ORIGINAL ARTICLE

Clinical profile and outcomes of patients admitted with Guillain-Barre Syndrome to a specialized Tertiary Teaching Hospital in Ethiopia- a retrospective cohort analysis

[1,2] Fasika T. Yimer, [1]Ammanuel Amare, [3]Justor Banda

[1]*Addis Ababa University College of Health Sciences, Addis Ababa, Ethiopia*
[2]*Department of Medical Science, University of Namibia, Windhoek, Namibia*
[3]*Department of Internal Medicine, Ndola Teaching Hospital, Ndola, Zambia*

ABSTRACT

Background: Despite the increased complications associated with Guillain-Barre Syndrome (GBS); there is scarce information on clinical characteristics and outcomes associated with the disease. The objective is to assess the clinical profile and outcomes of patients admitted with GBS at a tertiary hospital.

Methods: This was a retrospective cohort study that analysed non-electronic medical files of patients with the diagnosis of GBS during the period May 2008 to August 2016 at a tertiary level hospital. Guillain-Barre Syndrome was defined according to the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS).

Results: In total, 82 patients' files were included in the study and their median age was 29.5 years (IQR 20-36) and 62.2% of the patients were male. Antecedent events were seen in 36 (43.9%) patients and 15 (18.3%) had prior vaccination history; 93% of the later had anti-rabies vaccine. Nearly 90.0% of the GBS patients presented with extremity weakness that involved all extremities in almost 90.0%. Albumino-cytologic dissociation was seen in 77.6% of the analysed cerebrospinal fluid. The mortality rate was 11.0% and found to be significantly higher in those with dysautonomia (30.8% vs. 1.8%, P=0.00), mechanically ventilated (36.4% vs. 1.8%, P=0.00), those with respiratory failure (28.6% vs. 1.9%, P=0.00), and those with a longer median hospital stays [20 days (IQR 12-31) vs. 11 days (5-23), P=0.03]. In Multivariate adjusted analysis, respiratory failure [(OR=0.01), 95% CI (0.00-0.18), P<0.01] and longer hospital stay [(OR=0.89), 95% CI (0.81-0.99), P=0.03)] were strongly associated with mortality.

Conclusion: Our study demonstrated clinical profile comparable to previous; however, the in-hospital

***Corresponding author:**
Fasika T. Yimmer
Addis Ababa University College of Health Sciences,
Addis Ababa, Ethiopia
Email: fasiksf@gmail.com

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mortality rate was lower. Early mechanical ventilation and treatment of complications is recommended to improve the treatment outcomes.

INTRODUCTION

Guillain-Barre Syndrome (GBS), the commonest acute severe immune mediated neuropathy[1,2] was first described by Landry in 1859[3] and later by Guillain, Barré and Strohl as a disease that had acute clinical features consisting of motor weakness, areflexia, paraesthesia with minor sensory loss, and increased protein in cerebral spinal fluid (CSF) without pleocytosis (albumin-cytological dissociation)[4]. Despite the increased morbidity, mortality and medical patient care fees associated with GBS[5], there is scarce information on clinical patterns and outcomes of patients with GBS especially in Sub-Saharan Africa (SSA).

In previous global studies on GBS; there has been geographical variation in reported prevalence and clinical subtypes of GBS. The overall prevalence of GBS has been shown to range from 0.4-2 cases per 100,000 population per year[6,7] and sometimes higher in certain populations e.g. the 2019 GBS data drawn from 204 countries, revealed a respective point prevalence of 6.4, 4.2, 3.4 and 0.8 cases/100,000 in Asia Pacific, North America, Southern SSA and Eastern Asia[1]. Data on GBS that was drawn from the Hospital Quality Monitoring System (HQMS) that consisted of 75,548 tertiary hospitals in China reported 0.698 GBS cases per 100,000[7]. In this study, the prevalence of GBS was found to be higher in adults and men[7].

