Available Online at www.ijpscr.info
International Journal of Pharmaceutical Sciences and Clinical Research 2021; 1(4):383-389

RESEARCH ARTICLE

A Prospective Observational Study on Profile of Neurological Emergencies in an Emergency Department of a Tertiary Care Teaching Hospital

Renjith Varghese Eapen[1], T. V. Ramakrishnan[2], Roshni Kizhakedathu Nazar[1], Rosvin Vincent[1], Sangeetha Babu Raj[1], Rajanandh Muhasaparur Ganesan[1]

[1]Department of Pharmacy Practice, Sri Ramachandra Faculty of Pharmacy, Sri Ramachandra Institute of Higher Education and Research, Deemed to be University, Chennai, Tamil Nadu, India, [2]Department of Emergency Medicine, Sri Ramachandra Medical College and Research Institute, Sri Ramachandra Institute of Higher Education and Research, Deemed to be University, Chennai, Tamil Nadu, India

Received: 20-08-2021; Revised: 21-09-2021; Accepted: 07-10-2021

ABSTRACT

Background: Emergency departments are the typical initial contact for seriously ill and injured patients. Although diverse and sometimes subtle in presentation, acute neurological diseases have an urgency that makes their rapid diagnosis and treatment crucial for improving outcomes. **Methodology:** A prospective observational study was conducted during October 2020–January 2021 at the Emergency Department of Sri Ramachandra Medical Centre. **Results:** A total of 155 emergency cases were evaluated in the department during this period. The ages of the patients ranged from 18 to 97 years with a mean age of 49.76 years and the median age of 50 years. There were 104 males and 51 females. Stroke was the most frequent neurologic emergency and was identified in 137 (89%) patients, with 97 (70.8%) of these patients being male while 40 (29.2%) were females. **Conclusion:** The total percentage of the stroke patients that were under 50 years of age was 33 (21%), while those over 50 constituted 104 (78%). The second most common diagnosis was seizure found in 10 patients (6%).

Keywords: Accident, Emergency, Seizure, Stroke

INTRODUCTION

Emergency departments are the typical initial contact for seriously ill and injured patients. Although diverse and sometimes subtle in presentation, acute neurological diseases have an urgency that makes their rapid diagnosis and treatment crucial for improving outcomes. These patients may need to go to the intensive care unit, the interventional radiology suite, or the operating room and may require various consulting services but all of their care begins with the emergency physician. It is therefore vital that the emergency physician have expertise in recognizing these disorders and rapidly initiating appropriate treatments.[1]

During the past decade, at the start of the new century, the role of the hospital neurologist has become irrefutable in our environment. Progressive super specialization, the complexity of neurological diseases, their diagnoses and treatments, plus the appearance of a narrow therapeutic window in prevalent pathologies such as stroke mean that urgent neurological care is most relevant in caring for neurological patients, not only from point of view of quality but also of its efficiency.[2] The profile of neurologic cases presenting in the emergency unit differs from one country to another and varies among regions even in the same country. In some hospitals, headache remains the main cause of emergency neurologic visits while in most, cerebrovascular events top the list. The organization

***Corresponding Author:**
Rajanandh Muhasaparur Ganesan,
E-mail: rajanandh.mg@sriramachandra.edu.in

and management of neurologic emergencies also vary among hospitals.[3]

While some hospitals run an interdisciplinary emergency unit with consulting neurologists in attendance when called, others have specialized neurological emergency units. In most, a neurologist is not available and patients that have neurological conditions are attended by other primary care physicians such as Internists, Family physicians and emergency care physicians.[4] Neurological diseases are estimated to lead to 5.7 million deaths annually, causing about 10% of total deaths every year around the world. It will remain one of the top three killers by 2030.[5]

Among 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 and middle income countries 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.[6]

The common neurological disorders include Headaches, Epilepsy, Seizures, Stroke, Amyotrophic Lateral Sclerosis, Alzheimer's disease, Dementia, Parkinson's Disease and other are Neurological infections, Neurological disorders associated with malnutrition, Pain associated with neurological disorders.

MATERIALS AND METHODS

Study design and study site

A prospective observational study was conducted at the Emergency Department of Sri Ramachandra Medical College and Research Institute, Porur, Chennai, Tamil Nadu for 3 months (October 2020–January 2021).

Ethical consideration

The study protocol was approved by the Institutional Ethics Committee of Sri Ramachandra Institute of Higher Education and Research, Deemed to be University, Chennai, Tamil Nadu, India (CSP/21/JAN/89/73).

