

## Pattern of Neurologic Emergencies in Tikur Anbessa Specialized Hospital-Emergency Department in Addis Ababa, Ethiopia

Selemon Gebrezgabiher<sup>1\*</sup>, Aklilu Azazh<sup>2</sup> and Sofia Kebede<sup>3</sup>

<sup>1</sup>Department of Medicine, Yekatit 12 Hospital and Medical College, Addis Ababa, Ethiopia

<sup>2</sup>Department of Emergency Medicine and Critical Care, Addis Ababa University, Ethiopia

<sup>3</sup>Department of Emergency Medicine, Addis Ababa University, Ethiopia

### Abstract

**Background:** Neurological emergencies are a frequent presentations and often times with devastating short and long term consequences. Neurological disorders are increasingly prevalent in Sub-Saharan Africa with the paucity of data on adult neurological emergencies in the region.

**Objective:** The objective of the study was to determine the pattern of neurologic emergencies in TASH, Addis Ababa, Ethiopia.

**Method:** This was a Retrospective cross sectional study of adult patients with neurologic emergencies evaluated in emergency department of Tikur Anbessa Specialized and teaching Hospital from February 1, 2013 to January 31, 2014.

**Results:** Neurological emergencies accounted for 5.27% of the total medical emergencies. The mean age of the patients was  $44.68 \pm 1.1$  years and males outnumbered Females giving a sex ratio (M: F) of 1.22:1. The most common neurologic emergencies were cerebrovascular disorder (54%), neurologic complications of HIV/AIDS (9%), meningitis (8.7%) and seizure disorder (7.7%). Hemiparesis, altered mental status and convulsion were the common presenting features accounting 44%, 19.3% and 13.1%, respectively. The overall mortality rate of neurologic emergencies was 27.3%.

**Conclusion:** Cerebrovascular disorders, neurologic complications of HIV/AIDS, meningitis and seizure disorder are the most common diseases, and the causes of neurological morbidity are preventable and had high case fatality rates.

**Keywords:** Subarachnoid hemorrhage; Neuromuscular junction; Status epilepticus; Neurologic emergency; Meningitis

### Introduction

Neurological emergencies are emergencies due to diseases of the central and peripheral nervous system. It can involve the brain, spinal cord, cranial nerves, peripheral nerves, nerve roots, autonomic nervous system, neuromuscular junction and muscles. Neurological emergencies are common and frequently devastating. Every year, millions of peoples suffer an acute stroke, subarachnoid hemorrhage, status epilepticus, or spinal cord disorders severe enough to require medical intervention.

Neurological disorders are increasingly prevalent in Sub-Saharan Africa. The factors that are producing this increased burden include malnutrition, malaria, HIV/AIDS and other causes of encephalitis and meningitis, demographic transitions, increased vehicular traffic, and persistent regional conflicts. Leading neurological disorders include epilepsy, peripheral neuropathy, stroke, and, increasingly the nervous system complications of HIV/AIDS and alcohol abuse [1]. The disabling rather than fatal nature of many neurological disorders, the stigma associated with brain disorders, and the enormous difficulty in gathering epidemiologic data have resulted in their being under reported and neglected in Sub-Saharan Africa [1]. This neglect represents an unfortunate paradox, since neurological disorders make up at least 25 percent of the global burden of disease and are responsible for an even greater proportion of persons living with disability [2].

Neurological disorders and their complications are currently estimated to affect as many as a billion people worldwide [3]. The annual economic cost of neurological diseases amounted to approximately 180 billion USD in 2004 [3], contributing about one fifth of all hospital admissions [4], which is progressively increasing over the years [5,6], there by being a significant cause for global morbidity and mortality.

Neurological diseases are estimated to lead to 5.7 million deaths annually, causing about 10% of total deaths every year around the world. It was remain one of the top three killers by 2030 [7]. Amongst the burden estimation, neurological diseases would cause 46 million disability-adjusted life years, more than half of which would come from the developing countries. It is estimated that by 2030, neurological disorders would be responsible for more than 9% of total disability-adjusted life years in the lower & middle income countries [8].