Guillain-Barre Syndrome is highly associated with variable in-hospital mortality rate that ranges from as low as 1.0% to nearly 30.0% or higher. Zenebe *et al.* in a retrospective analysis 95 patients with GBS found a nearly 30.0% mortality rate while 12.0%[8] and 2.8%[9] mortality rates were respectively reported in studies performed in India and developed countries. Published studies in SSA have demonstrated some variations in clinical presentation especially in the occurrence of the different subtypes, presence of cranial nerve and autonomic dysfunctions. Furthermore, these studies have revealed an association of human immunodeficiency virus (HIV) with higher mortality in GBS patients[10,11,12].

The diagnosis of GBS depends on clinical criteria supported by electrophysiological studies and CSF findings. The weakness can vary from mild difficulty with walking to nearly complete paralysis of all extremities, facial, respiratory, and bulbar muscles[13,14].

The standard treatment of GBS is either Intravenous immunoglobulin (0.4 g/kg daily for 5 days) or Plasma exchange (200–250 ml/kg for 5 sessions)[15]. Even though the standard treatment for GBS is using ether of the two standard treatments, to date the patients in this study setting are not having regular access to both standard treatments. They can only access treatment from a few private pharmacies with a very expensive price, which may compromise the quality of the treatment as a result of prolonged shelf time. However, the number of neurologists has increased significantly with annually increasing post graduates. This may have significant impact in the reduction of mortality in this current study as compared to a decade ago. Despite the absence of that much improvement of access to the standard medications, there is better supportive management of GBS patients as compared to the time when only minimal number of neurologists were available. Current data on the clinical profile and outcomes of GBS patients in our specific setup is vital in providing data for improving the quality of services and thereby outcome of GBS cases. This study therefore, assessed the clinical profile and outcome among GBS patients.

METHODS

This was a retrospective cohort study that analyzed non-electronic medical files of patients admitted with the diagnosis of GBS to Tikur Anbessa Specialized Hospital (TASH) during the period May 2008 to August 2016.

TASH is the biggest tertiary specialized referral University hospital with over 700 beds. It caters complicated patients including neurology cases from all the different regions of the country. It is the only institution where some specialized tertiary health care is rendered. It is a well establish undergraduate, post graduate as well as sub-specialty training institution. It is also hosting the country's sole neurology post graduate program.

With the assistance of two nurses who were trained to identify the cases, all files with the diagnosis of GBS during the study period were collected in phases. Data were abstracted by the researcher who has the professional capacity (neurology registral) to analyses the cases. All consecutive medical records of patients with a diagnosis of GBS were indexed in the study. Excluded were 11 cases because of incomplete data for nine cases and alternative diagnosis for 2 cases; One case was diagnosed with transverse myelitis; another case was diagnosed with chronic inflammatory demyelinating polyneuropathy with recurrent attacks). Figure 1 shows the flow chart. The study was performed in line with the Helsinki declaration after obtained approval was obtained from the relevant institutions.

Study procedure

The study was conducted at TASH which is the biggest public referral hospital in the country with a relatively better Intensive Care Unit (ICU) setup and the majority of the patients with the diagnosis of GBS are referred to this hospital. All the relevant information about clinical presentation, physical findings, laboratory investigations, treatment given and outcome of the individual cases were abstracted from the hospital records of the cases. Then, the information was transferred in to a structured data sheet, coded and entered in to a computer data base. Data cleaning was done by editing or checking for percentage and other relevant calculations.

Study definition

The diagnosis of acute GBS in this study was based on the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) diagnostic criteria[16].

Antecedent events were taken as any kind of upper respiratory tract infection, acute gastroenteritis or vaccinations within the four weeks prior to the onset of the illness.

The presence of **dysautonomia** was documented whenever there was significant arrhythmia (bradycardia, tachycardia, and cardiac arrest), fluctuating hypertension or hypotension without other explanation, or any documentation of dysautonomia as diagnosis.

