Neurological Disorders in Libya: An Overview

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Key Words

Neurological disorders • Libya • Burden estimate

Abstract

The aim of this study was to review all publications related to the incidence and prevalence of neurological disorders in Libya, and to estimate the burden of these disorders in the country. The PubMed and the Libyan Medical Index were searched using different combinations of keywords. The references in all relevant papers were reviewed for any additional publications. An estimation of the number of patients with neurological disorders was made based on the reviewed data and adjusted using the Libyan Nationwide Official Census of 2006. Sixteen papers were identified. Incidence rate is available for twelve disorders and the prevalence rate for nine. Data for some of the most common neurological problems such as headaches, or for important disorders such as dementia, are lacking. Therefore, the estimate of 6,892 new neurological cases per year and a total of 11,908 neurological patients in 2006 in Libya is largely underestimating the burden of the neurological disorders in this country and should be regarded as the lowest possible estimation. Further neuroepidemiological studies in Libya are needed.

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Introduction

Neurological disorders are defined as diseases related to all structural disorders of the central and peripheral nervous system, as well as muscle diseases. Common conditions that are not caused by structural diseases such as headaches and conditions caused by disordered physiology such as epilepsy are also considered as neurological disorders [1]. The majority of neurological diseases are chronic and usually treated in an outpatient setting. However, different studies in the UK showed that around 20% of all acute medical admissions were patients suffering from neurological disorders [2, 3].

Libya is an Arabic, North African country with an estimated surface area of 1,775,500 km² and a population of 5.3 million with 32% of the population below the age of 15, according to the Libyan Nationwide Official Census of 2006 (www.tedad-Libya.inf).

Most of the populations live in the coastal area in the main cities, namely Tripoli and Benghazi. The Libyan people are generally affluent with the highest per capita income in Africa.

The aim of this paper was to review all the studies of the incidence and prevalence rates related to neurological disorders in Libya, and to estimate the burden of these disorders in the country. To the best of my knowledge no similar work has been carried out on this subject.

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Methods

Searching the PubMed using the keywords 'Libya', and 'Libya' combined with 'incidence', 'prevalence', 'epidemiology', 'neurology', 'neurological diseases' and 'neurological disorders' identified publications related to the neurological disorders in Libya. The references in all relevant papers were reviewed for any additional publications. The newly established database 'Libyan medical index' (www.lmi.com.ly) was also searched. The search was limited to the English language. The literature preceding 31 May 2007 was included.

An estimation of the number of patients with neurological disorders was made based on the reviewed published incidence and prevalence rates which were then adjusted using the Libyan Nationwide Official Census of 2006 that showed a total Libyan population of 5,323,991, of which 3,599,278 were above 15 years of age (www.tedad-Libya.inf).

Results

Twenty-four published reports related to neurology disorders in Libya were identified. Eight papers were excluded, being case reports and clinical series. Sixteen papers are included in this review as they contain data related to the incidence and the prevalence of various neurological disorders in Libya [4–19]. Publication dates range from 1985 to 1995.

All the studies were conducted in Benghazi/Libya. The health service at the time of the studies was based on walk-in polyclinics, four university hospitals and a rehabilitation centre. The neurology unit was based in one of the university hospitals (The Seventh of April Hospital). Medical care is free in Libya. No private medical service was available in the 1980s when the majority of the studies were conducted. Trained neurologists conducted all the studies by searching all medical facilities in Benghazi to identify all patients with specific neurological disorders, the subjects of each study. The studied population in Benghazi was 518,745. The majority of Benghazi's population are of Arabic descent but a small minority are of Turkish, Greek and Black descent.

The incidence and prevalence of studied neurological disorders in Benghazi/Libya are summarised in tables 1–3. Table 1 shows the age- and sex-specific annual incidence rates of eight neurological disorders. Table 2 shows the age- and sex-specific prevalence rates of nine neurological disorders. Table 3 shows the age- and sex-specific annual incidence rates for five rare neurological disorders.

Table 4 shows the estimated number of patients with nineteen neurological disorders.

The case-fatality ratio during the first month of the onset of stroke was 17.3%. The ratio was 13% for patients with ischaemic stroke and 35% for patients with cerebral haemorrhage [4]. The crude death rate from Parkinson's disease was 1.6 per 100,000 [5]. The mortality rate of patients with acute bacterial meningitis was 30, and 7.5% of patients with Guillain-Barré syndrome died during their illness [7, 13].

