Ethiopian Journal of Medical and Health Sciences
2021, Volume 1, Issue 1
https://journals.hu.edu.et/hu-journals/index.php/ejmhs

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Original Article

The pattern and burden of in-patient neurologic diseases at a tertiary hospital in southern Ethiopia: A retrospective hospital-based study

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Abstract

Background: The burden of neurologic diseases is higher in developing countries where the number of neurologists is lowest. However, the pattern of neurologic admissions in Southern Ethiopia is not known. The objective of this study was to determine the pattern and burden of inpatient neurologic diseases at Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia.

Methods: The medical records of all cases admitted with neurologic diseases at Hawassa University Comprehensive Specialized Hospital over a 3-year period were reviewed.

Results: Nine hundred and eighteen patients with mean age of 44 years (SD 18.7) and 1.7:1 male: female ratio were included in the study. Neurologic diseases accounted for 20% of all medical admissions. Noninfectious neurologic diseases were 69.2%. Stroke was the most common neurologic admission (51.5%) followed by infections of the nervous system (30.8%). The overall in-hospital mortality of neurologic diseases was 19.7%.

Conclusion: The burden of inpatient neurologic diseases is high at Hawassa University comprehensive specialized Hospital. Non-infectious neurologic diseases are responsible for the majority of neurologic admissions. Stroke is the commonest cause of neurologic admission followed by infections of the nervous system.

Keywords: Neurologic diseases, burden, pattern, mortality, Ethiopia

Introduction

Neurologic disorders represent a major burden of disease globally. In the Global Burden of Disease (GBD) 2010 study, neurologic disorders and cerebrovascular disease combined represent 7.1% of the total global burden of disease measured in disability-adjusted life year (DALY) for all causes and ages (1). Globally, in 2016, neurological disorders were the leading cause of DALYs (276 million [95% UI 247–308]) and second leading cause of deaths (9·0 million [8·8–9·4]). The four largest contributors of neurological DALYs were stroke (42·2% [38·6–46·1]), migraine (16·3% [11·7–20·8]), Alzheimer's and other dementias (10·4% [9·0–12·1]), and meningitis (7·9% [6·6–10·4]) (2). The burden of these neurological diseases is higher in developing countries where the number of neurologists is lowest. Based on some hospital based studies done in Africa, neurological disorders constitute 14-24% of medical admissions (3, 4, 5).

Lower income countries carry the double burden of infectious and non-infectious neurologic diseases. In a retrospective study of neurological diseases at Kenyatta National Hospital, Nairobi, infections of the nervous system were found to be the commonest. The 3 commonest neurologic diseases in this study were meningitis, epilepsy and cerebrovascular diseases accounting 23.1%, 16.6% and 15.0%, respectively (6). Another earlier study of neurological disease from 1957-1969 at a university hospital in Nigeria reported for infections of the nervous system to account for 43%, epilepsy 7%, and cerebrovascular disease 6% of all neurological diseases (7). A 6-month period review of medical admissions to two Ethiopian teaching hospitals (Tikur Anbessa Hospital of Addis Ababa University and Gondar University Hospital in North West Ethiopia) revealed that inpatient neurological cases made up 18.0% and 24.7% of all medical admissions (3). In recent studies from some parts of low income countries, a decreasing frequency of neuro-infections and increasing frequency of noninfectious neurological diseases (especially stroke) have been reported (3- 5, 8-12).

The pattern of neurological admissions varies amongst different regions of the world and this depends on many factors including the regional burden of neurological disorders.

In a recent Hospital based retrospective study in Nigeria, neurological diseases constituted 24.2% of all medical admissions. Stroke was found to be the commonest cause of admissions accounting for 42.1% of the cases followed by peripheral neuropathy (13.8%) and meningoencephalitis (7.2%) (13). In an old Ethiopian study done in two hospitals in Addis Ababa, cerebrovascular disease was the commonest cause of admissions accounting 45% of neurologic diseases followed by bacterial meningitis (12%) (14).