Neurological disorders are responsible for more than 20% of the world's burden of disease while neurological and psychiatric disorders are responsible for up to 28% of all years of life lived with disability [9]. Neurological disorders contributed to 92 million disability-adjusted life-years in 2005 and were projected to 103 million in 2030. The burden of these neurological diseases is higher in developing countries that constitute about 85% of the world's population [9]. However, there is paucity and scarcity of literature on neurological diseases in Ethiopia which resulted in neurologic conditions both under-recognized and under-treated. This study was therefore undertaken to determine the pattern of neurologic emergencies in emergency setting and then, it will help to identify priorities among neurological patients and prepare

**\*Corresponding author:** Gebrezgabiher S, Department of Medicine, Yekatit 12 Hospital and Medical College, Addis Ababa, Ethiopia, Tel: +251943294121, Tel: +905323355533; E-mail: [gzsrolex@gmail.com](mailto:gzsrolex@gmail.com)

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the hospital to better management of such cases in a socio- culturally appropriate and cost-effective manner and also serve as a baseline in planning health policies and distribution of scarce resources in Ethiopia where facilities for emergency care are grossly inadequate.

## Research Methodology

This is a retrospective cross-sectional study of medical records of all patients with neurological emergencies who were evaluated in ED from February 1, 2013 to January 31, 2014 at Addis Ababa University, college of health science Tikur Anbessa specialized hospital was conducted from December 2013 to June 2014. Tikur Anbessa specialized and Teaching Hospital is a tertiary health institution located in Addis Ababa, the capital city of Federal Democratic Republic of Ethiopia. The hospital receives patients from all regions of the country and the emergency department provides emergency care for adult patients 24 hours a day. It runs an interdisciplinary emergency care where medical emergencies are attended to by emergency medicine physicians, internal medicine specialists, emergency medicine residents, internal medicine residents and other allied medical professionals. Inclusion criteria for the study was patients with neurological problems who were 13 years and older and exclusion criteria were non-neurological medical emergencies, neurosurgical emergencies including traumatic neurologic cases and patients with incomplete medical record.

Medical records of all neurological emergencies evaluated in ED of the hospital from February 1, 2013 to January 31, 2014 were reviewed using the data abstracting format prepared. Data extraction format contains information from the case files included age, sex, residence, clinical presentation, confirmed diagnosis, co morbidity, outcome and disposition. The data was analyzed using Epi Info 3.5.4 and SPSS 16 and the results were presented in simple descriptive statistics like frequency tables, graphs and proportions.

A total of 7643 medical emergency patients were evaluated in the ER of TASH in the study period, 403 (5.27%) were founded to be neurologic emergencies. Data forms were completed in 311 (77.17%) of the cases. Those with incomplete information in their medical records 92 (22.83%) were excluded from the study.

## Demographic data

**Age and sex distribution:** The sex distribution of patients was 171 (55%) males and 140 (45%) females, giving a sex ratio (M: F) of 1.22:1. The ages of the patients' ranges from 13 to 87 years with the mean age of  $44.68 \pm 1.1$  years and median age of 45 years, 47.9% (149) of the patients were age 13 to 40 years old. The age distribution of patients is shown on Table 1.

**Place of residence:** Majority of patients came from Addis Ababa 173 (55.6%) followed by Oromia 76 (24.4%) and SNNP 39 (12.5%). See residence distribution in Table 1.

## Clinical profile

**Complaint and duration of illness during presentation to ED:** The main complaint for neurologic emergency visit was hemiparesis (44%), followed by altered mental status (19.3%), and Convulsion (13.1%). The complaints are presented in Table 2. The mean duration of symptoms during presentation to ED was 6.96 days and the median was 3 days.

**Morbidity pattern of neurologic emergencies:** In this study majority of patients were due to CVD 54% followed by neurologic complication of HIV/AIDS 9%, meningitis 8.7%, and seizure disorder 7.7%. The morbidity distribution is presented in Table 2.

Characteristics	Number	Percent
<b>Sex (n=311)</b>		
Male	171	55
Female	140	45
<b>Age (years)</b>		
13 – 25	69	22.2
26 – 40	80	25.7
41 – 55	61	19.6
55 – 70	70	22.5
>70	31	10
Mean $\pm$ SD	$44.68 \pm 1.1$	
Median	45	
<b>Residence (n=311)</b>		
Addis Ababa	173	55.6
Amhara	17	5.5
Gambela	1	0.3
Oromia	76	24.4
SNNP	39	12.5
Tigray	5	1.6

**Table 1:** Demographic characteristics of patients with neurologic emergency cases evaluated in ED of TASH from February 1, 2013 to January 31, 2014.