Data analysis

Analysis of the data was performed using IBM SPSS version 20. Normal data distribution was assessed using Shapiro–Wilk test. Categorical variables were reported as percentages or proportions while numerical (normally distributed variables) were reported as means with standard deviations, otherwise as median with inter quartile ranges (IQR). Association of categorical variables with outcome was performed using chi-square or Fisher exact and for numerical variables with mortality association was performed with student t-test or Wilcoxon signed-rank test when applicable at 5% significance level. Multivariate analysis was employed to establish the predictors of mortality.

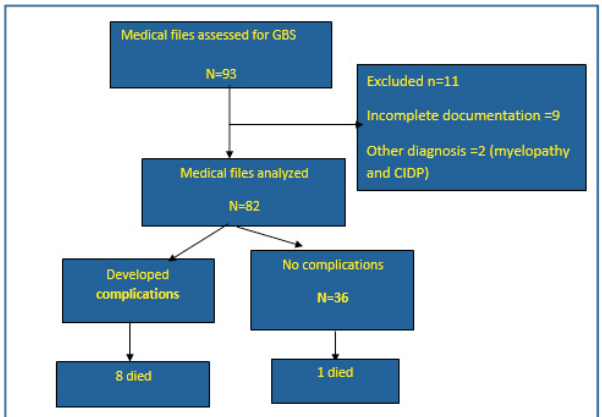

Figure 1: The flow chart of the GBS patients

RESULTS

Demographic, clinical and lab characteristics of the GBS patients

After excluding eleven medical files (Figure 1), a total of 82 medical records of patients with the diagnosis of GBS were included in the study and 62.2% of these were male.

At admission, 54.9% were hospitalized to the intensive care unit while the rest were in the ward. Their demographic and clinical characteristics are shown in table 1. Antecedent events were observed in 36 (43.9%) patients; 15 of them had recent vaccination history. Of the 15 patients with recent vaccination, 14 (93.3%) had anti-rabies vaccine. The median hospital length of stay was 20 days (IQR12-30).

At presentation, almost 90.0% of the GBS patients presented with extremity weakness. The pattern of weakness was ascending in nature in 85% of the patients. Symptoms of sensory, autonomic and loss of sphincter control were observed in 47.6%, 32% and 24.6% respectively.

Table 1 A: Demographic and clinical presentation of GBS patients

Characteristic	Number (n=82)
Age (years), Median age in years (IQR)	29.5(20-36)
Gender Male	51 (62.2%)
Hospital stay in days: Median (IQR)	20 (12-30)
Duration of symptoms: Median (IQR) days	7 (4-10)
Antecedent events, y/n	36(43.9%)/ 46(56.1%)
Recent vaccination, y/n	15 (18.3%)/67 (81.3%)
Admission place, y (ICU)/n (ward)	45(54.9%)/37 (45.1%)
Initial symptom:	
Extremity weakness	73 (89.0%)
-sensory symptom	8 (9.8%)
-Nonspecific symptom	1 (1.2%)
Distribution of weakness:	
-all extremity weakness	72 (87.8%)
-lower extremity weakness only	10 (12.2%)
Pattern of weakness:	
-Ascending	69 (84.1%)
-Descending	13 (15.9%)
All extremity weakness, y/n	72 (87.8%)/10(12.2%)
Lower extremity weakness only, y/n	10 (12.8%)/72(87.2%)
Ataxia and/or ophthalmoplegia, y/n	3 (3.7%)/79(96.3%)
Sensory (burning pain, numbness,) symptoms, y/n	39 (47.6%)/43(52.4%)
Autonomic manifestation, y/n	26 (31.7%)/56(68.3%)
Transient sphincter dysfunction, y/n	20 (24.4%)/62(75.6%)
Total cranial nerve involvement, y/n	23 (28.0%)/59(72.0%)
HSBP: Median (IQR) in mmHg	130 (118-145)
LSBP: mean (SD), mmHg	105 (SD + 13)
HDBP: mean (SD)	83 (SD + 12)
LDBP: mean (SD)	66.5 (SD + 10)
HHR: Median (IQR) bpm	103 (88-120)
LHR: Median (IQR) bpm	80 (70-84)
HIV positive, y/n	4 (14.8%)/23 (85.2%)
Co morbidities, y/n	22 (26.8%)/60(37.2%)
Died, y/n	9 (11%/73 (89%)