Study criteria

All patients above 18 years of age, both gender, who presented with neurological disorders and who consented to take part were included in the study. The patients with previous neurological diseases were included when they presented with acute complications or a recent worsening of symptoms. Patient's problem was diagnosed clinically with proper history, examination and with help of investigations in required cases. The main diagnoses were categorized by various disease groups, cerebrovascular disease (CVD), confirmed based on brain imaging and venous hemorrhagic and ischemic stroke conditions; epilepsy when the patient presented with a previous history of seizures and was admitted because of convulsive symptoms within the last 6 h; or if the patient presented with first-ever seizures within the past 24 h. Primary headache when the patient presented with a previous history of primary headache with symptoms worsening within the past 24 h. Migraine was diagnosed using the criteria for migraine in adults with repeated attacks of headache lasting 4–72 h. Neurological symptoms secondary to clinical conditions were considered when the neurological symptoms were related to clinical diseases due to systemic infection or metabolic, cardiac, endocrine or other system disorders. Central nervous system infection was suspected when clinical, neurological and complementary diagnosis confirmed a possible acute meningitis, encephalitis or brain abscess. Referral to other ERs and consultation with other medical sub-specialities was performed whenever necessary. All non-neurological medical cases were excluded from the study.

Study procedure

A specially designed pro forma was used to collect data. After getting written informed consent patients demographic data, admission time to and duration at Emergency room, the means of transfer to the emergency room (consultation or

referral from other regional hospitals, transport individually or by ambulance), first symptom, concomitant illness, emergency therapy initiated, final diagnosis, including complete blood count, liver function tests, renal function tests, lipid profile, cerebro spinal fluid analysis, brain computed tomography, brain magnetic resonance imaging, X-ray, electroencephalography and all other relevant tests were also recorded. After final diagnostic evaluation by neurologist, the patients were separated into two age groups, a younger group (18–≤50 years of age) and older group (>50 years of age) to identify the main diagnosis and outcome.

RESULTS

During the study period, 155 neurological emergencies cases were observed at the emergency unit. There were 104 males and 51 females, giving a male: female ratio of 2.03:1 as shown in Table 1. Male patients are highly diagnosed with neurological disease. The ages of the patients ranged from 18 to 97 years with a mean age of 49.76 years and the median age of 50 years. The highest peak age range of neurological disease was between 50 and 77 years as shown in Table 1. The observed patient presented with neurological complaints such as weakness of limb (52.2%), slurred speech (34%), giddiness (23%), and facial deviation (15.4%).

Stroke was the most frequent neurologic emergency and was identified in 137 (87%) patients, with 97 (70.8%) of these patients being male while 40 (29.2%) were females. Among the female group, those that were ≤50 years of age were 11 (28%) and >50 years of age were 29 (73%). In the male group, those who were ≤50 years of age are 23 (24%) and >50 years of age were 74 (76%). The mean age and median age are 59.01 years and 61.19 years, respectively, for the age distribution. The total percentage of the stroke patients that were under 50 years of age was 34 (26%); while those over 50 years of age constituted 103 (77%).

The second most common diagnosis was seizure found in 10 patients (6%), 7 (70%) of these patients being female and 3 (30%) patients being male. Other neurological emergencies encountered are as listed in Table 2.

On comparing diagnosis between young and older patients, it can be noted that stroke was found having more incidence in the patients above the age of 50 years (77%) that comes in the older patient category and seizures were found to be more incidence in patients below the age group of 50 (70%) that come in the younger patient category as shown in Table 3.

The commonly prescribed drugs for the treatment of stroke and seizure were Atorvastatin (80%), Citicoline + Piracetam (80%), Clopidogrel (65%)

Table 1: Baseline characteristics of study population.

Variables	Number	Percentage
Age in years		
18–27	4	3
28–37	12	8
38–47	16	10
48–57	30	19
58–67	42	27
68–77	39	25
78–87	9	6
88–97	3	2
Gender		
Male	104	67
Female	51	33
Chief complaints		
Weakness of limb	81	52.2
Slurred Speech	50	34
Giddiness	35	23
Facial deviation	24	15.4
Headache	14	9
Vomiting	9	6
Involuntary movement of limb	7	5
Numbness of limb	7	5
Visual disorders	5	3

Table 2: Pattern of neurological illness in study population.

Neurologic emergency cases	Number	Percentage
Stroke	137	87
Seizure	10	6
Dementia	2	1
Myelopathy	1	1
Neurocysticercosis	1	1
Parkinson	1	1
Right vertebral artery thrombosis	1	1
Transient global amnesia	1	1
Vasculitis	1	1

Table 3: Comparing diagnosis between younger and older patients.

