American Journal of Nursing and Health Sciences
2022; 3(3): 73-83
http://www.sciencepublishinggroup.com/j/ajnhs
doi: 10.11648/j.ajnhs.20220303.15

Assessing the Predictors and Outcomes of Guillain-Barré Syndrome at St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia

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To cite this article:

Wubakal Teshome, Tesfaye Dagne, Tsegaye Getachew. Assessing the Predictors and Outcomes of Guillain-Barré Syndrome at St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia. *American Journal of Nursing and Health Sciences*. Vol. 3, No. 3, 2022, pp. 73-83.
doi: 10.11648/j.ajnhs.20220303.15

Received: September 5, 2022; **Accepted**: September 16, 2022; **Published**: September 29, 2022

Abstract: Guillain–Barré Syndrome (GBS) is the most frequent cause of acute flaccid paralysis worldwide and constitute one of serious emergencies in neurology. In Ethiopia there is high prevalence of infectious disease influencing the prevalence as well as the subsequent outcome of GBS where there is significant constrain in the availability of critical care, rehabilitation and social service. So, the objective of this study is assessing predictors and outcomes of Guillain-Barré Syndrome. Retrospective cross sectional study was used and all patients who fulfill the inclusion criteria's for GBS in the 7 years period were included. The organized data was interpreted using descriptive methods in the form of tables, charts, and graphs in the SPSS version 20 and Excel software. Binary logistic regression analysis was used to assess the association between exposure variables and outcome of GBS. And univariate analysis performed to screen out potentially significant independent variables to be included in the multivariable binary logistic regression. The most common presenting symptoms were muscle weakness (91), respiratory muscle involvement (32) and Cranial Nerve involvement (27). HIV (40.64%) and DM (31.25%) were important comorbid illness. Cranial nerve palsies, respiratory compromise, disability score, need of mechanical ventilation, HIV and DM were significantly associated with worse outcome. Common GBS variants identified were AMAN (36%) and AIDP (30%), AMAN type were associated with unfortunate outcome. GBS-specific therapy was administered in 43.96% patients and having appropriate treatment had lower incidence of poor outcome. Generally, this study showed 60% of patients had good outcome (GDS $\leq$ 2) and 40% of bad outcome (GDS > 2). Digitization of medical recording evaluation report using a software based template would help to improve the completeness of each patient report and awareness of predictors of GBS outcome and being perceptive for alarming features will help allocate resource in keen manner in our resource restricted setting. Having GBS specific treatments available in affordable and accessible manner will inflict significant light in the prognosis of GBS patients. It would be better to conduct further studies on Concordance between molecular tests, anti-body, sequential electro-diagnostic tests and availability of physiotherapy to have better model that predict outcome of GBS.

Keywords: GBS Disability Score, Guillain–Barré Syndrome, Outcome, Predictors

1. Introduction

Guillain–Barré Syndrome, which is characterized by acute areflexic paralysis with albuminocytologic dissociation (i.e., high levels of protein in the cerebrospinal fluid and normal cell counts), was described in 1916 [1]. Since poliomyelitis has nearly been eliminated, the Guillain–Barrés syndrome is currently the most frequent cause of acute flaccid paralysis worldwide and constitutes one of the serious emergencies in neurology. A common misconception is that the Guillain–Barrés Syndrome has a good prognosis but up to 20% of patients remain severely disabled and approximately 5% die, despite immunotherapy [2].

The reported incidence of the Guillain–Barré Syndrome (GBS) in Western countries ranges from 0.89 to 1.89 cases (median, 1.11) per 100,000 person per year, although an increase of 20% is seen with every 10-year rise in age after the first decade of life. The ratio of men to women with the syndrome is 1.78 (95% confidence interval, 1.36 to 2.33) [3].

Although the etiology of GBS is not totally understood, infection-induced aberrant immune response including molecular mimicry and formation of cross reacting antibodies has been implicated in the immunopathogenesis of GBS. Approximately 70% of cases of GBS occur 1–3 weeks after an acute infectious process commonly due to Campylobacter jejuni (diarrhea), Mycoplasma pneumonia, Haemophilus influenzae, cytomegalovirus, Epstein-Barr virus and, influenza [4, 5]. The underlying etiology and pathophysiology of GBS are not completely understood but it is thought to be an immune-mediated process, leading to demyelination, axonal damage or both. This immune response is thought to be initiated in response to a variety of antigenic stimuli, such as viral or bacterial infection, particularly Campylobacter jejuni [6]. Approximately two thirds of GBS cases are preceded by an infection. Possible triggers are infections including bacteria (e.g. campylobacter jejuni) and viruses (e.g. dengue, chikungunya, cytomegalovirus, human immunodeficiency virus (HIV)). [7] GBS also have been reported associated with viral out breaks in different time and place in the world. As of June 16th 2016, in the context of Zika virus circulation, 13 countries and territories worldwide have reported an increased incidence of Guillain-Barré syndrome (GBS) and/or laboratory confirmation of Zika virus infection in people with GBS cases [8]. Vaccines are another antigenic stimulus for which potential associations with GBS have been reported, including formulations of rabies vaccine, tetanus toxoid vaccine, and some formulations of influenza vaccine. Many reports have documented the occurrence of GBS shortly after vaccinations, operations, or stressful events, but the specific relation with GBS is still debated [9]. However, in a recent US report on vaccinations and their side-effects, not only influenza vaccinations but also hepatitis vaccinations were suggested to be associated with the occurrence of GBS [10].