HDBP: highest diastolic blood pressure: highest systolic blood pressure, IQR; interquartile range, ICU: Intensive care unit, y/n; yes or no., LSBP: lowest systolic blood pressure, LDBP: lowest diastolic blood pressure, HHR: highest heart rate, LHR: lowest heart rate

Table 2 demonstrates the laboratory characteristics of GBS patients admitted during the study period. Cerebral spinal fluid (CSF) analysis was conducted in 58 (70.7%) patients; 87% of those had CSF cell count below 5 **cells/mm^3.** Out of the 49 patients who had CSF protein determination, 77.6 % demonstrated albumino-cytologic dissociation which is consistent with the diagnosis of GBS. Nerve conduction study was done for 34 (41.5%) patients and only 32 results were obtained to be analyzed. Majority, 19 (59.4%) were axonal type with 12 (37.5%) acute motor axonal neuropathy (AMAN) and 7 (21.9%) acute motor and sensory axonal neuropathy (AMSAN). There was 1 (3.1%) patient with Miller Fisher (MF) variant.

A total of 15 (18.3%) patients received intravenous immunoglobulin (IVIG); however, no patient received plasma exchange or steroid therapy.

Table 2: Laboratory characteristics of the patient with GBS

Variable	N=82
CSF: Median (IQR)	**0 (0-3)**
CSF analysis– total determined	58(70.7%)
Cell count < 5 cells/mm3	51(87.9%)
> 5 and < 50 cells/mm3	6(10.3%)
Protein - total determination	49(59.8%)
< 45mg/dl	11(22.4%)
>45mg/dl	38(77.6%)
AST: Median (IQR)	29(22-39)
ALT: Median (IQR)	27(18-38)
Serum creatinine: Median (IQR)	0.7(0.6-0.9)
BUN: Median (IQR)	28(17-36)
Sodium: Median (IQR)	138 (135-142)
Potassium: Median (IQR)	4.2 (3.65-4.6)
NCS done y/n	34 (41.5%)/48 (58.5%)
NCS findings obtained	**n=32**
Demyelinating (AIDP) type	11 (34.4%)
Axonal (AMAN)	12 (37.5%)
Axonal AMSAN)	7 (21.9%)
MF variant	1 (3.1%)
Normal	1 (3.1%)

WBC: white blood cell count, Hgb: hemoglobin, CSF: cerebra-spinal fluid, AST: aspartate transaminases, ALT: alanine transaminases, IQR: inter quartile range, SD: standard deviation, BUN: blood urea nitrogen, NCS: Nerve conduction study, AIDP: Acute inflammatory demyelinating polyneuropathy, AMAN: acute motor axonal neuropathy, AMSAN: acute motor and sensory axonal neuropathy, MF: miller fisher

Clinical outcomes of the GBS patients

Table 3 displays common complication identified in the GBS admitted patients during the study period.

Table 3: Complications in the patients with GBS

Complications observed	n=44	Percent
Sepsis. Pneumonia. Dysautonomia and Respiratory failure	7	15.9%
Pneumonia	5	11.4%
Respiratory failure	4	9.1%
Pneumonia and respiratory failure	4	9.1%
Pneumonia, respiratory failure and dysautonomia	4	9.1%
Dysautonomia with or without pressure sore	3	6.8%
Dysautonomia and respiratory failure	2	4.5%
Pressure sore, Pneumonia and dysautonomia	2	4.5%
UTI, Pneumonia, Dysautonomia and Respiratory failure	1	2.3%
UTI, Pneumonia and DVT/PTE	1	2.3%
Dysautonomia., respiratory failure and ophthalmoplegia	1	2.3%
Dysautonomia and pressure sore	1	2.3%
Contracture and multiple cranial nerve palsy	1	2.3%
Facial palsy, respiratory failure and dysautonomia	1	2.3%
Contracture and multiple cranial nerve palsy	1	2.3%
DVT	1	2.3%
Others (hypokalemia, bleeding tendencyx2, Carbuncle, burn	5	11.4%