There is a paucity of data on the burden of neurological diseases in Ethiopia. Hawassa University Referral Hospital started active clinical services in 2003. The Neurology Unit of the Department of Internal Medicine was only recently established with one neurologist in September 2011. The hospital has a wide catchment area, particularly for neurologic diseases, including the neighboring states. However, the pattern and burden of neurologic admissions in this area is not known. The objective of this study is to determine the pattern and burden of inpatient neurologic diseases at Hawassa University Comprehensive Specialized Hospital (HUCSH).

Materials and methods

Study area

The study was conducted in Hawassa University Comprehensive Specialized Hospital. Hawassa is the capital city of South Nations Nationalities and People Regional state (SNNPR) and Sidama Regional state. It is found 273 km south of Addis Ababa. Hawassa University Comprehensive Specialized Hospital provides diversity of services for about 12 million populations from all over South Ethiopia and neighboring region. It is the main referral center for neurology patients in the region. There was one neurologist in this university hospital during the study period. CT scan was available in one private center in Hawassa city. MRI, EEG, and NCS/ EMG were not available in the hospital during the study period.

Study subjects

All adult patients admitted to the medical wards of HUCSH with the diagnosis of neurologic diseases between September 2011 and August 2014.

Inclusion criteria: All patients aged 15 years or older admitted with a diagnosis of neurologic diseases.
Exclusion criteria: Patients with incomplete data.

Study design

Retrospective hospital-based study.

Sample size and Sampling Procedure

The medical records of all patients admitted with neurologic diseases over a 3 year period, September 2011 to August 2014, were reviewed.

Data collection methodology

Patients with potential neurologic diagnosis were identified from the medical admission log book and their medical records were retrieved from the hospital card room. Data were collected by the researcher using structured checklist in English. These included demographic data, date of admission, clinical history and physical examination findings, laboratory and other relevant investigations, treatment, hospital course, final diagnosis, date of discharge and outcome (improved, same condition, died, discharged against medical advice, or referred to other hospital).

Available laboratory findings including complete blood count; erythrocyte sedimentation rate; serum chemistry tests; serological tests for HIV, hepatitis, typhoid, typhus, and syphilis; serum electrolytes; coagulation studies; lipid profiles; CSF studies for cells, glucose, protein, Gram stain, acid-fast bacilli stain and India ink were abstracted from the patient chart. Other investigations like x-ray, electrocardiography (ECG), echocardiography, Doppler ultrasound, muscle biopsy and CT scan result were also abstracted.

Data Management and Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows Version 20. Continuous variables were summarized using measures of central tendency and dispersion and proportions were used for categorical variables. The burden of neurologic diseases was calculated by taking all admissions to medical ward during the study period as denominator and neurologic diseases as numerator.

Results

There were 4590 medical admissions during the study period, of which 918 (20%) had neurologic diseases. The mean age of patients with neurologic diseases was 44.0 ± 18.7 years (range, 15–95 years). Table 1 shows demographic data of patients with neurologic diseases. Table 2 shows the pattern of inpatient neurologic diseases. Stroke was the most common neurologic admission (51.5%) followed by infections of the nervous system (30.8%) Table 3 shows the magnitude of infections of the nervous system.

The median length of hospital stay was 8 days (IQR 5 to 12 days). Table 4 shows inpatient neurologic diseases with outcomes. Out of 918 neurologic admissions, 465 (50.7%) discharged improved, 181 (19.7%) died in hospital, 119 (13.0%) left against medical advice, 98 (10.7%) discharged with same condition, and 48 (5.2%) were referred to other hospitals while outcome was unknown in 7 (0.8%) of the cases. Death occurred at a median of 4 days (IQR 2 to 7 days) after admission. The case fatality rate was highest in those with encephalopathy.