Clinical profile	Number	Percent
<b>Presenting feature</b>		
Hemiparesis	137	44
Paraplegia	20	6.4
Quadriplegia	11	3.5
Altered mental status	60	19.3
Convulsion	41	13.1
Headache	28	9
Speech difficulty	4	1.3
Trismus	4	1.3
loss of sensation	1	0.3
neck stiffness	1	0.3
Vertigo	1	0.3
Others	3	1
<b>Confirmed diagnosis</b>		
CVD	168	54
HIV/AIDS associated neurologic disorders	28	9
Meningitis	27	8.7
Seizure	24	7.7
Spinal cord disorders	16	5.1
Encephalopathy	13	4.2
GBS	11	3.5
Brain abscess	7	2.3
Tetanus	4	1.3
Cerebral malaria	2	0.6
Headache disorder	1	0.3
Others	10	3.2

**Table 2:** Clinical profile of patients with neurologic emergency cases evaluated in ED of TASH from February 1, 2013 to January 31, 2014.

The morbidity pattern showed that CVD was the most common diagnosis it was identified in 168 (54%) patients; 93 (55.4%) of these patients were male, and 75 (44.6%) were females; the mean age was  $53.7 \pm 1.4$  years of age with mean age for men was 55 years, and 52 years for women, 66.67% (112) of the cases were age greater than 40 years. From all CVD cases, 90 (53.6%) of CVD cases were due to ischemic stroke, 76 (45.2%) were due to hemorrhagic stroke and 2 (1.2%) were due to subarachnoid hemorrhage. The mean duration of presentation of CVD to ED was 3 days.

The second most common neurologic emergency identified in ED was neurologic complications of HIV/AIDS, which presented in 28 (9%) patients; the mean age of the patients was  $36.6 \pm 2.1$  years old with 15 (53.6%) patients being male. the mean duration of symptoms while presenting to ED was  $15.7 \pm 3.7$  days (range 1-90). The major HIV/AIDS associated neurologic disorders were CNS Toxoplasmosis 12 (42.9%) followed by TB Meningitis 7 (25%), Cryptococcal Meningitis 3 (10.7%), HIV Myelopathy 2 (7.1%), Primary CNS lymphoma 2 (7.1%), Polyneuropathy 1 (3.6%) and others 1 (3.6%).

Meningitis 27 (8.7%) was the third common neurologic emergency identified in ED of TASH. The mean age of the patients was  $26.9 \pm 2.3$  years (range 14-62) with 89% of them < 37 years old and 66.7% were males giving a sex ratio (M:F) of 2:1. 17 (63%) of them came from Addis Ababa followed by Oromia 8 (29.6%), SNNP 1 (3.7%) and Amhara 1 (3.7%) and the mean duration of symptoms during presentation to ED was  $5.5 \pm 1.2$  days (range from 4 hours-30 days).

Seizure disorder accounted 7.7% (24) of neurologic emergencies with male dominance 58.3%. The mean age of the patients was 31.2 years old and they were presented by convulsion 91.7% of the patients followed by altered mental status 8.3% with mean duration of illness during the presentation was  $3.4 \pm 1.7$  days. 62.5% of the patients have known medical illness from them 86.7% had epilepsy. The type of seizures observed were GTC 62.5%, status epilepticus 29.16%, Myoclonic seizure 4.17% and partial seizure. Cerebral malaria (0.6%) and headache disorder (0.35%) were uncommon. From all neurologic emergencies 164 (52.7%) had known medical illness. medical illness associated with neurologic emergencies are listed in Table 3.

### Disposition and outcome of neurologic emergencies

After evaluation and management of neurologic emergencies in ED 53.7% (167) of them were admitted to ward, 24.4% (76) were discharged from ED, 6.1% (19) were referred to other hospital, 4.5% (14) were admitted to MICU and the rest 11.33% (35) of all neurologic emergencies evaluated in ED were died in the emergency unit. From this study the mean days of hospitalization of neurologic emergencies in TASH was  $9.8 \pm 0.6$  days range from 1 day to 64 days with longer hospitalization days for neurologic complications of HIV/AIDS with mean length of stay  $18.4 \pm 2.9$  days followed by mean day of hospitalization  $16.3 \pm 5.7$  for brain abscess (Table 4).

