Original Article

A study of clinical presentation and outcome of patients with Guillain–Barré syndrome: A prospective observational study at a tertiary care teaching hospital

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Abstract

Background: Guillain–Barré syndrome (GBS) is an immune-mediated damage to the nerve roots and peripheral nerves which may require intensive care unit management and adequate techniques for airway protection and ventilation.

Methods: Sixty four patients with GBS were studied from March 2017 to February 2018 with a detailed history of demographic and clinical data (age, gender, season, and antecedent events), functional disability bed on Hughes score, Medical Research Council (MRC) sum score at the time of admission. Final outcome was dichotomized to good (0–3) or bad (4–6) based on Hughes Disability Scale and was compared with different patient variables to find their association with patient outcome.

Results: The mean age of the patients studied was 45.9 ± 15.9 years. There were 37 males. Axonal variety was predominant GBS variant (85%). Twenty-four patients required mechanical ventilation and nine patients underwent tracheostomy. In total, 7 patients expired and 15 patients were discharged from the hospital with severe disability. Twenty patients developed complications during their course of stay in hospital. In total, 12 out of 15 (80%) with low MRC score (0–20) and 22 out of 49 patients with high disability score (Hughes score 4 or 5) at admission had a bad outcome ($P = 0.001$ and $P = 0.001$), respectively.

Conclusions: We concluded that, in our study, predictors of poor outcome at discharge were low MRC sum score at admission, high GBS disability score at admission, axonal variant GBS, longer duration of mechanical ventilator support, need for tracheostomy, and presence of complications, were associatedwith a poor outcome in patients with GBS.

Keywords: Guillain–Barré syndrome, Hughes scale, mechanical ventilation

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INTRODUCTION

Guillain–Barré syndrome (GBS) is an important cause of acute neuromuscular paralysis.[1] Specific management of GBS consists of immunomodulation – plasmapheresis, intravenous immunoglobulin (IVIg), and/or steroids. Ventilatory care is important in severely affected individuals. Respiratory failure requiring mechanical

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ventilation remains one of the most serious complications and occurs in approximately 30% of cases.[2] Morbidity and mortality are more frequent in severely affected patients, and prognosis tends to improve with wider availability of specialized intensive care unit (ICU) management and adequate techniques for airway protection and ventilation.[3]

The objective of the present study was to know the clinical presentation and outcome of patients with GBS getting admitted to the respiratory ICU (RICU)/acute neurological care unit (ANCU) at our tertiary care university teaching hospital.

MATERIAL AND METHODS

This study was a prospective observational study to evaluate the clinical presentation and outcome in patients with GBS admitted in RICU and ANCU. All patients aged 18 years or more with diagnosis of GBS were included in this study. Criteria developed by Asbury and Cornblath was used for the diagnosis of cases.[4] After obtaining approval from the Institutional Ethics Committee, consecutive patients admitted with a diagnosis of GBS were recruited in the study.

Sixty four patients were included in this study after obtaining written and informed consent from participants or responsible attendants in case of drowsy patients, over a study period of 12 months from March 2017 to February 2018. All patients had a complete neurological examination including cranial nerve examination, muscle power grading as per Medical Research Council scale(MRC),[5] reflexes, sensory examination, and disability using Hughes functional grading scale at admission.[6] Patients underwent nerve conduction study at admission. Treatment modalities used and complications were recorded for analysis.

The primary outcome measure was the GBS disability score based on Hughes functional disability scale measurement at discharge from ICU.[6] The outcome was dichotomized as good outcome (0–3) and bad outcome (4–6) for analysis. The determinants examined were demographic features (age and gender) and clinical and treatment parameters (antecedent events, MRC sum score, duration of ventilation, need for tracheostomy, treatment given, complications, and duration of ICU stay).

Statistical analysis

Categorical variables were analyzed in proportions and compared using Fisher's exact test and means compared with Student's *t*-test. The data were analyzed using SPSS version 21 software (SPSS Inc., Illinois, Chicago, USA).

RESULTS

A total of 64 patients were included in the study demographic dats are shown in Table 1.