Table 1: Demographic data of 918 patients with neurologic diseases at Hawassa University Comprehensive Specialized Hospital.

Variables	Frequency	Percent
Sex		
Male	578	63
Female	340	37
Age (years)		
15-24	166	18.1
25-34	158	17.2
35-44	128	13.9
45-54	164	17.9
55-64	152	16.6
≥65	150	16.3

Over all, noninfectious neurologic diseases predominated, accounting for 69.2%, while infections of the nervous system made up 30.8 % of neurologic admissions at Hawassa University Comprehensive Specialized Hospital during the study period.

Table 2: Inpatient neurologic diseases at Hawassa University Comprehensive Specialized Hospital.

Neurologic diseases	Number (%)
Stroke	473 (51.5)
Infections of the nervous system	283 (30.8)
Neuromuscular disorders	40 (4.4)
Spinal cord diseases	28 (3.1)
Brain Tumor	26 (2.8)
Toxic/metabolic encephalopathies*	22 (2.4)
Seizures and Epilepsy	20 (2.2)
Other neurologic diagnosis‡	18 (2.0)
Diagnosis unclear	8 (0.9)
Total	918 (100.0)

* Included uremic encephalopathy (8 cases), hepatic encephalopathy (7 cases), Wernicke's encephalopathy (2 cases), and others unspecified (5 cases).

‡ Other Neurologic diagnosis included idiopathic intracranial hypertension (3), demyelinating diseases of the central nervous system (2), movement disorders (2), traumatic intracerebral hemorrhage (6), subdural hematoma (3), Delirium (1) and functional quadriparesis (1).

Discussion

This study showed that neurologic diseases are common in South Ethiopia. Neurologic diseases accounted for 20% of all medical admissions during the study period. This is comparable to a previous study done in two Ethiopian hospitals, where neurologic cases made up 18.0% (Addis Ababa) and 24.7% (Gondar) of all medical admissions (3). There was male preponderance (63%) with M:F ratio of 1.7:1 in this study. This is similar to other studies done in Africa (4, 10 - 13). The mean age of patients with neurologic diseases was 44.0 ± 18.7 years (range, 15–95

Table 3: Infections of the nervous system at Hawassa University Comprehensive Specialized Hospital.

Infections of the nervous system	Number	Percentage among neurologic admission (n = 918)	Percentage among infections of the nervous system (n = 283)
Bacterial Meningitis	74	8.1	26.1
TB Meningitis	67	7.3	23.7
Cryptococcal Meningitis	7	.8	2.5
Meningoencephalitis and encephalitis	8	.9	2.8
Cerebral Malaria	18	2.0	6.4
Brain abscess	6	.7	2.1
Tuberculoma	36	3.9	12.7
CNS toxoplasmosis	6	.7	2.1
Tetanus	30	3.3	10.6
TB spondylitis	14	1.5	4.9
Others	17	1.9	6.0%
Total	283	30.8	100.0

years). The majority of the patients (67.1%) were between 15 and 54 years which is the productive population. This portends a great economic burden of neurologic diseases for the country.

Stroke was found to be the commonest cause of admissions in this study accounting for 51.5% of neurologic admissions. This is consistent with other African studies (4, 5, 10, 11, 13). A previous hospital based study in Ethiopia reported stroke to account for 45% of neurological admissions (14). Stroke is the second leading cause of death (15) and the third leading cause of disability-adjusted life-years worldwide (1). The burden of stroke in Sub-Saharan Africa, including Ethiopia, is likely to increase because of demographic changes and the inadequate control of major risk factors for stroke including hypertension, cardiac disease, obesity, diabetes, and smoking (16).