DVT; deep vein thrombosis, UTI: urinary tract infection, PTE: pulmonary thrombo-embolism

Of the 82 patients, 44 developed different complications in isolation or in combination. The most frequently seen complications were

respiratory failure and pneumonia which were observed in 24 (54.5%) patients in isolation or in combination. Dysautonomia was the next frequent complication, which was observed in 22 (50.0%) patients. Among those who developed complications, 7 (15.9%) patients had combinations of sepsis, pneumonia, dysautonomia and respiratory failure. Four (11.4%) patients developed combination of pneumonia, respiratory failure and dysautonomia. A total of 9 (11.0%) patients out of 82 died. Out of the 9 deaths 8 (88.9%) had combination of respiratory failure and dysautonomia with or without the other complications. One (11.1%) of the deaths had paraparesis with multiple cranial nerve palsy plus pancytopenia secondary to Aplastic anemia with neutropenic fever. Mortality was significantly higher in those with dysautonomia (30.8% vs. 1.8%, P=0.00), mechanically ventilated (36.4% vs. 1.8%, P=0.00), those with respiratory failure (28.6% vs. 1.9%, P=0.00) and those with longer median hospital stays [20 days (IQR 12-31) vs. 11 days (5-23), P=0.03]. In a multivariate analysis, respiratory failure [(adjusted OR=0.01), 95% CI (0.00-0.18), P<0.01] and longer hospital stay [(adjusted OR=0.89), 95% CI (0.81-0.99), P=0.03)] were associated with mortality.

Table 4 demonstrated comparison of the demographic and clinical characteristics as well as outcome of the current study with the study done 10 years before in the same setting. Most of the demographic and clinical chrematistics in both

Table 4: Comparison of the clinical profile and outcomes of GBS patients who were admitted to TASH, 1992-2001 verses 2008-2016

Period of study	Sep.1992 to Sep.2001 (Zenebe et. al.)	May 2008 to August 2016 (Current series)
Number of patients in the series	81	82
Age range in years	13-75	13- 70
Male to female ratio	1.25:1	1.6:1
History of antecedent events	47 (58%)	36 (43.9%)
Positive vaccination history	3 (3.7%)	15 (18.3%)
Cranial nerve involvement	33.3%	28%
Dysautonomia	30.9%	31.7%
HIV sero-positivity among tested cases	19/27(70.4%)	4/27(14.8%)
GBS subtypes: - Demyelinating - Axonal - Mixed - Miller Fisher - Normal	 26(55.3%) 9(19.1%) 12(25.5%) 0 0	 11 (34.4%) 19 (62.5%) 0 1(3.1%) 1(3.1%)
CSF analysis done	85.2%	70.7%
Albumino-cytologic dissociation in those LP was done	62.35%	77.6%
IV immunoglobulin given	5/81(6.2%)	15/82(18.3%)
MV requirement	23/81(28.4%)	28/82 (34.1%)
MV use	none	22 (26.8%)
Outcome at discharge: - Died - Partial or complete recovery - discharged in same condition	 21/81(25.9%) 52/81(64.2%) 8/81(9.8%)	 9(11%) 62(75.6%) 9(11%)

MV-mechanical ventilator; CSF- cerebrospinal fluid; IVIG-intravenous immunoglobulin; NCS- nerve conduction Study; EMG- electromyography