Table 1: Summary of descriptive data for patient demographic variables at admission

Variable	Patients (No)
Gender (male:female)	37:27
Antecedent infections	
Viral respiratory infection	10
URTI	5
GIT infection	4
Postpartum	3
Pregnancy	1
Nil	41
MRC sum score (severe/moderate/mild)	15/31/18
Hughes score at admission (0-3)/(4-6)	15/49

n=number of patients; URTI=Upper respiratory tract infection; GIT=Gastrointestinal tract; MRC=Medical Research Council sum score-severe (0-20)/moderate (21-40)/mild (41-60)

The mean age was 45.9 ± 15.9 years. There was a male preponderance (n = 37) compared to females (n = 27). Various antecedent events were reported by 23 patients on admission. No antecedent event was reported by 41 patients. The most common antecedent event reported by the patients was viral respiratory infection (n = 10). Most of the patients (93.8% [n = 60]) presented with quadriparesis and two each presented with paraparesis and ophthalmoparesis. All except in one patient had symmetrical weakness.

The most common cranial nerve palsy observed was facial palsy in 30 patients followed by bulbar palsy seen in 21 patients. Sensory symptoms were observed in four patients. Out of 64 patients studied, most of the patients had axonal variants. Predominant axonal variant was acute motor and sensory axonal neuropathy (AMSAN) (53.1%) followed by acute motor and axonal neuropathy (AMAN) variant (34.3%). Acute inflammatory demyelinating neuropathy (AIDP) (10.9%), Miller-Fisher syndrome (MFS) with only ophthalmoplegia (1.6%) and Miller Fisher syndrome-Guillain–Barré syndrome (MFS-GBS) (1.6%) with ophthalmoplegia along with weakness of limbs.

The hughes functional disability scale is a widely accepted scale for assessing the functional status of patients with GBS, ranging from 0 (healthy) to 6 (death). At admission 34 patients were bedridden (Hughes scale 4) and another 15 patients required assisted mechanical ventilation (Hughes scale 5) within 24 h of admission.

Patients were divided into three groups based on MRC sum score as mild (41–60), moderate (21–40), and severe (0–20). Majority of patients at the time of admission had a score between 21 and 40 [Table 1]. In our study, 42 patients had good outcome

and 22 had bad outcome based on Hughes disability scale. Out of 49 patients with high Hughes score (4–6) at the time of admission, 22 patients had bad outcome (Hughes scale 4–6) at the time of discharge ($P = 0.001$) [Figure 1]. Among 49 patients, 15 had severe MRC score (0–20) at the time of admission, and among these 15 patients, only 3 patients improved their motor power and reached low Hughes scale (0–3). Remaining 12 had high Hughes scale with bad outcome at the time of discharge ($P = 0.000$) [Table 2]. This indicates that high Hughes scale and severe MRC sum score at the time of admission are predictors of bad outcome at the time of discharge.

Table 2: Association of patient variables with final outcome

Variable	Outcome		*P*
	Good (*n*=42)	Bad (*n*=22)	
	Patients (*n*)		
Gender (male:female)	27:15	10:12	0.147
Antecedent events (P/A)	14:28	9:13	0.591
MRC sum score			
Severe (0-20)	3	12	0.000
Moderate (21-40)	23	8	
Mild (41-60)	16	2	
Hughes score at admission			
0-3	15	0	0.001
4-6	27	22	
GBS variant			
AMSAN	15	18	0.010
AMAN	18	4	
AIDP	7	0	
MFS	1	0	
MFS-GBS	1	0	
MV duration (days)	2.9±9.7	16.6±14.0	0.000
ICU stay (mean±SD) (days)	16.8±10.3	22.6±12.6	0.052
Tracheostomy	3	6	0.053
Complications	9	11	0.019
Treatment			
Plasmapheresis	33	22	0.019
IVIg	3	2	0.783
Steroids	1	2	0.228

n=Number of patients; P=Present, A=Absent; MRC=Medical Research Council; GBS=Guillain-Barré syndrome; AIDP=Acute inflammatory demyelinating polyneuropathy; AMAN=Acute motor and axonal neuropathy; AMSAN=Acute motor and sensory axonal neuropathy; MFS-GBS=Miller Fisher syndrome-GBS; MFS=Miller Fisher syndrome; MV=Mechanical ventilation; ICU=Intensive care unit; IVIg=Intravenous immunoglobulin; SD=Standard deviation