Clinical manifestations of GBS can vary but Typical clinical features of GBS are progressive, symmetrical muscle weakness associated with absent or depressed deep tendon reflexes. By definition, maximum weakness is reached within 4 weeks, but most patients have already reached their maximum weakness within 2 weeks [11, 12]. The weakness is very variable ranging from mild difficulty in walking to complete paralysis of all four extremities, motor cranial weakness to life-threatening respiratory muscle weakness. The later develops in 10 to 25% of patients necessitating ventilator support [13].

Until now, GBS has remained a descriptive diagnosis of a disorder for which there are no specific diagnostic tests. The combination of rapidly progressive symmetrical weakness in the arms and legs with or without sensory disturbances, hypoflexia or areflexia, in the absence of a CSF cellular reaction, remains the hallmark for the clinical diagnosis of GBS [14]. The most common type of GBS 61% was Acute Inflammatory Demyelinating 'Polyneuropathy (AIDP) and the commonest predisposing factor was HIV/AIDS. AIDP is by far the most common form of GBS among Caucasians, accounting for 90% to 95% of all cases in Europe, North America, and Australia. Despite significant advances over the past two decades, the pathogenesis of the various GBS subtypes is not understood. Why some develop AIDP while others develop AMAN despite C. jejuni infection being commonly antecedent to both is far from clear. Racial predisposition may be a factor [2]. The current study also revealed that most of the patients with GBS managed in the department of internal medicine at University Teaching Hospital, Lusaka, Zambia AIDP was the commonest type of GBS by nerve conduction study. In contrary Acute Motor Axonal Neuropathy (AMAN) and Acute Motor Sensory Axonal Neuropathy (AMSAN) subtypes constitute 30–40% of cases in Asia and South America [15].

In a typical patient with GBS, the diagnosis is usually straightforward. But the diagnosis of GBS can be difficult, particularly with asymmetric weakness, in those with weakness initially only in the arms, in patients with rapidly progressive deterioration in pulmonary function with relative preservation of muscle force in the extremities, and in patients with prominent pain or autonomic dysfunction as the presenting symptom [10].

Nerve-conduction studies help to confirm the presence, pattern, and severity of neuropathy. These studies are essential for research, given specific criteria for categorizing the diagnosis, but nerve-conduction studies are not obligatory for the recently proposed Brighton criteria for diagnosis, which were developed for use in resource-poor environments [16]. Albuminocytologic dissociation is present in no more than 50% of patients with the Guillain–Barré syndrome during the first week of illness, although this percentage increases to 75% in the third week [17].

2. Methodology

2.1. Study Area

The study was conducted in Addis Ababa which is the capital and largest city of Ethiopia. According to the 2007 population census, the city has a total population of 116,527,002. In this study two hospitals from Addis Ababa was selected due the following reasons, Namely Zewditu Memorial Hospital and SPHMMC. Zewditu Memorial Hospital is the hospital at center of Addis Ababa Ethiopia, it was built, Owned and operated by Seventh day Adventist church but nationalized about 1976, the hospital named after Empress Zewditu. Today the hospital is operated By Ministry of Health. Zewditu Hospital is one of the hospital in the treatment Neurologic cases referred to due to its Neurology OPDs, Neurologists and Physiotherapists Specialties in it.

The Study also, conducted in Saint Paul Hospital

millennium medical college, which is second main government owned referral center. It currently has 700 beds, with an annual average of 200,000 patients and a catchment population of more than 5 million. In the Department of internal medicine there are around 35-40 senior specialty among which 3 are neurologists and physiotherapist, 80-90 residents and 20-25 interns expected to be working at the Hospital providing the community with different preventive, curative and rehabilitative services.

2.2. Study Period and Study Design

The study period set for this research conducted is from March to October 2021. This period was used to collect data, analyze and produce the last research draft.

Retrospective cross sectional; the medical records of all patients admitted with the diagnosis of GBS to the Department of Internal Medicine, in SPHMMC and ZMH, from August 2014 to August 2021 was reviewed. The medical report of registered records in medical wards, and ICU registration books was reviewed to trace all cases.

2.3. Populations

2.3.1. Source Populations

All patients admitted with the diagnosis acute flaccid paralysis to the Department of Internal Medicine of the two hospitals during the 7 years period.

2.3.2. Study Population

All patients admitted with the diagnosis of GBS out of other cause of acute flaccid paralysis patients to the Department of Internal Medicine of the two Hospitals during the 7 year period and who fulfill the inclusion criteria.

2.4. Inclusion and Exclusion Criteria

2.4.1. Inclusion Criteria

1) All patients fulfilling the diagnostic criteria for GBS of the National Institute of Neurological Disorders and Stroke (NINDS).
2) Subjects included both sex who were >14 years of age.

2.4.2. Exclusion Criteria

1) Patient who had previous diagnosis of peripheral nerve disease.
2) Patient who had relapse case of GBS.
3) Those patients with incomplete recordings.
4) Those patients self-discharged or referred to other health centers.

2.5. Sampling Technique and Sample Size

All charts of patients admitted with the diagnosis of GBS to the Department of Internal Medicine at SPHMMC and ZMH from August 2014 to August 2021 was reviewed. The reason two Hospitals was selected is the fact that they are referral centers for neurology cases due to the availability of fair amount of Neurologist as well as for presence of adequate physiotherapy center and Equipped ICU for need of mechanical ventilation.