From all the neurologic emergencies evaluated in ED 48.6% (151) improved after management in TASH but 22.5% of the neurologic emergencies discharged or referred in the same clinical condition and 1.6% deteriorated. The overall mortality rate of neurologic emergencies was 27.3% (85) with 41.2% (35) of the 85 deaths occurred in ED within mean length of stay in ED of  $2.1 \pm 0.28$  days range. CVD was the most common cause of death observed in this study accounted 54.1% (46) with higher mortality from hemorrhagic stroke 54.3% (25) than ischemic stroke 45.7% (21). The second common cause of death was due to neurologic complications of HIV/AIDS 12.9% (11) followed by meningitis 11.8% (10) and encephalopathy 8.2% (7). There were 3.5%

Comorbidity	Frequency	Percent
Hypertension	69	42.10%
HIV/AIDS	32	19.50%
CRVHD	20	12.20%
Epilepsy	15	9.10%
CLD	8	4.90%
DM and Hypertension	7	4.30%
DM	6	3.60%
Malignancy	5	3%
Hypertension & HIV/AIDS	1	0.60%
DM & HIV/AIDS	1	0.60%
Total	164	100%

**Table 3:** Distribution of comorbidity of patients with neurologic emergencies evaluated in ED of TASH from February 1, 2013 to January 31, 2014.

Morbidity	Duration of hospitalization in days
Neurologic complications of HIV/AIDS	15.5 – 21.3
Brain abscess	10.6 – 22
GBS	8.3 – 15.7
CVD	8.4 – 9.8
Tetanus	1.8 – 15.8
Meningitis	6.5 – 8.7
Seizure disorder	3.2 – 6
Encephalopathy	3.3 – 5.1

**Table 4:** Mean hospitalization days of patients with neurologic emergencies evaluated in ED of TASH from February 1, 2013 to January 31, 2014.

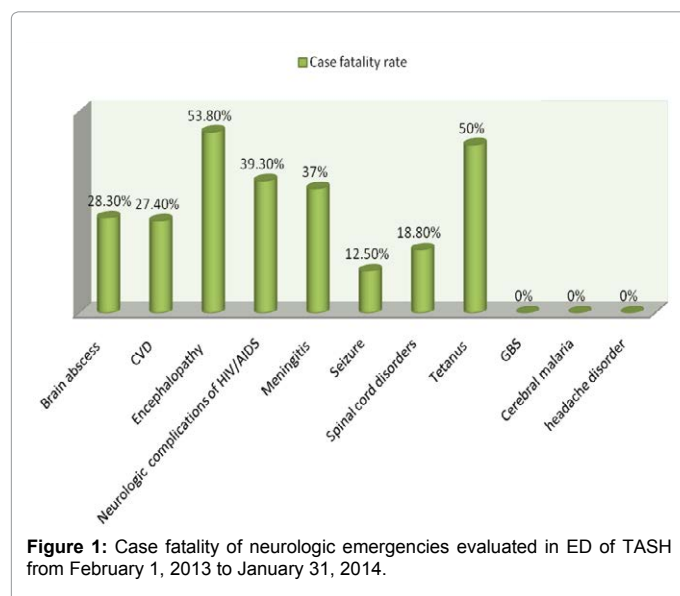
(3) deaths reported due to seizure disorder all of them from status epilepticus.

Encephalopathy recorded the highest case fatality rate of 53.8% (7) followed by Tetanus 50% even they were just two cases, neurologic complications of HIV/AIDS 39.3% (11), meningitis 37% (10) with more case fatality of sub-acute meningitis 71.4% (5) than acute meningitis 26.3% (5), the case fatality of CVD was 27.4% (46) with higher case fatality for hemorrhagic stroke 32.9% than ischemic stroke 23.1% and the case fatality of other disorders is presented in Figure 1.

### Results and Discussion

A total of 7643 medical emergency patients were evaluated in the ER of TASH in the study period, 403 (5.27%) were founded to be neurologic emergencies. Data forms were completed in 311 (77.17%) of the cases. Those with incomplete information in their medical records 92 (22.83%) were excluded from the study.

This study has demonstrated that neurological emergencies accounted for 5.27% of the total medical emergencies seen in ED of TASH during the study period. This figure was lower than that reported in Nigeria where neurologic emergencies accounted for 25.7% of medical emergencies [5] and in France where neurological emergencies were observed to account for 15% of the medical emergencies [10]. The magnitude of neurologic emergencies in this study is also lower than the magnitude of neurological disease seen in Ethiopian patient's hospitalized in general medical wards in two hospitals in Addis Ababa which made up 18.0% and 24.7% of all medical admissions [8]. The low rate could be from poor awareness of the public on neurologic disorders; still a lot of peoples in Ethiopia believe neurologic disorders are treatable only by holly water or spiritual power than proper medical management and follow up in hospitals.