Discussion

This review summarises all published incidence and prevalence data related to neurological disorders in Libya. This paper also attempts, for the first time, to estimate the burden of the various neurological diseases in Libya. The data are presented in a format to help identify the gaps in the neuroepidemiological data related to Libya and to help in planning and organising further neurological studies and services in the country.

The estimation of the burden of the neurological disorders in Libya using the published data, which are summarised in this paper, has several limitations: (a) the incidence and prevalence studies that are available are limited to certain neurological disorders (incidence rate is available for twelve disorders and the prevalence rate for nine), (b) the lack of data for some of the most common neurological problems such as headaches and important disorders such as dementia, (c) all the studies are hospital based, hence the lack of any door-to-door epidemiological studies. It follows that the estimate of 6,892 new neurological cases per year and a total of 11,908 of neurological patients in 2006 in Libya is largely underestimating the burden of the neurological disorders in this country and should be regarded as the lowest possible estimate.

It is not surprising that cerebrovascular diseases and epilepsy are the most common neurological disorders, especially since the studies were hospital-based and there were no data available for headache disorders. However, neurogenetic conditions also represented a significant portion of the neurological disease burden in the country (13% of the total estimated neurological cases: 1,566 cases). This is almost equal to the number of Parkinson's disease patients, and 7 times more than multiple sclerosis. This is likely to be related to the structure of the Libyan society. Like in many other Arabic countries, the Libyan populations are characterised demographically by large family units, high birth rates and high rates of consanguineous marriages (up to 50% of marriages), making

Table 1. Age- and sex-specific incidence rates for neurological diseases (per 100,000 per year) in Benghazi/Libya

Neurological disorder	Study	Study duration, years	Age, years	Male	Female	Total population
Cerebrovascular disease	Ashok et al. [4]	1	<30	3	5	4
			30–39	101	89	96
			40–49	152	195	172
			50–59	317	263	292
			60–69	390	310	348
			≥70	545	354	457
			>15	–	–	131.1
			15–69	–	–	92.9
			all ages	69	58	63
	Radhakrishnan et al. [14]	1	15–19	0	9.8	4.7
			20–24	16.9	24.2	20.4
			25–29	19.5	19.6	19.6
			30–34	92.9	58.9	76.6
			35–40	107.9	117.5	112.6
			15–40	39.3	40.3	39.8
			age-adjusted rate	47.7	46.1	47
	El Zunni et al. [6]	3	15–45	14	15	–
			>45	162	133	–
			all ages	–	–	48
Parkinson's disease	Ashok et al. [5]	2.5	all ages			4.5
Multiple sclerosis	Radhakrishnan et al. [8]	2	10–50			0.8
			all ages			0.4
Motor neuron disease	Radhakrishnan et al. [16]	5	0–29	0.11	0	0.05
			30–39	2.32	0.81	1.58
			40–49	2.84	2.17	2.53
			50–59	8.14	3.76	6.10
			60–69	8.11	2.27	5.35
			≥70	0	2.56	1.25
			all ages	1.19	0.56	0.89
			adjusted rate	1.17	0.57	0.87
Idiopathic intracranial hypertension	Radhakrishnan et al. [15]	2	>15	–	–	3.6
			female only population			3.6
			all ages	–	–	1.7
	Radhakrishnan et al. [9]	7 ¹	0–14	0.21	0	0.11
			15–19	0.64	6.32	3.34
			20–29	0.43	12.55	6.37
			30–39	0	19.12	9.33
			40–49	0.68	3.88	2.16
			50–59	0	1.34	0.62
			≥60	0	0	0
			all ages	0.27	4.32	2.23
			age-adjusted rate	0.26	5.92	3.17
			women aged 15–44	–	12	–
			obese women aged 15–44	–	21.4	–
Bell's palsy	Sridharan et al. [17]	2	0–9	4.4	4.05	4.24
			10–19	21.85	19.2	20.6
			20–29	34.7	39.25	36.9
			30–39	36.75	38.55	37.65
			40–49	47.35	51.55	49.3
			50–59	52.85	75.2	63.2
			≥60	43.65	40.85	42.3
			all ages	23	23.7	23.35
			age-adjusted rate	33.3	38.02	35.72