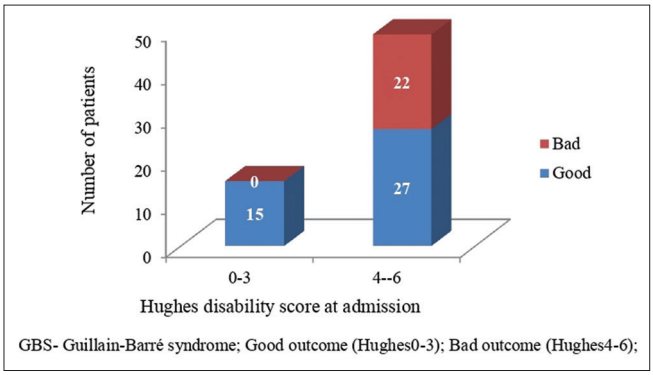

Figure 1: Association of Hughes disability score at admission with final outcome

All seven patients with (AIDP) were discharged with good outcome. The bad outcome rate among (AMSAN) and (AMAN) variants are 54% and 18%, respectively [Table 2]. Twenty-four patients from our study cohort needed mechanical ventilator support and nine out of them underwent tracheostomy for prolonged ventilator assistance. Out of 24 patients who needed mechanical ventilation support, 19 (79%) had bad outcome in contrast to only 3 out of 40 patients who were not ventilated had a poor outcome at the time of discharge [Table 3]. The mean duration of mechanical ventilation for those with bad outcome (16.6 ± 14 days) and good outcome (2.9 ± 9.6 days) was also compared, and there was a statistically significant difference ($P < 0.001$) [Table 2].

Table 3: Association of need for mechanical ventilation with final outcome

Mechanical ventilation	Good outcome, *n* (%)	Bad outcome, *n* (%)	Total (*n*)	*P*
Yes	5 (20.8)	19 (79)	24	0.000
No	37 (92.5)	3 (7.5)	40	

n=Number of patients; Good outcome (Hughes 0-3); Bad outcome (Hughes 4-6)

Fifty five 64 patients studie (85.9%) received plasmapheresis, and 5 (7.8%) patients received IVIg. In total, 20 patients out of 64 suffered from complications such as pneumonia, deep vein thrombosis (DVT), thrombophlebitis, bedsores, and atelectasis [Table 4].

DISCUSSION

GBS is an acute immune-mediated paralytic neuropathy. Despite the availability of treatment, certain subsets of GBS patients do not have a good outcome. Most people recover fully from GBS. The National Health Portal from India mentioned 3%–5% death rate among patients of GBS because of complications such as paralysis of respiratory muscles, blood infection, lung clots, or cardiac arrest.[7]

In our study, there was a slight male preponderance with a male: female ratio of 37:27. This was comparable with previous epidemiological studies which had demonstrated a slight male preponderance.[8,9]

A history of antecedent illness within 4 weeks is usually reported in GBS. In our study, only one-third of the patients reported an antecedent illness within 4 weeks of onset of illness [Table 1]. The most common illness reported was viral respiratory tract infection. In a study,[10] it was demonstrated that 40%–70% of cases of GBS are associated with an antecedent infection. In another a study[11] the rate of antecedent infection was reported as 52%.

Table 4: Descriptive data of clinical variables during ICU course of treatment

Variable	Patients (*n*)
Clinical presentation	
Quadriparesis	60
Paraparesis	2
Opthalmoparesis	2
Sensory symptoms	4
Symmetry	63
Areflexia	64
GBS variants	
AMSAN	33
AMAN	22
AIDP	7
MFS	1
MFS-GBS	1
Need for mechanical ventilation	24
Need for tracheostomy	9
Treatment	
P	55
IVIg	05
S	03
C	02
Complications	
Pneumonia	13
DVT	3
Thrombophlebitis	7
Bedsores	7
Atelectasis	1
Length of ICU stay (days) Median (IQR)	16 (11-22)
Outcome	
Good Hughes scale (0-3)	42
Bad Hughes scale (4-6)	22

