The cost of epilepsy in Marrakech city and its area
Le coût d’épilepsie dans la ville de Marrakech et sa région

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Conflits d’intérêt: aucun

Abstract

Introduction: Epilepsy represents the commonest neurological disorder in the world. Its incidence in the developing countries is nearly 190/100000 inhabitants. Consequently, epilepsy has become a socio-economic charge requiring a great and urgent attention. The aim of our study is to analyze the cost of this pathology with its two components; direct and indirect, and its socio-economic impact in Morocco.

Patients and methods: Our study consisted of a series of epileptic patients that were regularly followed in epilepsy outpatient of neurological department, during two years (from 2004 to 2006). A random sample of 60 patients was the subject matter of our study. Analyzed data concentrated on different items meant to evaluate the cost of epilepsy through a questionnaire prepared to serve this purpose. All the participants showed clear and free consent before answering the form.

Results: The total cost of epilepsy per patient and per annum is estimated at 17501.79 dhs (1944.64 $), and exceeds the GNP per inhabitant (108, 55% of GNPh). Direct cost represents 48, 92% of the total cost (8562.14 dhs, 951.34 $), while indirect cost constitutes 51, 07% of the total cost (8939, 65 dhs, 993, 29 $). Traditional practices generate an important cost which is almost equal to that of the medical treatment.

Discussion: In our study, total average cost is relatively higher than in other developing countries and more important in developed countries. Indirect costs exceed direct ones both in our study and in the review of literature.

Conclusion: Epilepsy constitutes a great socio-economic load in our country, because it heavily endangers productivity. A better investment in the elements of its direct cost (use of new anti-epileptics drugs, epilepsy surgery…) would considerably reduce its indirect cost, and thereafter its negative impact on our country’s productivity.

Keywords: Epilepsy- Cost- Treatment-Direct- Indirect.

Résumé

Introduction: L’épilepsie représente le trouble neurologique la plus courante dans le monde entier. Son incidence dans les pays en développement est de près de 190/100000 habitants. Par conséquent, l’épilepsie est devenue une charge socio-économique nécessitant une grande et une urgente attention. Le but de notre étude est d’analyser le coût de cette pathologie avec ses deux composantes; directe et indirecte, et son impact socio-économique au Maroc.

Patients et méthodes: Notre étude a consisté en une série de patients epileptiques qui ont été régulièrement suivis en ambulatoire épilepsie du département neurologique, pendant deux ans (de 2004 à 2006). Un échantillon aléatoire de 60 patients a été l’objet de notre étude. Les données analysées sont concentrés sur les différents éléments destinés à évaluer le coût de l’épilepsie à travers un questionnaire préparé pour servir cet objectif. Tous les participants ont montré un consentement clair et libre avant de répondre à la forme.

Résultats: Le coût total de l’épilepsie par patient et par an est estimé à 17501.79 dhs (1944.64 $), et dépasse le PNB par habitant (108,55% de GNPh). Le coût direct représente 48,92% du coût total (8562.14 dhs, 951.34 $), tandis que les coûts indirects constituent 51,07% du coût total (8939.65 dhs, 993.29 $). Les pratiques traditionnelles génèrent un coût important qui est presque égal à celui du traitement médical.

Discussion: Dans notre étude, le coût moyen total est relativement plus élevé que dans d’autres pays en développement et plus important dans les pays développés. Les coûts indirects dépassent ceux directs à la fois dans notre étude et dans la revue de la littérature.

Conclusion: Épilepsie constitue une grande charge socio-économique dans notre pays, car il met en danger fortement la productivité. Un meilleur investissement dans les éléments de son coût direct (utilisation de nouveaux médicaments anti-épileptiques, la chirurgie de l’épilepsie …) permettrait de réduire considérablement ses coûts indirects, et par la suite son impact négatif sur la productivité de notre pays.

Mots-clés: Épilepsie- Coût- Traitement- Direct- Indirect.

Introduction

Epilepsy is a common disease whose prevalence across Africa is extremely variable. (From 5 to 74/ 1000). Its social and economic consequences in this continent are not well established. As far as we know, there is no published report on the cost of epilepsy in Morocco, nor in North African countries. Costs are resources expended to obtain a desired state of health (estimated under direct and indirect costs). The aim of our study is to estimate the cost of epilepsy in South Morocco (especially direct and indirect costs).