2.6. Study Variables

2.6.1. Dependent Variable

Outcomes of GBS.

2.6.2. Independent Variables

1) *Socio demographic variables*; age, sex and place of residence.
2) *Disease related variables*; Type of GBS on NCS, time to maximal weakness and GDS clinical features at presentation, Duration Of Hospital Stay, comorbid illness.
3) *Preceding event*; HIV seropositive, respiratory tract infections, Gastroenteritis, Rabbis vaccine and other febrile illness.
4) *Medication related variables*; Treatment applied, availability of ventilation support and tracheostomy.

2.7. Operational Definitions

National Institute of Neurological and Communicative Disorders and Stroke (NNCDS) diagnostic criteria [11]:

1) Progressive weakness of more than one limb due to neuropathy.
2) Areflexia or hyporeflexia.
3) Duration of progress less than 4 weeks.
4) The absence of a sharp sensory level on the trunk.
5) The absence of other causes of acute neuropathy.
6) Less than 50 mononuclear leukocytes per mm^3 in cerebral spinal fluid.

Outcome was defined as the patients' disability upon discharge using Hughes functional grading. Those, grades 0-2 was considered as good outcome and more than 2 bad outcome [18].

Hughes Scale (GBS Disability score)

0- Healthy

1- Minor symptoms or signs of neuropathy but capable of manual work/capable of running

2- Able to walk without support of a stick (5m across an open space) but incapable of manual work/running

3- Able to walk with a stick, appliance or support (5m across an open space)

4- Confined to bed or chair bound

5- Requiring assisted ventilation (for any part of the day or night)

6- Death

2.8. Data Collection Instrument

Data was collected using structured questionnaire which was adapted from reviewing published studies [19 - 21] with some modification to ensure applicability to our current study, credibility and quality. The questionnaire consists of socio-demographic factors, history of antecedent events and medication use, disease conditions, clinical features, treatment received outcome of the patients and additional remarks on patient progress.

2.9. Data Quality Control

Each paper was checked for completeness using format prepared by reviewing different literatures and undertaking modifications for the population studied. Data collectors were trained and data was collected by the trained internes and supervised by the principal investigator. The questionnaires was pre-tested on 5% of the study population. Which is not part of the study. At time of data collection filled questionnaires was checked for completeness and consistency of information by the data collector and PI on daily basis. Any ambiguity and other problems of data collectors was addressed. The template was internal consistency checks. The study was done as per the ethical code of conduct.

2.10. Data Processing and Analysis

The methodologies employed to analyze the data were descriptive and quantitative statistics. Thus, the organized data were interpreted using descriptive methods in the form of tables, charts, and graphs in the SPSS version 20 and Excel software. Binary logistic regression model was used to assess the association between exposure variables and outcome of GBS and univariate analysis performed to screen out potentially significant independent variables to be included in the multivariable binary logistic regression model. The adequacy of the final model was checked using the Hosmer and Lemeshow goodness of fit test. Then various graphs were plotted to inspect the nature of relationship between the dependent and independent variables. Finally the findings were discussed and conclusions and recommendations forwarded.

3. Results

This chapter focus on the analysis of predictors and outcomes of Guillain-Barre Syndrome using Excel and developed correlations and regression models using SPSS software. And also, presents data in the form of Tables, Pi chart and Graphs. A good outcome is defined as the ability to ambulate without assistance (GBS disability score ≤2); a poor outcome, as the inability to ambulate independently (GBS disability score ≥3), including death with GDS of 6.

3.1. Demographic Characteristics of the Study

Of the 91 cases analyzed, 57.1% were males and the rest 42.9% were female. The median age at presentation was 34 (SD12.8) and as shown in the figure 2, the age group 25-60 years are responsible for the larger number of cases which accounts 75.82% of patients and only 4.4% were ≥60 year of age group. Majority of the patients in this study came from Addis Ababa and Oromia, 52 and 26 patients respectively. In this study females had 2.4 odds of having poor outcome than males (CI: 1.00-5.74). In addition, as age increases the likelihood of subsequent poor outcome also increased (OD= 2.87, P=.045).

Table 1. *Frequency Distribution of Sex and Age St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

Sex	Frequency	Percent	Age Range	Frequency	Percent
Male	52	57.1	15-24	18	19.8
Female	39	42.9	25-60	69	75.8
Total	91	100.0	> 60	4	4.4
			Total	91	100.0

3.2. Predictors and Outcomes of GBS Among Patients

When we look for the preceding events that occurred before clinical features of GBS which was documented in 72 of all cases, Gastroenteritis (39) was the most common followed by Upper Respiratory Tract (28) and Rabies Vaccine was found only in 5 cases while in 17 of the patients no triggering factor was found. In this study there was no significant association between the antecedent's infection as well as preceding vaccination with poor outcome.