ICU=Intensive care unit; *n*=number of patients; P=Plasmapheresis; IVIg=Intravenous immunoglobulin; S=Steroids; C=Combined; DVT=Deep vein thrombosis; AIDP=Acute inflammatory demyelinating polyneuropathy; AMAN=Acute motor and axonal neuropathy; AMSAN=Acute motor and sensory axonal neuropathy; MFS-GBS=Miller Fisher Syndrome-GBS; MFS=Miller Fisher Syndrome; IQR=Interquartile range

Our patients were admitted to the respiratory and neurointensive care unit. There was a slightly longer median duration of ICU stay in our cohort (16 days) [Table 4] similar to other studies.[8,12] This longer duration of ICU stay may be due to our center being a tertiary referral center and the resulting referral bias toward patients with severe illness and our policy of admitting patients in ICU if the patient was in the stage of progression.

Compared to previous studies, our patients had a higher GBS disability score at treatment initiation. Most of our patients had a GBS disability score >3, indicating significant disability before treatment initiation. This distribution of disability score was similar to observation from another study.[13] This may reflect a referral bias with more severe cases being preferentially referred to our institute and can also be an indicator of the department protocol, wherein only those patients with Hughes Grade 3 or more or rapidly progressing are considered for definitive therapy.

Most observational studies[9,12] showed higher number of patients undergoing treatment with IVIg, but in our study, there was a significantly higher rate of plasmapheresis [Table 4]. This may be because our center is one of the few regional centers offering plasmapheresis as a treatment modality for GBS and patients with severe grade of weakness are specifically referred for the same. The higher expense for treatment with IVIg also contributed to selection bias for treatment where few patients opted for IVIg as the primary mode of treatment.

In our study, 34% of the patients had a bad outcome (Hughes 4 - 6) at discharge. In a study[14] 30% of the patients had a bad outcome at 12 weeks.[14] In our study, the number of patients with bad outcome was lower compared to other studies. This may be because of our policy of admission for observation in ICU for progression of illness, early ventilation, and higher rates of plasmapheresis with intensive neurorehabilitation programs.

We had studied the association of different variables with outcome of patients at discharge from ICU. The outcome measured was the GBS disability score at discharge. This outcome was dichotomized as good (Hughes score 0 – 3) and bad (Hughes score 4 – 6). Our study subgroup analysis of age revealed patients with older age had a higher proportion of high GBS disability score (4 – 5) at admission [Table 2]. Of 13 patients above 50 years who had a bad outcome, only 8 patients were fit for survival to discharge with a higher disability score of 4 or 5 and 5 (35%) patients expired (Hughes score 6). Older age was found to be a predictor for poor outcome at 6 months.[13] A recent comprehensive review on the outcome of GBS also found similar results.[15]

Many of the studies have not shown any association between gender and outcome.[16] A study concluded that male sex is strongly associated with bad outcome.[17] In our study, there were 37 male and 27 female. Among the female patients, 44% ($n = 12$) had bad outcome in contrast to only 27% male patients. However, this did not reach statistical significance ($P = 0.147$) [Table 2]. The more number of female patients in our study having a bad outcome could be because more females in our study were admitted with a higher Hughes scale.

In our study, only 33% patients reported an antecedent event on admission to the hospital. Among the reported antecedent event, viral respiratory tract infection is the most common (10 out of 23 patients) [Table 4]. In contrast to Paul *et al*.,[18] who had found poorer outcome in patients with antecedent illness, we did not

find any association of antecedent events with outcome (Hughes scale) ($P = 0.591$) [Table 2].

Forty-nine patients had a high Hughes disability score (4/5), out of which, 22 patients continued to have similar score at the time of discharge or death [Table 2]. Low MRC sum score at admission was also found to be associated with poor outcome at discharge in our study ($P = 0.000$) [Table 2 and Figure 2]. A clinical prognostic model proposed by Walgaard *et al*. revealed that higher age, preceding diarrhea and low MRC sum score on admission and at 1 week were independently associated with inability to walk at 4 weeks and 3 and 6 months.[14] Moreover, on admission, MRC sum score also has a strong association with outcome ($P < 0.001$). Almost 80% of patients with severe grade MRC sum score (0–20) had a bad outcome in contrast to 25% with moderate severity and 11% with mild severity MRC sum score in our study [Table 2].