Next to stroke, infections of the nervous system constitute the major burden of neurologic diseases in this study accounting for 30.8% of neurologic admissions. This is in keeping with a West African Hospital based study (12) where infections of the nervous system made up 30.89% of neurologic admissions. Previous studies in Sub-Saharan Africa reported infections of the nervous system to be the commonest cause of neurological admissions (6, 7). In recent studies from some parts of low income countries, a decreasing frequency of neuro-infections and increasing frequency of noninfectious neurological diseases (especially stroke) have been reported (3- 5, 10-12). This reveals the changing pattern of neurologic diseases in Africa and non-infectious neurologic diseases will increase in low income countries. The burden of neurological diseases in developing countries is rising due to increasing life expectancy, urbanization of population and better diagnostic facilities.

The overall in-hospital mortality of neurologic diseases in this study was 19.7%. This compares to 21.8% in a study on neurological diseases in Addis Ababa (3) but lower than that reported from Gondar (34.7%) (3). This may probably reflect the presence of a neurologist in Hawassa and Addis Ababa for the diagnosis and management of neurologic diseases during the study period. In-hospital mortality of 20 % to

Table 4: Neurologic diseases with outcomes at Hawassa University Comprehensive Specialized Hospital.

Neurologic diseases	Outcomes						
	Total n (%)	Improved n (%)	Same condition n (%)	LAMA* n (%)	Death n (%)	Referred n (%)	Unknown n (%)
Stroke	473 (51.5)	253 (53.5)	62 (13.1)	66 (14.0)	80 (16.9)	10 (2.1)	2 (0.4)
Infections of the nervous system	283 (30.8)	155 (54.8)	10 (3.5)	31(11.0)	76 (26.9)	8(2.8)	3(1.1)
Neuromuscular disorders	40 (4.4)	18 (45.0)	8 (21.1)	11 (28.9)	3 (7.9)	0 (0.0)	0 (0.0)
Spinal cord disease	28 (3.1)	4 (14.3)	10 (35.7)	2 (7.1%)	0 (0.0)	10 (35.7)	2 (7.1)
Brain tumor	26 (2.8)	4 (15.4)	5 (19.2)	1 (3.8)	3 (11.5)	13 (50.0)	0 (0.)
Encephalopathy	22 (2.4)	7 (31.8)	0 (0.0)	1 (4.5)	14 (63.6)	0 (0.0)	0 (0.0)
Seizures and epilepsy	20 (2.2)	14 (70.0)	0 (0.0)	3 (15.0)	0 (0.0)	3 (15.0)	0 (0.0)
Other neurologic diagnosis	18 (2.0)	8 (44.4)	2 (11.1)	2 (14.3)	2 (11.1)	4 (28.6)	0 (0.0)
Diagnosis unclear	8 (0.9)	2 (25.0)	1 (12.5)	2 (25.0)	3 (37.5)	0 (0.0)	0 (0.0)
Total	918 (100.0)	465 (50.7)	98 (10.7)	119 (13.0)	181 (19.7)	48 (5.2)	7 (0.8)

*LAMA = Left Against Medical Advice.

36.5% for neurologic diseases had been reported in other African hospital based studies (4, 8, 10, 13).

The limitation of this study is due to the fact it was entirely retrospective hospital-based review and it may underestimate the burden of inpatient neurologic diseases and does not necessarily represent the prevalence of neurologic disease in the community. Therefore, well-designed multi-centered studies should be done to know the burden of neurologic diseases in Ethiopia.

Conclusion

The burden of inpatient neurologic diseases is high at Hawassa University comprehensive specialized Hospital. Non-infectious neurologic diseases are responsible for the majority of neurologic admissions. Stroke is the commonest cause of neurologic admission followed by infections of the nervous system.

Ethical clearance

The study protocol was approved by the Institutional Review Board (IRB) of the College of Medicine and Health Sciences of Hawassa University.

Acknowledgement

The author would like to thank Hawassa University for funding this research.

Data availability statement

The data that support the findings of this study are available on a reasonable request from the author (birrieneuro@yahoo.com).

Conflicts of interest

The author declared that no conflicts of interest exist.

Funding statement

The study was funded by Hawassa University.

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