Patients and methods

A sample of 60 epileptic patients taken blindly from our out-patient epilepsy. Standardized questions from a questionnaire biostatistically validated. Data collected concerned direct medical costs (consultations,
hospital admissions, complementary examinations and treatments), and indirect costs (evaluated from days of disrupted family life). It was not practical to study intangible costs in our context.

**Cost estimates:**
Calculation of the cost of epilepsy involves applying economic cost of illness methods to estimate the different types of cost experienced by individuals, their families, third-party payers, health providers, and society at large.

**Direct cost:**
includes the cost of resources consumed when health care, social services, and patient or family member services are used to prevent, diagnose, treat, or rehabilitate persons with epilepsy.

Indirect cost: is the cost of unemployment decreased productivity, and household work that is lost when people with epilepsy are less able to do their jobs or to work at home.

**Intangible cost:**
Is the economic value of pain and suffering that individuals experience with the disorder. The intangible cost of pain, suffering, loss of self-esteem, and their loved ones is generally acknowledged, but rarely measured, because of the difficulty of estimating its monetary value.

**Results:**
Our study involved 60 epileptic patients, 19 females and 41 males. The age varied between 4 and 61 years with the predominance of patients aged between 10 and 30 years. 70% of our patients live in rural areas. The majority of who are in Marrakech, while the rest comes from rural areas more or less distant from the city. Only 5% of them have pursued higher education, while 30% have never been to school. 38 patients are not working, 10 are students and for the remainder, only 4 of them have a stable work (1 officer and 3 teachers) the others are in the majority manual workers having unstable income (carpenter, craftsman, server or housekeeper...), which means that their wages are in the majority of cases weak and insufficient to meet their needs especially in terms of taking charge of their disease. That is what makes 85% of our patients dependent on their care takers who are one of the parents in most of the time or another family member if the parents are deceased or unable to take charge of their child. It follows that only 30% of patients are covered by health insurance, which is a huge problem care. It was also noted that more than three-quarters of the cases (78%) do not show up only at the consultation, which increases the number of GNP. The average total cost of epilepsy per inhabitant and per year is up to 17501.79 Dhs (1944.64$), 8939.65 Dhs constitutes indirect cost (993.29$) and represents 51.07% of the total cost of epilepsy. While the direct cost is estimated at 8562.14 Dhs [951.34] and represents 48.92% of the total cost. Most of the direct cost is occupied by the cost of medicines estimated at 2733.4 Dhs (307.37$), and it represents 32.30% of the direct cost and 15.80% of the total cost knowing that 56% of patients in the study were under monotherapy.

The second largest medical cost in our study, after drugs is the cost of the balance sheet (blood tests and imaging). Laboratory tests cost only 172 Dhs (19.11$) per year per patient, while the price of imaging examination varies between 90 and 6400 dhs, with an average of 2081.66 Dhs.

10 patients among 60 of the sample remained in hospital at least once during the last 12 months preceding the start of the study, and had in 80% of cases a companion. The annual cost generated by the hospital is estimated at 723.5 Dhs, and is even higher if the hospital took place in a reanimation service when it comes to severe cases of epilepsy. The number of visits per year depends on the nature of epilepsy as whether balanced or not. As a result, the number rarely exceeds 6 with a rate of a consultation every 2 months.

The cost of the consultation is 239 Dhs per year. A significant portion of the direct cost of epilepsy is occupied by the costs of traditional practices, 62% of patients in our sample have resorted at least once in their lives to a traditional healer (fquih). And the resulting cost varies between 0 and 50000 Dhs with an average of 2337.8 Dhs per patient. The cost of moving the patient to the place of consultation varies according to the distance between the place of residence of the patient and the hospital, the number of visits per year and whether or not there is a companion. This cost is 241.77 Dhs per year.

Given the enormous rate of unemployment found in our sample, it was preferable to multiply the number of days disrupted by gross national product (GNP) per inhabitant at the time of the study, which was estimated at 16123 dhs (1791$).