Table 1 (continued)

Neurological disorder	Study	Study duration, years	Age, years	Male	Female	Total population
Central nervous system infection	Radhakrishnan et al. [7]	2	>15			8.6
Guillain-Barré syndrome	Radhakrishnan et al. [13]	3	0–9	0	0.7	0.3
			10–19	2.3	1.2	1.8
			20–29	4	2.1	3.1
			30–39	3.9	8.1	5.9
			40–49	1.6	1.8	1.7
			50–59	0	3.1	1.5
			≥60	2.1	0	1.1
			all ages	1.62	1.86	1.74
			age-adjusted rate	1.61	1.85	1.73

¹ This study was an extension of the first study on idiopathic intracranial hypertension and included data from the original study.

Table 2. Age- and sex-specific prevalence rates for neurological diseases (per 100,000) in Benghazi/Libya

Neurological disorder	Study	Study duration, years	Age, years	Male	Female	Total population
Epilepsy	Sridharan et al. [18]	2	15–24	370	350	360
			25–34	290	200	250
			35–44	170	180	180
			45–59	90	120	100
			≥60	110	80	100
			>15	240	210	230
			age-adjusted rate	210	170	190
Parkinson's disease	Ashok et al. [5]	2.5	<40	0	0.5	0.2
			40–49	14.2	32.6	22.8
			50–59	81.4	103.3	91.5
			60–69	219.5	155	185.7
			≥70	544.5	501.3	524.6
			all ages	32.5	30.3	31.4
			age-adjusted rate	58.2	62.1	60.1
Multiple sclerosis	Radhakrishnan et al. [8]	2	0–14	0	0	0
			15–19	0	14.7	7
			20–29	6	6.3	6.2
			30–39	7.7	28.4	17.8
			40–49	14.2	5.4	10.1
			50–59	8.1	0	4.4
			≥60	0	0	0
			all ages	3	5.2	4
			age-adjusted rate	5.4	6.4	5.9
Motor neuron disease	Radhakrishnan et al. [16]	5	0–29	0.53	0	0.27
			30–39	7.74	4.06	5.94
			40–49	9.47	10.85	10.11
			50–59	32.55	18.78	26.16
			60–69	30.42	0	16.06
			≥70	0	12.79	6.26
			all ages	4.48	2.39	3.47
			adjusted rate	4.39	2.45	3.42

Table 2 (continued)

Neurological disorder	Study	Study duration, years	Age, years	Male	Female	Total population
Hereditary cerebellar ataxia	Sridharan et al. [19]	2	all ages	–	–	2.7
Hereditary spastic paraplegia	Sridharan et al. [19]	2	all ages	–	–	2.1
Spinal muscular atrophy	Radhakrishnan et al. [10]	4	childhood	–	–	2.3
			adult	–	–	0.6
			distal	–	–	0.6
Muscular dystrophy	Radhakrishnan et al. [13]	3	all ages	–	–	13.2
Hereditary sensory and motor neuropathy	Radhakrishnan et al. [13]	4	all ages	–	–	7.9

Table 3. Age- and sex-specific incidence rates for some rare neurological diseases (per million per year) in Benghazi/Libya

Neurological disorder	Study	Study duration, years	Age	Male	Female	Total population
Polymyositis	Radhakrishnan et al. [13]	3	<20	4.1	6.6	5.4
			20–40	5.6	29.4	17.3
			>40	6.7	7.6	7.2
			all ages	4.9	11.9	8.4
			adjusted rate	4.9	12.6	8.8
Myasthenia gravis	Radhakrishnan et al. [11]	4	<20	0	6.7	3.3
			20–39	0	13.3	6.5
			40–59	7.5	0	4
			>60	13.9	0	7.2
			all ages	1.9	7	4.3
			adjusted rate	2.1	6.8	4.4
Progressive supranuclear palsy	Radhakrishnan et al. [11]	4	all ages	–	–	3
Subacute sclerosing panencephalitis	Radhakrishnan et al. [11]	4	all ages	–	–	2.4
Creutzfeldt-Jakob disease	Radhakrishnan et al. [12]	4	all ages	–	–	0.48

genetic diseases a common health issue [20]. These factors should be taken into consideration when further planning neurology services.