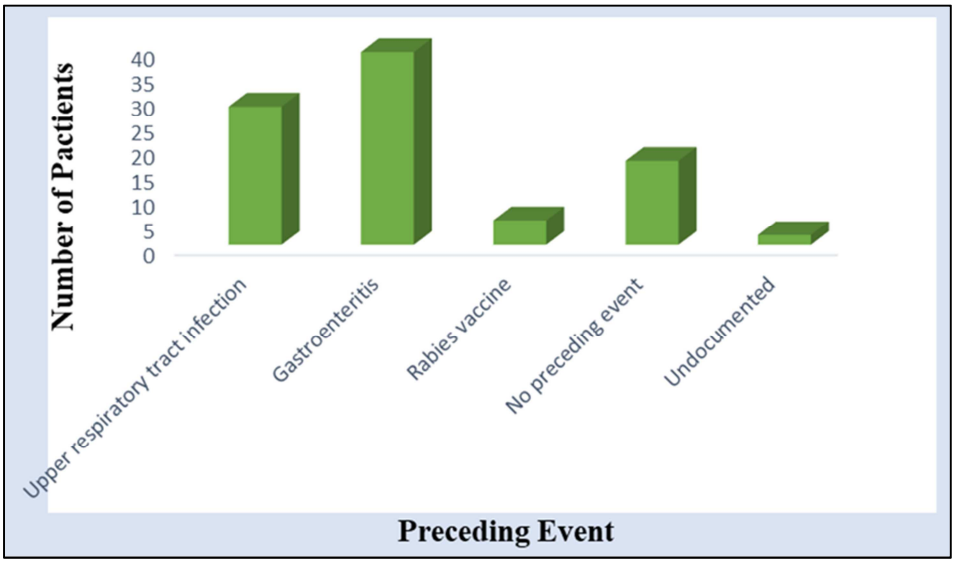

Figure 1. *Preceding Events of GBS at St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

3.3. Clinical Features

The mean time from onset of symptoms to hospital admission was 7 days (SD 3.6) the most common presenting symptoms were muscle weakness and respiratory muscle involvement that was shown in 91 and 32 of cases respectively. The weakness was ascending type in majority of patients (89%) and only 4% of patient present with nonspecific pattern. The average interval from onset to nadir of the weakness was (7.6). As table 3 shows, days to nadir of weakness and respiratory muscle involvement (shortness of Breath) were less likely to show significant improvement while pattern of weakness as well as voiding difficulty didn't have prognostic significance.

Cranial Nerve involvement was found in 27 patients, of which 20 had Facial Nerve Palsy and 7 of them had Multicranial Nerve involvement. Sensory involvement, Sphincter Dysfunction and Hyperestesia were not commonly seen in this study. Autonomic Dysfunction was recorded in 9 cases predominantly affecting Blood pressure and heart rate. Of 32 patients who had difficulty in breathing at admission, 15 of the patients needed mechanical ventilation and 8 needed tracheostomy. The median duration of ICU stay was 7 days. In this study, Facial Nerve Palsy or other cranial nerve palsies and need of mechanical ventilation were associated significantly with longer duration of ICU and poor outcome at discharge. In this study highly significant increase in disability score was found in the poor outcome group (OR = 13.069). Over all duration of hospital stay described by range as seen in the figure 5, most patient stayed less than 14 days (37) and 32 cases remained in the range of 15-30 days while 11 patients had ≥46 days.

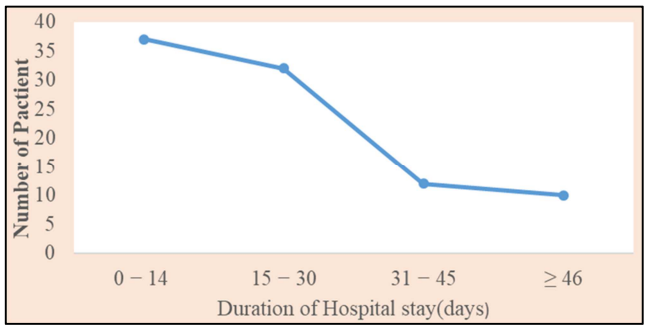

Figure 2. *Duration of Hospital stay (days) at St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

Among GBS patients 35.16% had History of Chronic Medical Illness. From the known comorbid factors, HIV/AIDS (40.64%) was the most common followed by Diabetes (31.25%) and Hypertension (18.75%) as shown in the figure below. out of these HIV and DM were important comorbid illness that were significantly associated with worse outcome in current study.