**Whenever the patient needs an accompanying:**
The number of days disrupted because the consultations is doubled, tripled or even quadrupled as patients are often accompanied by more than one person.

- The number of days disrupted because hospitalization is doubled
- The number of days disrupted because of seizures for the accompanying equals half of those lost by the patient because of seizures.

The average number of days lost per year for each patient was 202 days, and the indirect costs arising there from is estimated at 8939.35 Dhs (993.29$).

**Table 1: Direct cost.**

<table>
<thead>
<tr>
<th>Direct cost</th>
<th>Cost (Dhs/$)</th>
<th>$ of direct cost</th>
<th>$ of total cost</th>
<th>$ of GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>2766.4 (30737)</td>
<td>32.30</td>
<td>15.8</td>
<td>17.15</td>
</tr>
<tr>
<td>Investigations</td>
<td>2253.67 (250.40)</td>
<td>26.32</td>
<td>12.87</td>
<td>13.97</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>723.5 (80.30)</td>
<td>8.44</td>
<td>4.13</td>
<td>4.48</td>
</tr>
<tr>
<td>Consultation</td>
<td>239 (26.55)</td>
<td>2.79</td>
<td>1.36</td>
<td>1.48</td>
</tr>
<tr>
<td>Displacement</td>
<td>241.77 (26.86)</td>
<td>2.82</td>
<td>1.38</td>
<td>1.49</td>
</tr>
<tr>
<td>Traditional practices</td>
<td>2337.8 (259.75)</td>
<td>27.30</td>
<td>13.35</td>
<td>14.49</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8562.14 (951.34)</strong></td>
<td><strong>32.30</strong></td>
<td><strong>15.8</strong></td>
<td><strong>17.15</strong></td>
</tr>
</tbody>
</table>
Discussion

Once the improvement of health services remains the primary objective in any health system, it becomes necessary to identify what benefits lead to optimize profits with minimal cost, and that is why economic analysis is an indispensable tool in the promotion and production of preventive and effective therapeutic strategies for different diseases and especially those with large social and economic burden such as epilepsy. Calculating the cost of epilepsy requires the application of standardized methods of «cost disease» to estimate the direct and indirect costs attributable to epilepsy [11]. The absence of good health information systems complicates the methods that estimate the cost in developing countries. According to our study, the average total cost of epilepsy per inhabitant and per year is 17501.79 Dhs (1944.64$), a relatively high cost when compared to the costs found in other developing countries. In Colombia, for example, the total cost of epilepsy per inhabitant and per year is estimated at 579$, compared with 344$ in India and 487$ in Indonesia [10]. While in developed countries, this cost becomes very important and may even reach 15530$ in Switzerland, 12389$ in USA or 8589$ in Great Britain [12]. Whereas in other poorer countries, taking the example of Burundi, a case-control study conducted in 2001 showed that the total cost of epilepsy per person per year is only 48.4$ in cases where patients were receiving treatment and only 11 for patients who have not had the chance to be treated [10]. Knowing that in these countries the shortage of medicines added to the unavailability of paraclinical examinations reduces direct costs, but contributes to increase the indirect cost. When distributing these costs, it was noted that the results of this study agree well with the results of the majority of studies in different countries, whether developed or not, indirect costs exceed the direct costs and this in various ways. In particular, in the study that we conducted, the largest share of direct cost is occupied by the cost of treatment. This cost increases with the number and types of drugs administered. It should be noted that most of the patients on monotherapy took the Carbamazepine which costs higher than phenobarbital used in the majority of developing countries the cost of which is only estimated at 5$ per person per year [13]. Regarding new antiepileptic drugs, their use is still limited in our country because of the unavailability of many of them on the Moroccan market, and their prices so far remained very high in comparison with the purchasing power of the majority of patients.

The second largest medical cost in our study, after medication, is the cost of the assessment (blood tests and imaging). Laboratory tests cost only 172 Dhs [19.11] per year per patient, but it should not be forgotten that 38% of our patients have no blood test prior to the initiation of treatment, and that the dosage antiseptics in the blood, conducted at least once per year in 48% of French patients [14], has been made only in one or 2 patients in the sample, which means that the cost is relatively low in our country while it is 31 in Italy for example [15].

