Multicenter Transversal Two-Phase Study to Determine a National Prevalence of Epilepsy in Algeria

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Key Words
Epilepsy · Prevalence of epilepsy · Algeria

Abstract
Background/Aims: The prevalence of epilepsy in Algeria is unknown. The aims of this multicenter transversal study were to determine the national prevalence and clinical characteristics of epilepsy in the Algerian population. Methods: This two-phase study was conducted in 5 circumscriptions and included 8,046 subjects aged over 2 months who attended the randomly selected public and private primary care clinics. In the phase 1 study, a questionnaire was submitted to the sample of patients. In the phase 2 study, all potentially epileptic people were examined by neurologists and a second questionnaire was submitted, eventually assessed by appropriate investigations. Results: Sixty-seven patients were identified as having active epilepsy, giving a crude prevalence ratio of 8.32 per 1,000 (95% CI, 6.34–10.3) and an age-adjusted prevalence ratio of 8.9 per 1,000. The highest age-specific ratio was found in patients aged 10–19 years (16.92 per 1,000). Generalized seizures (68.7%) were more common than partial seizures (29.8%). Perinatal injuries were the major leading putative causes (11.9%). Conclusion: The prevalence of epilepsy of 8.32 determined in this study is relatively high. These results provide new epidemiological data and suggest that epilepsy remains an important public health issue to consider in Algeria.

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Introduction

Epilepsy is a frequently occurring chronic neurologic disorder and its management imposes one of the biggest burdens on health care systems. The average prevalence of epilepsy is estimated at 8 per 1,000 in the world population [1]. However, studies carried out in developing countries have reported higher rates [2] although many countries in Asia have reported lower rates compared to
sub-Saharan or Latin American countries [3]. In Algeria, as in the other countries of North Africa, epilepsy remains an important public health issue with medical, economic and sociocultural implications. However, very few epidemiological studies of epilepsy were carried out in this region. One of them, initiated in the region of Kelibia in Tunisia using the door-to-door method, reported a prevalence of 4.04 per 1,000 [4], and another in the region of Benghazi in Libya, using multiple sources for ascertainment, reported a prevalence of 2.3 per 1,000 [5].

In Algeria, only one (unpublished) study by M. Ait-Kaci-Ahmed, in 1977, found an incidence of 56 per 100,000 inhabitants in Algiers. Thus, the unavailability of data led us to undertake a national, observational, multicenter, transversal survey in order to determine the epilepsy prevalence in Algeria.

**Population Study and Methods**

The main objective of this study was to estimate the prevalence of epilepsy, all forms and etiologies combined, in the Algerian population who attend primary care clinics in an unscheduled plan. The secondary objectives were to estimate the prevalence of epilepsy by sex, age and frequency according to the seizure type and etiology of epilepsy.

Algeria had 36,300,000 inhabitants in January 2011. Its health system is represented all over the country by teaching hospitals, general and specialized hospitals, primary health centers and private practices of general practitioners and specialists. All the medical consultations as well as radiological and laboratory assessments in the public sector are free of charge for all the population.

Moreover, drugs for chronic diseases like epilepsy are also free of charge, being at the expense of the main public insurance.

This two-phase study was conducted in 5 ‘wilayas’ or circumstances, including 3 in the north (east, center and west) and 2 in the south of the country, these regions being representative of the Algerian population (fig. 1).

The targeted population included patients aged over 2 months, who attended a general practitioner or pediatrician in public or private clinics in an unscheduled plan from January 23 to February 23, 2011, this population being the closest to the general population. The minimal sample size of this population was calculated from the known average prevalence of epilepsy in the world of 8 per 1,000 [1]. The found sample was spread out over the public and private primary care clinics, according to the wilaya population size (fig. 1). In the phase 1 study, an internationally validated questionnaire for epilepsy, orally translated into Algerian Arabic, was submitted to this sample of patients who attended the randomly selected public and private clinics for any health problem. On completion of this questionnaire, the previously trained practitioner was able to identify patients with possible or definite epilepsy. In the phase 2 study, all the thus identified potentially epileptic people were examined by trained public and private local neurologists and submitted to a second questionnaire, and subsequently assessed by appropriate investigations (EEG, CT scan or MRI).
Epilepsy was considered as active if the individual had at least two seizures or had been treated by antiepileptic drugs in the last 5 years (febrile and occasional seizures were excluded). Thus, at the end of this step, the neurologist was in general able to confirm or refute the diagnosis of epilepsy. Finally, the patient files were reviewed by the main research team headed by a senior epileptologist mainly to confirm the classification of the epilepsy. The type of seizures was based on the international classification of epileptic seizures [6] and the type of epilepsy on the international classification of epileptic syndromes [7]. The prevalence of epilepsy was estimated with a 95% confidence interval and age adjusted to the Algerian population (census 2008). Comparisons according to subgroups in relation with secondary objectives had been conducted using the chi-squared test. All assessed subjects gave informed consent to take part in this study, which was approved by the Ministry of Health, Health Ethics Committee, Algeria.