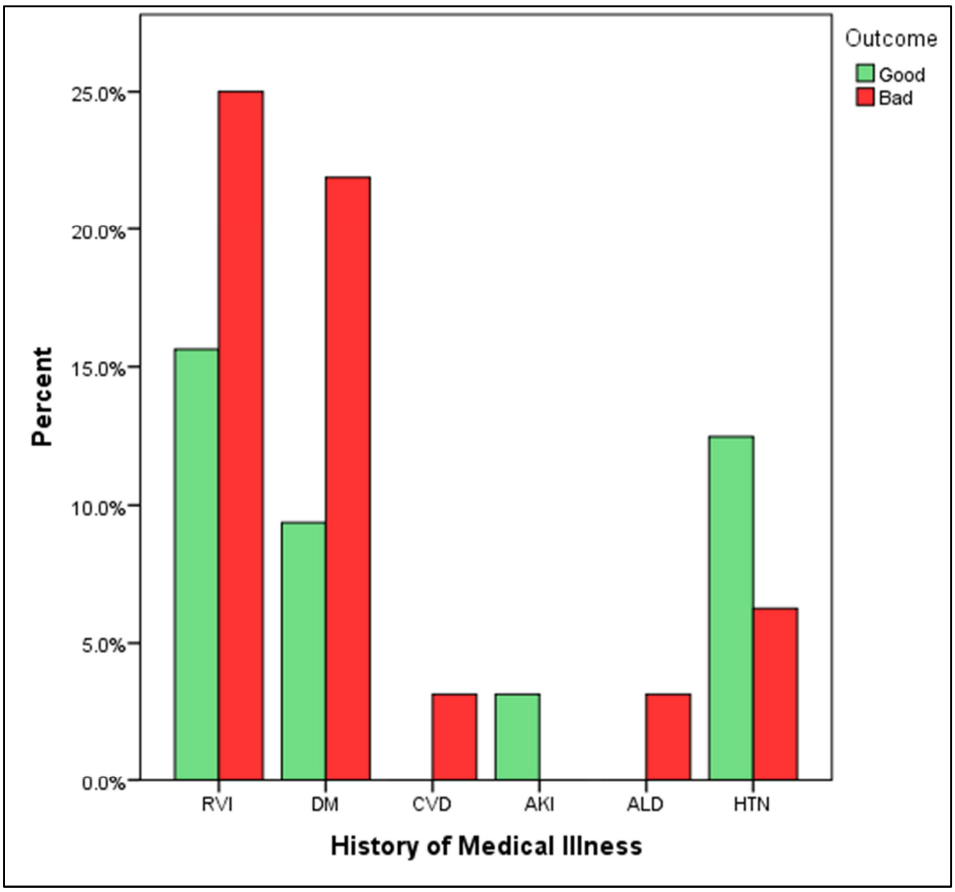

Figure 3. *History of Medical Illness, St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

Table 2. *Descriptive Statistics of Clinical Feature at St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

Description	Range	Minimum	Maximum	Mean	Std. Deviation
Age	53	15	68	35.76	12.803
Days to max weakness	14	2	16	7.66	3.643
Need of MV	35	0	35	5.23	7.864
Tracheostomy	21	0	21	.98	3.697
Duration of ICU	45	0	45	10.48	12.407
GDS Desability Score	4	2	6	4.42	.731
Duration of Hospital	3	1	4	1.96	1.010
Valid N (listwise)	91				

3.4. Laboratory and Electrophysiological Study Findings

According to the figure presented below CSF analysis was performed in 68% patients and "cytoalbuminological dissociation" was observed in 65% of patients though in 32% of patients CSF analysis was not available. Patient who undergone lumbar puncture and CSF analysis with "cytoalbuminological dissociation" presence were having worse out come at discharge (OR =4.043, P=.004) While serum Na level at admission were not having prognostic value.

As the figure 7, Eighty Five of the patients had their sodium level determined, of which 47.26% patients had hyponatremia in the range of 121-135 meq/l and 3.29% had sever hyponatremia of ≤120 meq/l while the other 3.29% had hypernatremia at presentation.

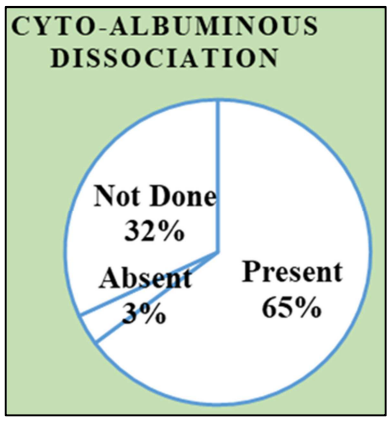

Figure 4. *Cyto-Albuminous Dissociation, St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

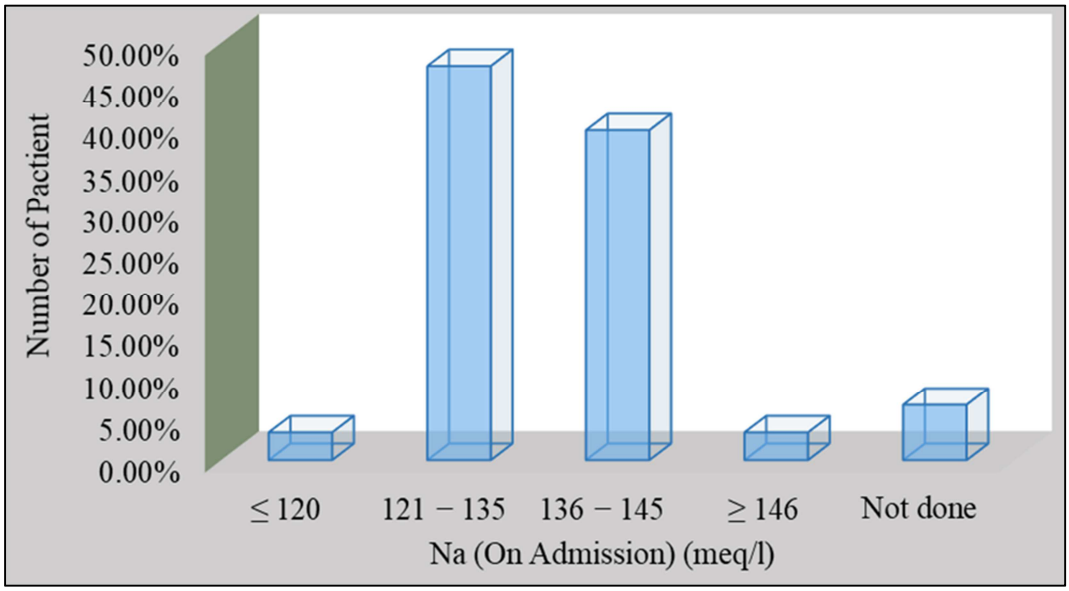

Figure 5. *Na (on admission) (meq/l) St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

Common GBS variants according to nerve conduction studies were AMAN (36%) and AIDP (30%) and the least being mixed axonal and demyelinating type which is only 1% of cases. However the nerve conduction studies of 16% patients were unknown. As shown in the figure below, among the electrophysiological subtypes of GBS, AMAN type were associated with unfortunate outcome.