The two studies from Benghazi about the incidence of cerebrovascular diseases showed different results. The first study was a 12-month study from November 1983 to October 1984 and showed an incidence rate of 63 per 100,000. The second one was a 3-year study from January 1991 to December 1993 and showed an incidence rate of 48 per 100,000. The two studies from Benghazi looked at the same population and used the same methods. It is unlikely that these results represent a true general decline in the incidence of stroke in Benghazi/Libya in such a

short period of time; instead, case ascertainment is the likely explanation. The first study was conducted in the mid-1980s [4], the time when private medical practice was banned in Libya, while the second study was conducted in the early 1990s [6], after the opening up of the private medical sector. It is likely that many patients elected to be treated in the newly established private sector rather than in the university hospitals, leading to a false reduction in the recorded cases of cerebrovascular diseases. Therefore, a well-designed epidemiological study of such an important neurological disorder is urgently required.

Table 4. Estimated number of patients with neurological disorders in Libya

Neurological disorder	Study on which the estimation is based	Estimated new cases per year	Estimated total number of cases
Cerebrovascular disease	Ashok et al. [4]	4,719 ¹	–
Epilepsy	Sridharan et al. [18]	–	8,272 ¹
Parkinson's disease	Ashok et al. [5]	240	1,672
Multiple sclerosis	Radhakrishnan et al. [8]	21	213
Motor neuron disease	Radhakrishnan et al. [16]	47	185
Idiopathic intracranial hypertension	Radhakrishnan et al. [9]	119	–
Bell's palsy	Sridharan et al. [17]	1,243	–
Central nervous system infection	Radhakrishnan et al. [7]	310 ¹	–
Guillain-Barré syndrome	Radhakrishnan et al. [13]	93	–
Hereditary cerebellar ataxia	Sridharan et al. [19]	–	144
Hereditary spastic paraplegia	Sridharan et al. [19]	–	112
Spinal muscular atrophy	Radhakrishnan et al. [10]	–	186
Muscular dystrophy	Radhakrishnan et al. [13]	–	703
Hereditary sensory and motor neuropathy	Radhakrishnan et al. [10]	–	421
Polymyositis	Radhakrishnan et al. [13]	45	–
Myasthenia gravis	Radhakrishnan et al. [11]	23	–
Progressive supranuclear palsy	Radhakrishnan et al. [11]	16	–
Subacute sclerosing panencephalitis	Radhakrishnan et al. [11]	13	–
Creutzfeldt-Jakob disease	Radhakrishnan et al. [12]	3	–

¹ Above the age of 15.

Neurological disorders, and neurosciences in general, usually have a low profile especially in comparison with heart diseases, cancer and diabetes. According to the World Health Organisation (<http://www.emro.who.int/mnh/whd/CountryProfile-LIY.htm>) the main causes of hospital mortality in Libya in 1987 were injury and poisoning (15.5%); diseases of the circulatory system (11.6%); certain conditions originating in the perinatal period (11.4%); diseases of the respiratory system (7%), and neoplasm (4.4%). Neurological disorders do not appear on the list of the main causes of mortality, as the diseases of the nervous system tend to be chronic and disabling rather than a direct cause of death. Also, neurological disorders such as epilepsy have social stigma attached to them, leading to major psychological and behavioural difficulties. Therefore, raising the profile of neurosciences is important to provide a better service to patients. Accurate estimation of the burden of neurological disorders based on good epidemiological studies is an essential first step to increase the public awareness about neurological disorders.

Neurological conditions are one of the main causes of chronic disabilities. Studies from the UK estimated that 33% of epilepsy patients, 60% of stroke patients, 85% of Parkinson's disease patients, 50% of multiple sclerosis pa-

tients and 93% of motor neuron disease patients have a significant disability [1, 21]. This has a significant impact on patients, their families, and the society as a whole. No specific data are available from Libya; therefore, studies to assess the extent and the effect of disabilities related to neurological disorders in Libya are essential.

It is clearly highlighted in this paper that despite the availability of some good epidemiological data, further studies are essential to cover all neurological disorders and other important aspects related to these conditions such as mortality rate and long-term disabilities, and their implication for the health service and the Libyan society. This will allow for a more accurate estimation of the burden of the neurological disorders in Libya.

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