The mean age of the patients with neurological emergencies was  $44.68 \pm 1.1$  years. Though this was lower than the studies in Nigeria, Spain and France had reported the mean age of those with neurological emergencies to be 49.76, 59 years and  $56.9 \pm 21$  years respectively [5,10,11]. It was also higher than the study done in India, the mean age of those with neurologic emergencies was  $37.4 \pm 19$  [12]. The discrepancy may be it was due to socio demographic differences. In this study males outnumbered females, this agrees with a study carried out in Nigeria and India they also observed a male predominance of 56.7% and 63% among those with neurological emergencies [5,13]. In previous studies it is thought that the hormonal differences especially estrogen may be protective to the women.

The main complaint for neurologic emergency visit was hemiparesis this was correlated with the study in Germany where the most common chief complaints for emergency visit were focal weakness [12]. In the same study from Germany headache was the second common presentation followed by, dizziness or vertigo and seizure [12] however in this study altered mental status was the second common presentation followed by headache and convulsion. But in UK Headache was the frequent presentation to ED followed by loss of consciousness, balance difficulties and power loss [2] this difference could be from setting and time variation between the studies.

The most common neurologic emergencies in this study were CVD, neurologic complications of HIV/AIDS, meningitis and seizure disorder. The finding indicated an epidemiological transition of morbidity pattern in Ethiopia from communicable to non-communicable diseases this has brought CVD to the forefront of the neurologic disorders. Compared to study done in Nigeria the three most frequent neurologic emergencies were stroke, Meningitis, and hypertensive encephalopathy [5]. In similar study in Spain it was found that Stroke, headache and epilepsy were the most common disorders seen in ED [11]. But in India the most common neurologic emergency was seizure disorder which accounted 51.5% followed by stroke which was 24% of the neurologic emergencies [13].

From this study the mean days of hospitalization of neurologic emergencies in TASH starting from they presented to ED until they discharged from TASH or died in TASH was  $9.8 \pm 0.6$  days with longer hospitalization days for neurologic complications of HIV/

AIDS with mean length of stay  $18.4 \pm 2.9$  days followed by mean day of hospitalization  $16.3 \pm 5.7$  days for brain abscess. This is lower than the study conducted in northwest Nigeria where length of hospitalization of neurologic disorders was 25 days [14].

## Conclusion

After evaluation and management of neurologic emergencies more than half of them 53.7% were admitted to ward, 23.8% were discharged to their home and the overall mortality rate of neurologic emergencies was 27.3%, 49.4% of the deaths happened in patients who were admitted to ward with mean length of stay  $9.1 \pm 1.3$  and 9.4% of the deaths were in MICU which was 57.1% of neurologic emergencies admitted to MICU during the study period this is consistent with the study from ICU in Nigeria where the overall mortality rate of neurologic disorders was high 52.4%. 11.3% of all neurologic emergencies evaluated in ED were died in the emergency unit with two days mean day of stay in TASH that was 41.2% of all the deaths due to neurologic emergencies in TASH. 48.6% of the neurologic emergencies evaluated in ED improved after management in TASH.

Cerebrovascular disorders, neurologic complications of HIV/AIDS, meningitis and seizure disorder are the most common diseases encountered while Encephalopathy, GBS, brain abscess, tetanus, cerebral malaria and headache disorder were rare. It also showed that causes of neurological morbidity are preventable and had high case fatality rates.

## Recommendations

The high fatality of neurologic emergencies can be decreased by early recognition and early treatment of neurologic disorders. Hypertension and HIV/AIDS were the two frequent co morbidities identified especially in patients with stroke and neurologic complication of HIV/AIDS so it is important to advice every patient with hypertension and HIV/AIDS to follow doctor's recommendations, to take all medications exactly as prescribed, and adopt healthy lifestyle. We also believe it will be very useful for health care policy makers if they focus on planning for better management and prevention of common neurologic emergencies and assist health education of the public to improve awareness on prevention modalities of stroke, seizure disorder and neurologic complication of HIV/AIDS.

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