Diagnosis	Number of patients 18–≤50 years of age	Percentage	Number of patients>50 years of age	Percentage
Stroke	34	26	103	77
Seizure	7	70	3	30

Table 4: Treatment for patients with neurological disease.

Diagnosis	Drugs name	Number	Percentage
Stroke	Atorvastatin	109	80
	Citicoline+Piracetam	109	80
	Clopidogrel	89	65
	Levetiracetam	36	26
	Acetyl salicyclic acid	24	18
	Metoprolol	18	13
	Pantoprazole	121	88
Seizure	Levetiracetam	7	70
	Oxcarbazepine	2	20
	Phenytoin	2	20
	Brivaracetam	1	10
	Lacosamide	1	10
	Pantoprazole	9	90

Pantoprazole (88%), etc., and Levetiracetam (70%), Phenytoin (20%), Oxcarbazepine (20%), respectively, as shown in Table 4.

DISCUSSION

This study has demonstrated the neurological emergencies admitted in the Emergency Department of our medical centre in Chennai, India. In this stroke was the most frequent neurologic emergency and was identified in 137 (89%) patients, with 97 (70.8%) of these patients being male while 40 (29.2%) were females. The mean age of the patients with neurological emergencies was 49.76 years, and the median age was found to be 50 years. Other studies in Spain and France had reported the mean age of those with neurological emergencies to be 59 years and 56.9 ± 21 years, respectively.[7,8] Yet in another study conducted in India, the mean age of those with neurologic emergencies, 37.4 ± 19, was found to be lower than that noted in our study.[9] The highest peak age range of neurological emergencies in our study was between 50 years and 77 years. This is mostly contributed from stroke which is most frequent in the elderly.[2,10] Most of our patients were males, this agrees with studies carried out in India[11] that also observed a male preponderance of 67–56.6%, respectively, among those with neurological emergencies. But contrasts with earlier studies where most of the patients were females.[7,12] And yet in another Spanish study, no sex difference was observed.[13] It is thought that the hormonal differences especially oestrogen may be protective to the women.

Most of our patient consulted emergency department exclusively with neurological symptoms such as weakness of limb (52.2%), slurred speech (34%), giddiness (23%), and facial deviation (15.4%). These findings are contrast to those obtained in Spain and Cameroon where the most frequent complaints were headache (20%), focal neurological deficits (16%) and loss of consciousness (14%).[4,14] Our findings are also contrast to another study in Spain where headache was the main presenting complaint in the neurological emergency centre.[15] The most common symptoms in the United Kingdom were hemiparesis (40%), headache (24%), and seizures (15%).[16]

The common neurologic disease in our study was stroke (87%) and seizure(6%). The three most common neurologic emergencies in South Nigeria study were stroke (52.5%), meningoencephalitis (11.3%), and hypertensive encephalopathy (7%).[17] Carroll and Zajicek working in Plymouth, United Kingdom, had found stroke, headache and seizures (29%, 13%, and 12%, respectively) to be the three most frequent neurologic emergencies.[16] In a study by García-Ramos *et al*.,[2] stroke topped the list of the neurological emergencies accounting for 24.57% of the cases, with epilepsy (13.06%) as the second most common condition while headache emerged third (6.07%). Casado in Spain had equally found stroke, headache and epilepsy to be the most frequent neurologic disorders in the emergency room.[18]

Since in our study stroke was found to be the most frequent neurological emergency, we can say that

this is in conformity with previous studies that observed stroke to be the most common neurologic emergency.[12] Stroke was found to be commoner in those over 45 years in both sexes. Age has been observed to be strongly associated with stroke. In a study by Walker *et al*. in Tanzania, stroke incidence was markedly increased for males than females in the age band of 55–64 years, 65–74 years, and 75–84 years in Hai rural area.[19] Stroke was also observed in the present study to be more frequent in males than females. This is in agreement with earlier studies that found stroke to be commoner in males than females.[18,20,21] Onwuekwe *et al*. had also observed a male preponderance among computed tomography confirmed stroke cases, with a male to female ratio of 2.55:1.[22] The literature concerning sex-specific aspects of CVDs is scanty. Females are usually many years older than males when the first stroke occurs.[18] This sex difference in stroke has been hypothesized to be related to sex hormones, mainly oestrogen in females which are thought to be protective.