DISCUSSION

Our study revealed occurrence of GBS at young age with male predominance (62.2 %); 43.9% antecedent events and 11.0% in hospital mortality rate. Furthermore; almost 90.0% of the GBS patients in our study presented with weakness that affected nearly 90.0% of the limbs and almost 80.0% of these patients showed an albumino-cytological dissociation and mortality was higher in the patients with respiratory failure, dysautonomia; respiratory failure being an independent predictor of mortality. The mortality rate of this current study is way better than the study done by Zenebe et al 10 years before in the same setting[17]. This may be due to the presence of more number of neurologists as well as neurology specialty and sub-specialty program in the study hospital obviously improving the patient care. The finding of a lower age at presentation in our study is consistent with published studies from SSA that have shown a young age of the population[16,18,19] compared to studies from developed countries. In a recent retrospective analysis of 156 patients with GBS in Saudi Arabia, at least half of these patients were young aged below 39 years and nearly 62.0% were male[5]. Similarly, the recent Hospital Quality Monitoring System (HQMS), a multi-institutional data analysis of 38,861 patients with GBS in China also found a male predominance in GBS patients[7]. The male age predominance in this study is in contrast to a study from Nigeria which revealed an equal male to female distribution[18].

This present study demonstrated antecedent events in 43.9% which is higher than reported in previous studies from Tanzania (12) 32.2% but lower than reported in other studies conducted in Indian (48%) and (55.0 %) (18, 19) were reported. In a study conducted in Burkina Faso[11], at least 84.0% had antecedent events. The prevalence of antecedent events (43.9%) was lower than what was reports a decade ago from the same hospital by Zenebe et al, 58.0 %[17].

In this present study, there were non-negligible number of cases, 15(18.3%), with prior history of vaccination; 14 cases with anti-rabies vaccine and one case with influenza vaccine. This is higher compared to that reported 10 years ago, 3.7%, in the same set up[17]. This could be attributed to use of sheep brain anti-rabies vaccine which is less immunogenic but has a higher incidence of neuroparalytic complication[20]. There are many case reports of GBS and similar demyelinating encephalitis following sheep brain rabies vaccine[20,21,22,23] which is in agreement with the finding of this current study.

In this present study, the initial presentation in the majority was extremity weakness, only few patients mentioned sensory symptoms as their initial presentation and this could be due to the fact that patients in this part of the world present late and complain only their serious disabilities, undermining the less severe symptoms. Like in the other studies, quadriparesis predominates than paraparesis as demonstrated by findings from the previous Ethiopian[17] and the Indian[24] studies. However, a study from Nigeria has shown that both quadriparesis and paraparesis were comparable in distribution[18].

Cranial nerve involvement was seen in 23 (28.0%) cases which was lower than reported from; India 62.5%[24,25]. In all of these studies, facial nerve affection predominated. But in the Burkina Faso study the overall facial nerve involvement was only 9.4%[11]. Bulbar palsy in our study was 47.4% which was much higher than reported from the previous Ethiopian[17]. Nigerian[18] and Indian[26] studies.

The ascending pattern of weakness in our study was slightly higher than reported a decade ago from the same hospital[17]. In this present study, only 50% of the cases had areflexia unlike the findings in the Indian[24] and the previous Ethiopian study which were 100%.[20] A significant number, 34 (41.5%) cases, had depressed DTR (Deep Tendon Reflexes) and there were 7 (8.5%) cases with normal DTR. The Nigerian study also reported normal DTR findings in 5.9% of the 34 cases[27]. Signs of autonomic dysfunction were seen in 31.7% of cases which is in line with most studies in developing countries like in the Burkina

Faso (28%)[11] and the previous Ethiopian (30.9%)[17] studies. In the Indian study[25], autonomic dysfunction was seen in 16% of cases; on the contrary, in the Nigerians it was as high as 64.5%[18].

In this present study, among 58 cases who had CSF analysis 51 (87.9%) had cell count of 0 to 5 cell/mm^3. Ten percent of the cases had CSF cell count between 5 to 50 cells/mm^3. Albumino-cytologic dissociation was seen in 77.6% of the cases which is comparable to the study done in Burkina Faso which accounted for 75% of the cases[11] and in one of the Nigerian studies[27] which was 73.5%. It is lower than reported by Sunmonu *et. al.* from the other study in Nigeria (56)[18]; and it accounted for about two third of the cases in studies done India (65.4%)[24], and the Netherlands (62.3%)[28].

