability also	1800
Neurological disability also	350

**Medical manpower provision** (approximate mean figures)

General practitioners (unrestricted principals)	465
Consultant psychiatrists (mental illness)	22
Consultant general physicians	21
Consultant paediatricians	11
Specialists in community medicine	6
Consultant psychiatrists (mental handicap)	3
Consultant neurologists	3
Consultant neurosurgeons	2
Consultant clinical neurophysiologists	1

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Approximate estimates only, derived from a variety of sources

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