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The Epidemiology and Mortality of Epilepsy

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ABSTRACT
Epilepsy is slightly more common in males than in women, and it tends to peak in the elderly, reflecting the higher prevalence of stroke, neurological disorders, and malignancies in this age range. In both children and adults, focal seizures are more prevalent than generalised seizures. The aetiology of epilepsy varies depending on the sociodemographic features of the affected populations and the thoroughness of the diagnostic workup, although in around half of cases from high-income nations, a documented cause is still missing (HIC). When judged by seizure freedom, the general prognosis of epilepsy is positive in the majority of individuals.
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INTRODUCTION

Epilepsy is a widespread neurological disorder that affects people of different ages, ethnicities, socioeconomic backgrounds, and places. Epilepsy is a brain illness marked by a chronic tendency for seizures, as well as the neurobiologic, cognitive, psychological, and social implications of recurrent seizures [1]. Epileptic seizures are recurrent paroxysmal occurrences marked by stereotyped behavioural alterations that reflect the disease's neurological underpinnings. The differential diagnosis of epilepsy includes a range of clinical disorders characterised by transitory changes in consciousness and/or behaviour. In most situations, a comprehensive history or observation of a seizure may be used to identify the illness. Although an etiologic agent may be identified in around half of the cases, the aetiology is unclear in the other half [2]. A varying genetic tendency to exhibit seizures and the different distribution of various environmental risk factors might explain the global variety of the disease's occurrence, course, and consequences. Aside from the recurrence of seizures, the underlying cause and treatment's side effects have neurologic, cognitive, psychological, and social ramifications that have a substantial influence on afflicted people's quality of life, making the condition a complex nosographic entity [3].

INCIDENCE OF ACUTE SYMPTOMATIC SEIZURES

Acute symptomatic seizures occur at a rate of 29–39 per 100,000 [4]. Children under the age of one year and the elderly are more likely to have acute symptomatic seizures. Fever, traumatic brain injury (TBI), cerebrovascular illness, medication withdrawal, infection, and metabolic insults are the most prevalent triggering events.

INCIDENCE OF EPILEPSY

In a comprehensive review and meta-analysis of incidence studies, the pooled incidence rate of epilepsy was 61.4 per 100,000 person-years (95 percent CI 50.7–74.4) [5].
With 139.0 (95 percent CI 69.4–278.2) vs. 48.9 (95 percent CI 39.0–61.1), low/middle-income countries (LMIC) had a higher prevalence than high-income countries (HIC).
This can be explained by differences in risk population structure, increased exposure to prenatal risk factors, and higher incidence of CNS infections and TBI in LMICs. Epilepsy is also more common among HIC's lower socioeconomic levels, as well as among persons of diverse ethnic backgrounds within the same community [6].
Methodological difficulties, such as stricter case verification and the exclusion of solitary and acute symptomatic seizures in some cases, were discussed.

PREVALENCE OF EPILEPSY

Epilepsy prevalence varies widely between nations, depending on the geographical distribution of risk and etiologic variables, the number of seizures upon diagnosis, and whether only current epilepsy (active prevalence) or cases in remission are included (lifetime prevalence). According to Fiest *et al*. [5,] the total lifetime prevalence of epilepsy was 7.60 per 1,000 persons (95 percent confidence interval 6.17–9.38) and was higher in LMIC (8.75 per 1,000; 95 percent confidence interval 7.23–10.59) than HIC (5.18 per 1,000; 95 percent confidence interval 3.75–7.15).

The prevalence of active epilepsy was 6.38 per 1,000 (95 percent confidence interval: 5.57–7.30). The median point prevalence of active epilepsy in LMICs was 6.68 (95% CI 5.45–8.10), while it was 5.49 (4.16–7.26) in HICs.

Estimates of prevalence vary by population, but are often greater among those of specific ethnicities [7], those in poor health, and the elderly. as well as socially disadvantaged individuals [8]. The presence of risk factors in the environment, as well as the quality of health-care management, may all be at risk, in addition to

Incidence and Prevalence of Epilepsy by Sex and Age

Men are somewhat more likely than women to suffer from epilepsy [5]. The differential might be explained by differences in the prevalence of the most frequent risk factors, as well as the concealment of the disease in women in some places for sociocultural reasons [9]. Epilepsy is more common in the youngest and oldest age groups [5, 6], with estimates of 86 per 100,000 per year in a well-defined population in the first year of life, a downward trend to about 23–31 per 100,000 in people aged 30–59 years, and a subsequent increase to 180 per 100,000 in people over 85 years [10]. Epilepsy is most common in children during their first year of life, then reduces to adult levels by the tenth year [11]. Epilepsy is more frequent among children in LMICs, which may be attributable to older people's lack of understanding of the ailment as well as the demographic composition of the nation.

Overall mortality

Premature mortality has been observed to be considerably greater in epileptic patients than in the general population [18]. For community-based research, the SMRs vary from 1.3 to 3.1. (For research employing incident cases, the figures are 1.6 and 2.6). Using a state-wide paediatric mortality monitoring system, a community-based investigation of death in children aged 1-14 years in Victoria, Australia, reported an all-cause SMR of 13.2 (95 percent confidence interval [CI]: 8.5 20.7) [23]. A long-term research that followed 245 Finnish children with epilepsy for more than 30 years discovered that those who had not attained remission had a higher risk of mortality and a poorer chance of survival [24].