In this present study the most common lesion identified by NCS is axonal, 20 (62.5%) of the 32 patients with NCS, which is similar to the Sudanese (76.0%) study[19]. But in the study done in our setup a decade ago, the commonest electrophysiologic finding was demyelinating lesion (55.3%) while the axonal accounted for only 19.1% of the cases[17].

In our study a total of 15 (18.3%) cases received IVIG which is a very small proportion compared to the study done in India (35.0%)[24]. This could be due to the fact that most of the patients in this setup do not afford to buy the drug. There was no patient given plasma exchange or steroid therapy. During the time of the study the treatment modality was mainly supportive. IV immunoglobulin was not available in the state hospitals. Therefore, only those patients who were able to buy the treatment by their own from private pharmacies were getting the treatment. In addition, most patients referred from countryside, come very late and also could not afford to buy the medication. Plasmapheresis was not available at all. This situation may have affected the outcome negatively including, increased mortality rate from acute complications, prolongation of time to recovery, or development of long-term complications.

However, in the study done in India, 10.0% of the cases received plasma exchange[24] and in a Nigerian series[27] oral prednisolone was given and the patients' improvements were attributed to the steroid treatment.

Our study found an 11.0% mortality rate which was higher in those with respiratory failure, the mechanically ventilated and those with dysautonomia. The mortality rate in our study was higher than reported in developed countries like Norway (1.8%)[12], and Leicester, UK (4.0%)[29], but it was comparable with the findings of two studies from India and another from Kenya[30] which reported deaths rates of 10.4%, 8.3% and 9% respectively. In a recent study in Burkina Faso, Anselme *et al.* found a 14.3% mortality rate among patients with GBS and this was attributed to the severe nature of the disease[31]. The high mortality among patients on MV could be mainly due to the severity of the disease itself in those who required mechanical ventilation; in addition, there could be some delay to put them on MV because of lack of early detection of those who deserve it and the limited number of mechanical ventilators in TASH during the study period. Therefore, the lack of adequate mechanical ventilator, lack of early Spirometry measurements and the severe nature of the disease could be among the major reasons for the increased mortality of ventilated patients.

Limitation of the study

Documentations were not complete enough to get all the necessary information; Even the available information were not put in an orderly manner because each patient was being managed by several physicians of different level with their own documentation style.

Most patients were lost for their follow up and therefore, their final outcome after discharge was not documented and analyzed. This study is retrospective in nature and from a single hospital.

CONCLUSION

Clinical profile of GBS patients was similar to what was reported from the same hospital over a decade ago. However, there was much better outcome evidenced by lower mortality rate than what was reported then. Respiratory failure and dysautonomia were the major predictors of mortality. Proper monitoring of the need for respiratory support, early mechanical ventilator support and treatment of complications is recommended to improve treatment outcome of patients. This study demonstrated significant number of post rabies vaccine cases.

Recommendation

Efforts to improve documentation for future studies is recommended. The finding of the study has to be shared to the health professionals and the policy makers to minimize the number of lost to follow up. Future multi-regional research is also recommended to find out the geographical distribution as well as seasonal variation of the disease. It is strongly recommended to revise the available anti-rabies vaccine as WHO does not recommend the production and use of nerve tissue vaccine because of the neurologic complications including post rabies vaccine GBS. There is an urgent need to maintain regular availability of the standard treatment (IVIG and or Plasmapheresis) to improve the outcome of GBS patients. Neurology service and management of acutely ill patients has to be expanded to the different regions of the country for the improved outcome of such disease.

Competing interest.

The listed authors declare no competing interest. The research for this study was done in partial fulfillment of the requirements for sub-specialty degree in Clinical Neurology at Addis Ababa University College of Health Sciences, Ethiopia.

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Ethics approval

The local hospital and ethics committee approved the study.

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