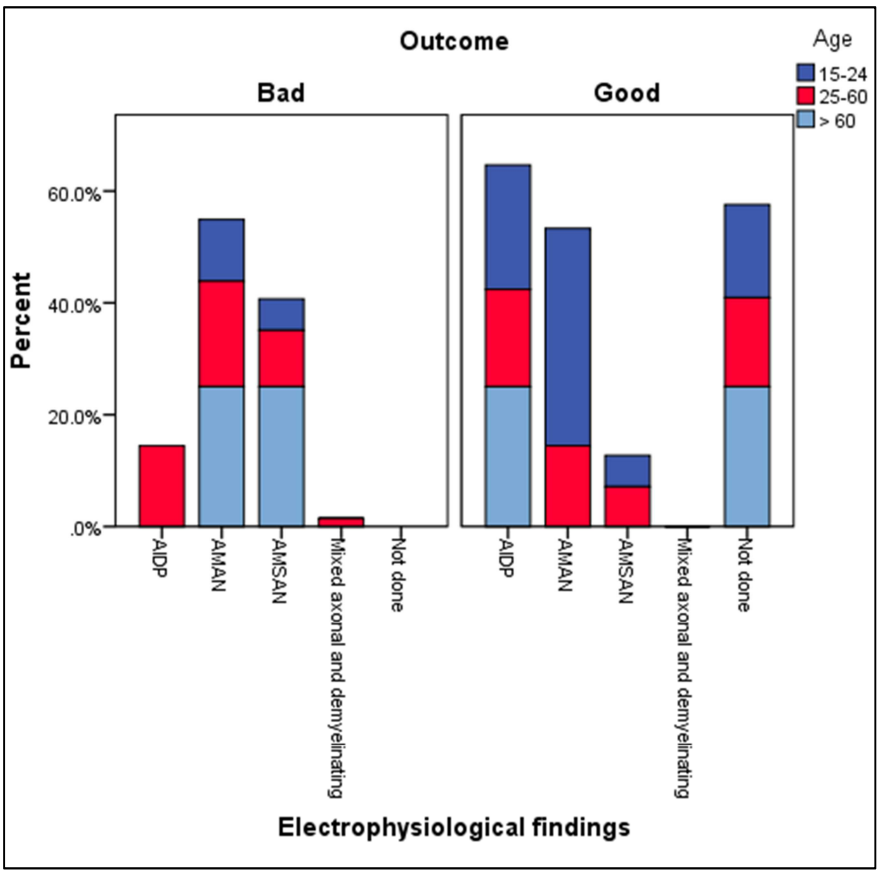

Figure 6. *Electrophysiological, Age and Outcomes Relationships, St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

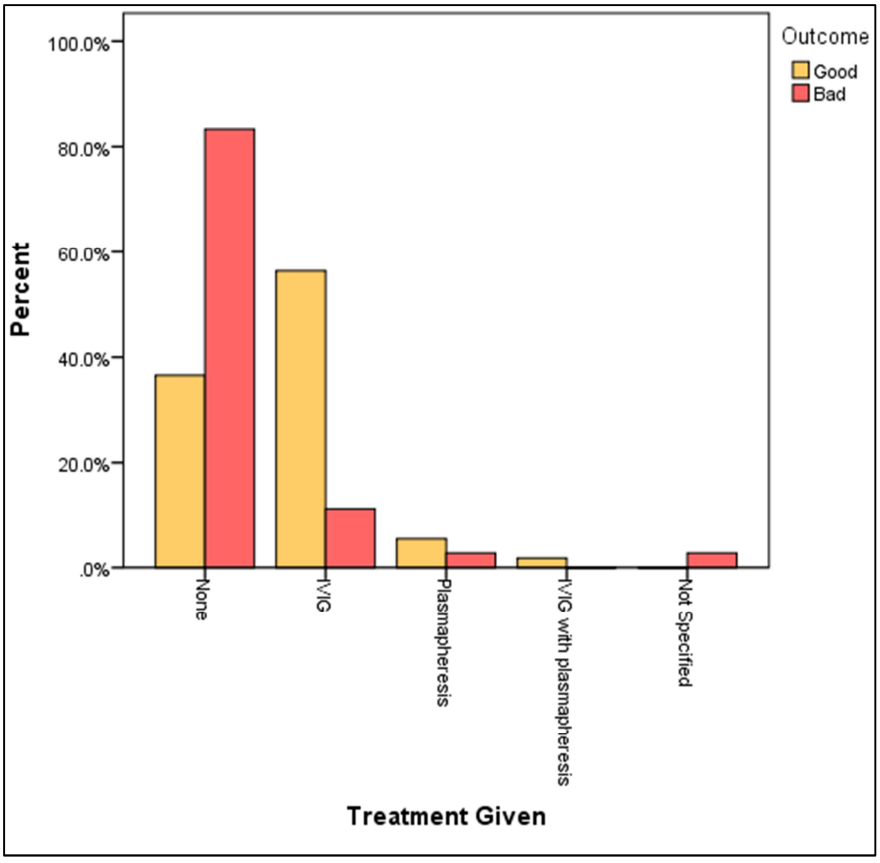

Figure 7. *Treatment Given, St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