Those who had not entered remission had a higher risk of mortality and a decreased chance of survival [24]. In a community-based cohort study in Nova Scotia, Canada, which tracked 692 children diagnosed with epilepsy between 1977 and 1985, SMRs > 5 were detected in the first 15-20 years following diagnosis [25]. The majority of persons who start having seizures as youngsters die in their adult years [24]. In studies of specific groups, SMRs tend to be greater. In a large cohort analysis of all patients over 15 years old who had an epilepsy diagnosis upon discharge from any hospital in Stockholm between 1980 and 1989, an SMR of 3.6 (CI 3.5-3.7) was calculated [16]. There were 53,520 person-years in this cohort, with 4,001 fatalities. In a retrospective analysis of outpatients examined in a Dutch epilepsy centre over a 40-year period (38,665 person-years, 404 fatalities), the SMR was 3.2 (CI 2.9-3.5) [28]. In a cohort of adult outpatients with epilepsy at a tertiary referral facility in the UK (1849 patient-years), the SMR was 5.1 (CI 3.3-7.6) [27]. Institutionalized populations (patients in residential epilepsy centres) had SMRs ranging from 1.9 to 3.0 [18].

RISK FACTORS DETERMINANTS OF MORTALITY

The increased risk of early death does not apply to all persons with epilepsy, and it is just a summary measure that hides considerable disparities in mortality among epilepsy patients. Epilepsy mortality studies determine rates depending on aetiology, epilepsy duration and type, age, and gender. In its published criteria for epidemiological investigations, the ILAE advocated categorising epilepsies and epileptic seizures into aetiological groups: idiopathic, cryptogenic, acute symptomatic, distant symptomatic, and progressive symptomatic [14]. No research have followed the new categorization approach to the letter thus far. Idiopathic (or cryptogenic, or primary) epilepsy, distant symptomatic (or postnatally acquired secondary epilepsy), and (congenital) neuro-deficit epilepsy were the three principal aetiological groupings prior to this new categorization. With SMRs ranging from 1.5 to 1.8 in population studies [16, 28], idiopathic (and/or cryptogenic) epilepsy has the lowest long-term mortality, meaning that death rates in this group are 50-80 percent greater than those in the general population. Other studies [21, 22, 29], on the other hand, showed no indication of a substantial increase in mortality in this group. Studies in children follow the same demographic trends in mortality in idiopathic and cryptogenic

cases [24, 23, 24], as well as in cases without significant neurological deficiency [25]. Although the probability of obtaining remission in people with distant symptomatic epilepsy and idiopathic epilepsy are equal, the risk of mortality is not [12]. Long-term mortality is considerably greater in those with distant symptomatic epilepsy, with SMRs of 2.2 (CI 1.8-2.7) in the Rochester study [16], 2.3 (CI 1.4-3.5) in an Icelandic research [29], 3.7 (CI 2.9-4.6) in the NGPSE [21], and 3.3 (CI 2.4-4.5) in the Västerbotten County study [22]. Patients with symptomatic epilepsy who have congenital neurological deficits or CNS tumours have a risk of mortality that is over 10 times greater, and those with cerebrovascular illness or alcohol addiction have a risk of death that is 2-3 times higher [21]. In a typical paediatric epilepsy group, the reported SMR The reported SMR for distant symptomatic epilepsy in an Australian child epilepsy population was 49.7 (CI 31.7-77.9) [23]. Children with abnormalities severe enough to induce functional neurological impairments were 22 times more likely to die prematurely than those who did not, according to a population-based research [25]. Children with remote symptomatic epilepsy and no neurological damage are unlikely to die from seizures, according to the authors [25]. Long-term mortality is higher in the neuro-deficit group, with reported SMRs ranging from 11.0 (CI 6.9-16.4) [16] to 25 (CI 5.1-73.1) [21]. The severity of epilepsy, which is commonly evaluated by seizure frequency, increases the chance of mortality. SMRs were shown to be considerably greater in individuals with "severe" epilepsy or frequent seizures in one research compared to those with "slight" epilepsy or no seizures [19]. Patients whose seizures responded to AED therapy had a lower death rate (SMR 2.13 versus 3.77, respectively) than those whose seizures were poorly controlled. Patients who entered remission had an SMR of 2 for the first five years of seizure independence in the Rochester trial [16], but the SMR did not climb appreciably after that. Two subsequent studies [17, 30] that looked at long-term mortality in epilepsy surgery groups backed up these findings. SMRs were 4.69 (CI 2.33-7.75) and 7.4 (CI 2.33-7.75) [17] and 7.4 (CI 2.33-7.75) [30], respectively, with a reported death rate of 1.37 per 100 person-years [17]. Patients who attained seizure-free condition following surgery, on the other hand, had death rates equivalent to the general population [17, 30]. Death rates among persons with epilepsy grow with age [16, 19, 20, 21, 29], although this increase is more prominent in those under 50 and reduces significantly after age 60 [16, 19, 20, 21, 29]. Patients under the age of 50 have been reported to have SMRs of 6 to 8, whereas patients above the age of 70 had SMRs of 2 [13, 16, 19]. This may be explained by the high mortality rates in patients with neurological impairments at birth, as well as the greatly higher risk of unexpected death in younger individuals with epilepsy owing to head trauma and brain tumours [15, 16]. When the three aetiological groups (idiopathic, distant symptomatic, and neurodeficit) were evaluated independently in the Rochester research [16], the trends remained, with the neurodeficit group having much higher starting SMRs. The results of a study of mortality in a Dutch epilepsy centre cohort [20] were identical to those of this final group. Males showed larger SMRs than females in certain studies [16, 19, 20, 28, 31], but not in others [17, 21, 22, 27].

CONCLUSION

Despite the fact that the illness burden has decreased, epilepsy remains a significant cause of disability and mortality. If used in epidemiological research, the new epilepsy definition, which now covers a large number of individuals with single unprovoked seizures, will have an impact on epilepsy incidence, prevalence, and mortality in the future.

CONFLICT OF INTEREST

The authors declared no conflict of interest

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