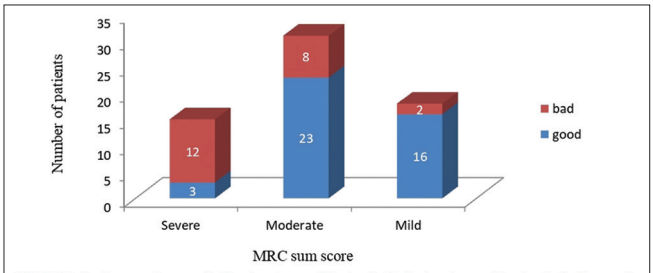

Figure 2: Association of the Medical Research Council sum score at admission with final outcome

An increased duration of mechanical ventilation in our study is associated with poor outcome. In our study, the duration of mechanical ventilation has a strong association with outcome ($P < 0.001$) [Table 3], whereas duration of ICU stay has just tended to be a significant association with outcome ($P = 0.052$) [Table 2]. In a study by Netto *et al*.,[19] out of 173 patients, 53 needed mechanical ventilation for a mean duration of 20.5 days and had a mortality of 10.4%. In our study, mortality rate among ventilated patients was 29% (7/24) which is much higher than Netto *et al*.,[19] but similar to another report,[8] which showed a mortality rate of 23% among 56 mechanically ventilated patients ventilated for a mean duration of 30 days. The higher mortality rate in the current study could be due to smaller sample size. In another study,[14] from North India a similar higher mortality rate was observed owing to smaller sample size ($n = 11$).

Nine patients required tracheostomy during the course of mechanical ventilation. We did not find any association between need for tracheostomy and bad outcome ($P = 0.053$) [Table 2]. The need for tracheostomy was lower in our study 25% (6/24) [Table 4] in contrast to Bhagat *et al*.,[8] where almost 59% patients needed tracheostomy.

In our study (AMSAN), variant was the most common variant followed by AMAN variant [Table 4]. Most of the Indian studies[9,20,21] have found AIDP as the most common variant of GBS. However, like other studies, the AMSAN variety most of the times requires mechanical ventilation and had bad outcome in 54% cases. The reason for the high prevalence of AMSAN variety in our study is because of referral bias. Most of the patients belonging to AMSAN group had a higher disability score than AIDP, and many times necessitated institution of mechanical ventilation. As our hospital is the referral center, many of these cases were referred to our hospital for ventilator management and thereby spuriously increase the prevalence of AMSAN variety in our study cohort. Similar to our observation, a study by Durand *et al*. also reported good outcome in AIDP variety.[22] In our study, all seven patients with AIDP were survived to discharge with good outcome score (Hughes score 0–3). Similar to our study, poor outcome at 6 months in patients with axonal variety of GBS has been reported in another study.[23]

In our study, 55 patients underwent five cycles of plasmapheresis and 33 had good outcome ($P = 0.019$) [Table 2]. However, with IVIg and steroid therapy, there was no statistically significant difference between good and bad outcome [Table 2]. However, equal efficacy was observed with IVIg and plasmapheresis by Kishore *et al*.[24]

Complications like pneumonia, DVT, thrombophlebitis, atelectasis, and bedsores were observed during our study period and found that patients with bad outcome had a higher complication rate [Table 4]. Similar to other studies,[8,25] pneumonia was the most common complication observed (13/20) followed by thrombophlebitis and bedsores.

The predictors of poor outcome as per the current study are low MRC sum score at admission, high GBS disability score at admission, axonal variant (AMSAN/AMAN) GBS, longer duration of mechanical ventilator support, need for tracheostomy, and presence of complications. Our study helps in assessing predictors of poor outcome, prognostication of disease course, and for counselling of the patient relatives at the time of admission.

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Conflicts of interest

There are no conflicts of interest.

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