3.5. Therapy / Treatment Given

GBS-specific therapy was administered in 43.96% patients of all GBs cases as shown in figure 7. The majority of these patients 38.47% had intravenous immunoglobulin (IVIg), and the remaining had plasmapheresis and both plasmapheresis and IVIg in 4.40% and 1.09% respectively. Despite the fact that majority of the patients (54.95%) were not provided with treatment in 1.09% patient the treatment given were not clearly specified. As table 3 shows, those having appropriate treatment had lower incidence of poor outcome (OR =0.086, P=0.001). At discharge, 60% of patients were able to walk without support but incapable of manual work/running. Among 40% who had bad outcome, 31% died, 8.79% Patients were bedridden, and 60% had significant disabilities requiring support for ambulation. The common imminent cause of death among the study population were mentioned as GBS related respiratory failure, autonomic dysfunction, and ventilator associated pneumonia.

Table 3. *Multivariable binary regression analysis of main predictors of poor outcome at St. Paul's and Zewditu Hospitals in Addis Ababa, Ethiopia.*

Main Predictors	Bad Outcome (N)	Good Outcome (N)	B	P-Value	Odds Ratio [Exp. (B)]	95% C. I. for Exp. (B)	
						Lower	Upper
Sex (Female)	19	20	3.204	.049	2.400	1.003	5.745
Age ≥25	33	40	1.567	.045	2.866	1.022	8.037
HMI (RVI)	8	5	1.688	.031	3.953	1.131	13.816
HMI (DM)	7	3	-5.178	.019	5.765	1.332	24.951
DMW ≤ 7 day	28	18	.008	.000	.767	.662	.889
NMV	30	18	.401	.001	1.128	1.049	1.212
DOI >14	17	11	-.093	.001	1.071	1.030	1.114
GDS>4	31	15	3.163	.000	13.069	4.435	38.514
EPF (AMAN)	16	17	-1.942	.157	2.550	1.698	9.311
CAD (Present)	22	37	1.653	.004	4.043	1.582	10.330
MCN	6	1	-1.532	.031	10.800	1.241	93.980
FNP	20	2	4.184	.000	26.500	5.593	125.561
SOB	27	5	9.509	.000	30.000	9.134	98.535
TG (Not Given)	30	20	-2.453	0.001	0.086	0.026	0.281

Predicted probability is of membership for bad outcome.

As seen in the Table 3, the study confirms that the poor outcome is associated with main predictors identified in the study which are explained in detail in the result and discussion.

4. Discussions

This study shows slight male predominance with male to female ratio of 1.3:1. The predominance of GBS in men is consistent with those in previous regional and global studies [22-23]. Outcome from this study indicate 60% of patient were able to walk without support but incapable of manual work/running. Among 40% who had bad outcome, 31% died, 8.79% Patients were bedridden, and 60% had significant disabilities requiring support for ambulation. In the Pakistani population, mortality rate in the acute disease phase was 7.9% [24], previous national study done at Tikur Anbessa University Hospital showed GBS mortality was 25.9% and in WHO report in 2018 GBS mortality even in the best setup reach 5%. The higher mortality observed in this study as well as previous national study could be due to lack of resource for critical care of patients as well as geographical variations may be influenced by endemic infections.

In the study, the presence of diarrhea or other preceding events before the onset of weakness was not statistically significant associated with GBS outcome. However, there has been some debate as to whether preceding infection especially diarrheal infection is a predictor of poor outcome in GBS which was seen in several studies [18, 5]. There were also other reports that contradict this findings [25]. The difference could be in the fact that, not just the presence of diarrhea but the causative organism can also influence the disease severity which is not specifically mentioned in most of the studies. This could be due to the absence of aggressive microbiologic work up for the diarrhea as well as the temporal relation between the weakness and the preceding infection is variable affecting the result of the investigations.

HIV infection were seen as preceding infection in most other studies as well as predictor of disease severity which is strengthened by this study as well [26]. Since Cell-mediated immunity is known to play an important role in the pathogenesis of GBS, it is seen in acute phase of HIV where the there is no profound immunosuppression. This association may even be more than this because in the study, not all patient were screened for HIV due to temporal unavailability of the test. The worse out come in this patients may be because of HIV itself has the tendency to cause inflammatory response that leads to neuronal damage which will have additive effect in nerve damage caused by GBS. Diabetic patients had shown worse clinical course from the study and this association was also observed in previous studies suggesting that DM exacerbates the clinical and electrophysiological features of GBS [5]. The effect of diabetes can be explained by chronic inflammation and nerve ischemia coexisting with peripheral neuropathy in DM that

may potentiate nerve damage in the course of GBS.

Cranial nerve involvement was found in 40 patients (43.96%) and the most cranial nerve involved was facial nerve which was 50% in this study, Facial nerve involvement had significant association with poor outcome (OR = 26.5). Most other reports also indicate cranial nerve involvement ranging from 30-60% with facial and bulbar nerves being commonly involved and about 15%–20% of GBS cases who require mechanical ventilation were noted to have preceding facial weakness [27].