The second most common neurological emergency in our study was seizure found in 10 patients (6%), 7 (70%) of these patients being female, and 3 (30%) patients being male. In a study by García-Ramos *et al*.,[2] stroke topped the list of the neurological emergencies accounting for 24.57% of the cases, with epilepsy (13.06%) as the second most common condition. Study conducted by Casado in Spain had equally found stroke, headache and epilepsy to be the most frequent neurologic disorders in the emergency room.[18] In a study conducted in Bangladesh[23] other than stroke, seizure (9.3%) was the next common event for consultation seeking in contrary to most of the European studies except for the Irish, reported epilepsy as a major cause of referral, followed by stroke.[21,24-26] The Irish reporting had stroke (22.7%) and epilepsy (10.2%) as two most common causes for referral. This is probably partly due to the difference in disease prevalence and the methodology applied in these studies. Epilepsy though most common in the outpatient setting, was not as commonly seen in inpatients most likely due to its chronic nature. It is also likely that the proportion of people with epilepsy will be higher in community-based studies. Although, the annual incidence of epilepsy (50/100000 population) in developing countries is twice that of the developed world, the increased burden of stroke has outnumbered other diseases in our study. The frequency of other neurological problems, such as Myelopathy, Vasculitis, and Parkinsonism, was very low.

In another Spanish study, headache was the main reason for visits to the emergency neurologic department.[15] No patient presented with headache as an emergency in our study. The possible reason why headache was rare in our study could be due to the fact that our population underestimates the significance of headache. Patients often prefer over-the-counter drugs and sometimes home remedies to take care and will only report to an emergency care setting if the headache escalates into a more serious condition.

In our study, stroke was the most prevalent neurological disease in older group when compared with the younger group (77%) versus (26%). Study conducted by Marcos C has equally found stroke was the most common disease in both groups but was more prevalent in the older group compared with the younger group (59.6%) versus (21.8%) and the incidence of seizures was almost three times more frequent in the younger group (18.6%) than in the older group (8.1%).[10] Our study also found that seizure was more common in younger group (70%) than in the older group(30%).

For patients with Transient Ischemic Attack or Ischemic stroke of atherosclerotic origin who are able to tolerate statins, we suggest high-intensity statin therapy, independent of the baseline low-density lipoprotein cholesterol, to reduce the risk of stroke and cardiovascular events.[27,28] We suggest treating with atorvastatin 80 mg/day, since this was the agent and dose used in the Stroke Prevention by Aggressive Reduction in Cholesterol Levels trial that showed a benefit for secondary ischemic stroke prevention. In our study, the patient was prescribed with 80 mg of atorvastatin.

Most studies, however, demonstrated a positive effect with the use of citicoline during the acute and subacute phases of Ischemic stroke.[29] Citicoline is a safe and effective pharmacological product in patients with acute Intracerebral hemorrhage and can be used in acute stroke patients even before images are obtained to separate ischemic from hemorrhagic stroke.[30] Single-agent antiplatelet

therapy is recommended for long-term secondary prevention. Aspirin, clopidogrel, or aspirin/ER dipyridamole is all reasonable options depending on patient-specific factors. Some experts, however, prefer clopidogrel or aspirin.

CONCLUSION

Neurological diseases are very common in Emergency Department with stroke (87%) being the most frequent diagnosis, and it is more common among older adult (>50 years) patients when compared with younger patients. Atorvastatin, Citicoline plus Piracetam was most frequently prescribed drug to patients with stroke.