### Results

Our study population involved 8,046 subjects enrolled in 40 primary care centers by 91 general practitioners and pediatricians. One hundred and fifty-seven of them were identified as definite epileptics (26 males and 41 females) including one treated epileptic patient who did not participate in the phase 2 study. The average age of epileptic patients was 25.8 ± 20.5 years with a median age of 19 years. The overall prevalence of epilepsy was 8.32 per 1,000 inhabitants (95% CI, 6.34–10.3) and the age-adjusted prevalence to Algerian population was 8.9 per 1,000. Thus, in the study of the Russian Federation [11], symptomatic epilepsy was associated with head trauma. In contrast, in the study of the Russian Federation [11], symptomatic epilepsy was associated with head trauma. In sub-Saharan Africa, the most frequent cause may be related to the occurrence in these areas of neurocysticercosis [12], uncommon in our country.

### Table 1. Age-specific prevalence ratios for epilepsy (per 1,000 inhabitants)

<table>
<thead>
<tr>
<th>Age years</th>
<th>Patients</th>
<th>Epileptics</th>
<th>Prevalence per 1,000</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–9</td>
<td>1,756</td>
<td>17</td>
<td>9.68</td>
<td>5.10–14.26</td>
</tr>
<tr>
<td>10–19</td>
<td>1,064</td>
<td>18</td>
<td>16.92</td>
<td>9.17–24.67</td>
</tr>
<tr>
<td>20–29</td>
<td>1,245</td>
<td>7</td>
<td>5.62</td>
<td>1.47–9.77</td>
</tr>
<tr>
<td>30–39</td>
<td>1,207</td>
<td>9</td>
<td>7.45</td>
<td>2.60–12.30</td>
</tr>
<tr>
<td>40–49</td>
<td>940</td>
<td>5</td>
<td>5.32</td>
<td>0.67–9.97</td>
</tr>
<tr>
<td>50–59</td>
<td>735</td>
<td>3</td>
<td>4.08</td>
<td>0.00–8.67</td>
</tr>
<tr>
<td>≥60</td>
<td>1,099</td>
<td>8</td>
<td>7.28</td>
<td>2.25–12.31</td>
</tr>
<tr>
<td>Total</td>
<td>8,046</td>
<td>67</td>
<td>8.32</td>
<td>6.34–10.3</td>
</tr>
</tbody>
</table>

Prevalence of Epilepsy in Algeria

**Discussion**

This is the first ever national study to determine the prevalence of epilepsy in Algeria and in North Africa. The primary care population sample for this study was the closest to the general population, the access to public health services being free of charge.

The current prevalence rate (8.32 per 1,000) of active epilepsy reported in our study is in the range of 5–10 per 1,000 reported in most countries [8]. Using door-to-door methodology, age-adjusted prevalence ranged from 2.2 per 1,000 in India [9] to 41 per 1,000 in Nigeria [2]. In North Africa, there is an immense deficit in epidemiological data regarding epilepsy. The overall prevalence of 8.32 estimated in our study is higher than the ratio of 4.04 per 1,000 reported in Tunisia in the area of Kelibia [4] and the ratio of 2.3 per 1,000 reported in the area of Benghazi (Libya) [5]. The high prevalence ratio determined in our study compared to these latter ones is likely due to the different methodological procedures.

In our study, prevalence by age increased with age in children and young adults, with the highest ratio in patients aged 10–19 years (16.92%). This was also reported in the Tunisian study [4]. Generalized seizures were the predominant pattern (68.7%) followed by partial seizures (29.8%). This was in contrast to some previous reports [10] but in agreement with others [3, 4, 5, 9]. Conditions associated with symptomatic epilepsy were different between studies and included all major conditions. Perinatal injuries were frequently associated with epilepsy in our study, as it was in the report from Tunisia [4]. In contrast, in the study of the Russian Federation [11], symptomatic epilepsy was associated with head trauma.
Conclusion

This is the first study in Algeria to estimate the prevalence of epilepsy in a sample closest to the general population. The overall prevalence of epilepsy of 8.32 per 1,000 inhabitants (95% CI, 6.34–10.3) was relatively high. Seizures were generalized in 68.7% of cases, whereas partial seizures were observed in 29.8%. These results provide new epidemiological data in North Africa. The high proportion of symptomatic epileptic cases due to perinatal injuries emphasizes the urgent need for planning of more preventive measures to improve perinatal medical care in Algeria.

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Disclosure Statement

The authors have no conflicts of interest to disclose.

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