As far as other examinations are concerned: EEG, cerebral CT and MRI, they are estimated at 2081.66 Dhs (231.29 $) per person per year while it was only 57.8$ in Italy.

Much works must be provided in order to reduce the maximum cost to allow the greatest number of patients, if not all patients benefit from these tests that often characterize the disease of epilepsy and detect the secondary forms that can be subject to specific and effective treatment.

Another very important cost, and that is the particularity of many developing countries, is that of traditional practices. This very common practice is directly related to beliefs that differ from one country to another and that can influence individual strategies faced with care possibilities. According to our study, 62% of patients have used the traditional practices at least once in their lives. Two other studies on the same population of the region of Marrakech and southern Morocco have found figures close to our percentages, 70 and 74% [19]. You should know that in addition to illiteracy, which unfortunately affects 52% of our population, several factors are contributing to leaving the field open to traditional healers who are in most cases charlatans, noting for example the lack of neurologists and their poor distribution, the lack of involvement of GPs sometimes trained in the field of epilepsy, medical coverage that is not entirely widespread throughout the kingdom and that makes the course of the epileptic originating from certain rural areas very complicated, not to mention the problems of drugs.

In our study, the indirect cost is 8939.65 Dhs (993.29$) and represents 51.07% of the total cost of epilepsy. Similar studies conducted in other countries have also found that the indirect cost of epilepsy exceeds the direct cost. In Colombia, for example, it is estimated at 364 $ per patient per year, making 62.9% of the total cost, while it represents 83.6% of the total cost in Burundi and it is only 40.5$.

In developed countries, and even if the values of the direct costs, amounting to thousands of dollars, the indirect costs are higher in most studies. In the United States, it is 9418$ and constituted 76% of the total cost as compared with 69.7% in Britain and 55.13% in Australia [10].

Dropping out from school at an early age is one of the reasons that increase the indirect cost of epilepsy because it is responsible for subsequent sub-employment or even unemployment, without forgetting that in our country this phenomenon affects nearly 12% of the active population «in good health and, above all, of a high level of education» [7], then what can we say about our uneducated patients having epilepsy?

### Table II: Total cost.

<table>
<thead>
<tr>
<th></th>
<th>Cost (Dhs/$)</th>
<th>% of total cost</th>
<th>% of GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct cost</td>
<td>8562.14 (951.34)</td>
<td>48.92</td>
<td>53.10</td>
</tr>
<tr>
<td>Indirect cost</td>
<td>8939.65 (993.29)</td>
<td>51.07</td>
<td>55.44</td>
</tr>
<tr>
<td>Total cost</td>
<td>17501.79 (1944.64)</td>
<td>100</td>
<td>108.55</td>
</tr>
</tbody>
</table>
According to our work, 80% of patients in our sample are aged between 15 and 60 years old and are considered economically active population. The unemployment rate among them is 68.7%. It is a huge rate when compared to those found throughout the Moroccan population (11.7% for the year 2004 when we conducted the study).

A French study showed that the unemployment rate among active subjects is twice higher among patients with epilepsy than general population (42% versus 20%). These figures can be compared to those of a survey conducted in Britain which revealed that 50% of people with epilepsy between 18 and 65 are unemployed, compared to 20% in the witness population.

The unemployment rate is respectively 79% and 77 when neurological or psychiatric disability is associated (14). Fear, ignorance, stigma and social discrimination arising from epilepsy often push patients “into the shadows”. The social consequences of epilepsy may vary from one country to another, but there is no doubt that everywhere in the world, they are often more difficult to cope with than the seizures themselves. That is the intangible cost of epilepsy [16]. This component of the cost has not yet been properly examined. And the few studies that have addressed this aspect of the economy of epilepsy expressed in units or ladders, while others have converted to a monetary value. We must stress the fact that how others see patients contribute in maintaining the devaluation that the patient has of himself. All this means that the psychosocial care of patients with epilepsy must be recognized in an undeniable interest.

**Conclusion**

As far as we know, there is no published report on the cost of epilepsy in Morocco, nor in North African countries. Indirect costs represent the greatest proportion in adult epilepsy treatment in the literature. Evaluation of epilepsy cost in South Morocco will improve the management and prevention of epilepsy.

**Références**

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