REFERENCES

1. Hewer RL. The economic impact of neurological illness on the health and wealth of the nations and of the individuals. J Neurol Neurosurg Psychiatry 1997;63:S19-23.
2. García-Ramos R, Moreno T, Camacho A, González V, Bermejo F. Neurological emergencies in a university hospital. Neurología 2003;18:431-8.
3. Sopelana D, Segura T, Vadillo A, Herrera M, Hernández J, GarcíaMuñozguren S, *et al*. Benefit of the implementation of on-call neurology physicians in a general hospital. Neurologia 2007;22:72-7.
4. Olazarán J, Navarro E, Galiano M, Vaquero A, Guillem A, Villaverde F, *et al*. Quality of neurological care in the emergency services: A study from the community-hospital. Neurologia 2009;24:249-54.
5. Falco FA, Sterzi R, Toso V, Consoli D, Guideti D, Provinciali L, *et al*. The neurologist in the emergency department. An Italian nationwide epidemiological survey. Neurol Sci 2008;29:67-75.
6. World Health Organization. Dementia: A Public Health Priority. Geneva: World Health Organization; 2012.
7. Saddichha S, Saxena MK, Vibha P, Methuku M. Neurological emergencies in India-lessons learnt and strategies to improve outcomes. Neuroepidemiology 2009;33:280-28.
8. Chapp-Jumbo EN. Neurological admissions in the Niger Delta Area of Nigeria A ten year review. Afr J Neurol Sci 2004;23:14-20.
9. McLigeyo SO. The pattern of geriatric admissions in the medical wards at the Kenyatta national hospital. East Afr Med J 1993;70:37-9.
10. Langer MC, Braatz VL, Tomiyoshi C, Novak FM, Fernandes AF, Zamproni LN, *et al*. Neurological diagnoses in the emergency room: Differences between younger and older patients. Arq Neuropsiquiatr 2011;69:212-6.
11. Rizos T, Jüttler E, Sykora M, Poli S, Ringleb PA. Common disorders in the neurological emergency room--experience at a tertiary care hospital. Eur J Neurol 2011;18:430-5.
12. Walker R, Whiting D, Unwin N, Mugusi F, Swai M, Aris E, *et al*. Stroke incidence in rural and urban Tanzania: A prospective, community. Lancet Neurol 2010;9:786-92.
13. Appelros P, Stegmayr B, Terent A. Sex differences in stroke epidemiology: A systematic review. Stroke 2009;40:1082-90.
14. Mapoure YN, Ongono JS, Nkouonlack C, Beyiha G, Mouelle AS, Luma HN. Neurological disorders in the emergency centre of the Douala general hospital, Cameroon: A cross-sectional study. Afr J Emerg Med 2015;5:165-70.
15. Jimenez-Caballero PE. Analysis of the headaches treated in the emergency neurology departments. Rev Neurol 2005;40:648-51.
16. Carroll C, Zajicek J. Provision of 24 h acute neurology care by neurologists: Manpower requirements in the UK. J Neurol Neurosurg Psychiatr 2004;75:406-9.
17. Eyo E, Komomo I, Sidney K. Profile of neurologic emergencies at the accident and emergency department of a tertiary hospital in South Nigeria. J Neurol Sci 2013;30:72-8.
18. Casado V. Neurological patient care in Emergency departments. A review of the current situation in Spain. Neurologia 2011;26:233-8.
19. Imam I, Olorunfemi G. The profile of stroke in Nigeria's federal capital territory. Trop Doct 2002;32:209-12.
20. Onwuekwe IO, Ezeala-Adikaibe BA, Ohaegbulam SC, Chikani MC, Amuta J, Uloh H. A study of CT images in Nigerian African stroke patients. J Neurol Sci 2008;25:148-54.
21. McColgan P, Carr AS, McCarron MO. The value of a liaison neurology service in a district general hospital. Postgrad Med J 2011;87:166-9.
22. Wyller TB. Stroke and gender. J Gender Specif Med 1999;2:41-5.
23. Chowdhury RN, Hasan AH, Rahman YU, Khan SI, Hussain AR, Ahsan S, *et al*. Pattern of neurological disease seen among patients admitted in tertiary care hospital. BMC Res Notes 2014;7:202-6.
24. Mallik MU, Parvez SI. Disease profile 2011: Internal medicine. In: Azad KA, editor. Year Book 2011. Bangladesh: Department of Medicine, Dhaka Medical Colledge Hospital. BeximcoPharma; 2011.
25. Chapman FA, Pope AE, Sorensen D, Knight RS, Al-Shahi Salman R. The uses of a rapid access neurology clinic. J R Coll Physicians Edinb 2009;39:296-300.
26. Sanders JW, Shorvon FD. Epidemiology of the epilepsies. J Neurol Neurosurg Psychiatry 1996;61:433-43.
27. Kernan WN, Ovbiagele B, Black HR, Bravata DM, Chimowitz MI, Ezekowitz MD, *et al*. Guidelines for the prevention of stroke in patients with stroke and transient

ischemic attack: A guideline for healthcare professionals from the American heart association/American stroke association. Stroke 2014;45:2160.
28. Grundy SM, Stone NJ, Bailey AL, Beam C, Birtcher KK, Blumenthal RS, *et al*. 2018 AHA/ACC guideline on the management of blood cholesterol: A report of the American college of cardiology/American heart association task force on clinical practice guidelines. J Am Coll Cardiol 2019;73:e285.
29. Dávalos A, Secades J. Citicolinepreclinical and clinical update 2009-2010. Stroke 2011;42:S36-9.
30. Secades JJ, Álvarez-Sabín J, Rubio F, Lozano R, Dávalos A, Castillo J. Trial investigators citicoline in intracerebral haemorrhage: A double-blind, randomized, placebo-controlled, multi-centre pilot study. Cerebrovasc Dis 2006;21:380-5.