GBS induced dysautonomia includes blood pressure fluctuations, diaphoresis, GI motility dysregulation, and cardiac arrhythmias [28]. Autonomic dysfunction mostly presenting as Heart rate and blood pressure fluctuations was seen in 9.9% of our patients but demonstrated likelihood of having bad outcome was not significant. This may be because, most Autonomic changes rarely persist in a patient with GBS and are transient but some patients had Cardiac arrest from the incidence of autonomic dysfunction. Therefore, it is important to recognize the symptoms of dysautonomia immediately, monitor its course closely, and be vigilant about the risk of sudden and life-threatening cardiac arrest [29].

In this study, voiding difficulty was 5.5% (SD 0.23) but unlike other studies Initial voiding difficulty was not related with poor prognostic factor. A study done on early predictor of GBS showed strong association of voiding difficulty with poor outcome, this implicating severe involvement of sacral roots which is associated with difficulty in urination and walking. [30-31]. Most Patients with initial voiding difficulty presented with initial higher GBS disability scale in these studies due to shared mechanism of urination and walking; so the confounding severity of the weakness may be the reason for association with poor outcome.

In contemporary study, need to mechanical ventilation and duration of ICU stay were both significantly associated with poor out come with odds ratio of 1.128 (CI: 1.049-1.212) and 1.071 (CI; 1.03-1.11) respectively. Which was supported by similar studies [32], besides the major reason for mechanical ventilation was respiratory muscle weakness and inability to clear secretions. It is recommended that patients should be intubated if in respiratory distress or if there is difficulty in clearing secretions [33]. According to this study, the electrophysiological findings 33 (36.3%) of our cases had AMAN type GBS followed by AIDP in 29.67% of the patients. Similar national study had showed the commonest electrophysiological abnormality encountered was demyelinating picture in 26 (55.3%) followed by mixed and axonal in 12 (25.5%) and 9 (19.1%) respectively [34]. This is quite different from studies from other sites. In the Western part of the world, most patients with GBS had demyelination of both sensory and motor nerves (AIDP), which accounted for 80-90% of cases, whereas in China the axonal and AMSAN types of GBS were up to 65%. [35]. In this study, worse outcome were more expected with AMAN variant (OR 2.55, CI; 1.69-9.31). Correspondingly it was found in the study that peak disability was higher in AMAN group than AIDP. It also have been described to have a more rapid progression and higher frequency of ventilator dependence [36]. The severity seen with AMAN group may be due to the fact that it is distinguished by its selective involvement of motor nerves and by an electrophysiological pattern of axonal involvement than merely demyelination.

Apart from clinical symptoms, the finding of CSF albumin protein dissociation is one of the most important diagnostic features in GBS [9], likewise this study showed the presence of Cyto-albumin dissociation was significantly related to poor outcome (OR 4.04, P=.004). Higher CSF total protein levels are associated with severe and longer disease duration in other studies as well. Though the reason Is not fully clear it could probably results from two main mechanisms: release of myelin proteins from spinal nerve roots into the CSF due to inflammation and/or disruption of the blood–nerve barrier relating to severe nerve damage [37]. The present study found no significant association between serum sodium level and GBS outcome; in contrary some studies have shown Hyponatremia was related significantly to disease severity and poor outcome [3]. This variation from other studies may be due to serum sodium level determination time from admission is variable due to the inaccessibility of the investigation as well as financial constrain.

Our result showed providing GBS specific treatment to the patients significantly decrease the subsequent bad outcome (OR= 0.03), but most of our patient didn't receive the GBS specific treatment mostly because of financial inadequacy. Even in those treatment was given there is heterogeneity in time frame from onset of disease and availability of treatment to the patient which can create difference in the outcome since treatment is most effective when given soon after admission or disease onset. There is a significant difference in the provision of treatments between the patients who ended with poor outcome and good outcome. In similar study done in Saudi Arabia also showed IVIG was the treatment given to most cases who ended with good functional outcome (69.4%) [38, 15]. Studies have shown Physiotherapy had significant impact in recovery of patients and regaining functional abilities [39]. But in this study due to unavailability of documentation regarding the provision and adequacy of physiotherapy, it was difficult to reach to conclusion.

5. Conclusion

In general, patient characteristics including increasing age and female sex as well as having HIV infection and DM as comorbid illness were poor prognostic indicators were predictyors of GBS. Other clinical features that determine the severity of GBS from the study includes Days to maximum weakness, respiratory muscle involvement and Need of mechanical ventilation, cranial nerve involvement, Duration of ICU and GDS at admission.

So, strengthening infectious control strategies including HIV infection will help hinder the increasing prevalence of GBS as well as severity of the disease as seen in this study and having GBS specific treatments available in affordable and accessible manner will inflict significant light in the

prognosis of GBS patients towards Good outcome. This could be done with collaboration of Pharmaceuticals and voluntaries.

Ethical Considerations

Ethical clearance was acquired from SPHMMC institutional review board and Addis Ababa Health Office. In addition written consent from internal medicine department on behalf of the patients whom charts are going to be reviewed was obtained. The confidentiality of the charts was kept and the information collected was used solely for the intended purposes. Identity and names was not included in the questionnaire. The questionnaires was safely stored by the principal investigator.

Competing Interest

There is no competing interest among all authors.

Authors Contribution

All authors equally contributed.

Acknowledgements

We would like to thank the management body of St. Paul and Zewditu hospital for letting us to conduct this study.

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