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Original Research Article

ELECTROPHYSIOLOGICAL SUBTYPES OF GUILLAIN-BARRÉ SYNDROME AND ITS OUTCOME IN BRD MEDICAL COLLEGE, GORAKHPUR

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Abstract

Background: Guillain-Barré Syndrome (GBS) is an acute autoimmune neuropathy with varying electrophysiological subtypes. The most common forms include Acute Motor Axonal Neuropathy (AMAN), Acute Inflammatory Demyelinating Polyneuropathy (AIDP), and Acute Motor and Sensory Axonal Neuropathy (AMSAN). Regional differences in subtype distribution impact clinical outcomes, particularly in Asia. This study aims to evaluate the distribution of GBS subtypes and its outcome. **Materials and Methods:** A prospective observational study was conducted over one year (June 2023 - May 2024) involving 41 patients diagnosed with GBS. Electrophysiological studies classified patients into AMAN, AIDP, AMSAN, and MFS subtypes. Clinical data, cerebrospinal fluid (CSF) analysis, and outcomes were recorded. Functional outcomes were assessed using Hughes and MRC scores at admission, discharge, and at 3 months. **Result:** Of the 41 patients, 61.0% were male, with a mean age of 30.8 ± 19.8 years. AMAN was the most common subtype (63.4%), followed by AIDP (19.5%) and AMSAN (14.6%). Elevated CSF protein was observed in 80.5% of cases. 95.1% of patients were successfully discharged, with MRC scores improving from 11.0 at admission to 43.0 at 3 months. **Conclusion:** AMAN was the predominant subtype in this study, consistent with Asian patterns. While initial severity was high, most patients experienced significant recovery, emphasizing the importance of early diagnosis and intervention, especially for severe subtypes.

INTRODUCTION

Guillain-Barré syndrome (GBS) is an acute, frequently severe autoimmune polyradiculoneuropathy. It predominantly affects adults but can occur at any age, with males being more commonly affected. GBS impacts both motor and sensory nerves, causing muscle weakness, diminished sensation, and potentially life-threatening complications such as difficulties with swallowing and breathing. Globally, the incidence of GBS ranges from 0.6 to 4.0 cases per 100,000 people, increasing significantly beyond the age of 50.[1] Approximately two-thirds of GBS cases are linked to preceding infections, including Campylobacter Jejuni, Cytomegalovirus, and Epstein-Barr virus.[2-4]

Initial symptoms of GBS often involve weakness or tingling, beginning in the legs and potentially spreading to other areas, including the arms and face. As GBS progresses, paralysis may occur, and around one-third of patients experience chest muscle weakness, resulting in breathing difficulties. Although most patients recover fully with medical care, some may face lasting weakness or, in severe cases, fatal complications like respiratory failure, bloodstream infections, or cardiac arrest.[5-7]

Diagnosis relies on clinical assessment, including the presence of symmetrical limb weakness and diminished reflexes, supported by lumbar puncture and electrophysiological studies like Nerve Conduction Studies (NCS). The Brighton Criteria further categorizes GBS diagnosis into three levels of certainty based on clinical, electrophysiological, and cerebrospinal fluid (CSF) findings.[8,9]

Treatment typically involves hospitalization and immunotherapy, such as plasma exchange or intravenous immunoglobulin, within 7-14 days of symptom onset. Post-acute rehabilitation may be necessary for muscle strength recovery.[10,11]

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This study explores GBS subtypes diagnosed through clinical examination and NCS, evaluating outcomes using the Hughes Disability Scale (HDS) and Medical Research Council (MRC) Sum Score at admission, discharge, and 3 months post-discharge.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Medicine at BRD Medical College, Gorakhpur, from June 1, 2023, to May 31, 2024. The study aimed to evaluate 41 patients diagnosed with Guillain-Barré Syndrome (GBS) using purposive sampling. Inclusion criteria included patients with flaccid weakness who met the Brighton Criteria for GBS and had symptom onset within two weeks. Exclusion criteria included patients with symptom progression beyond four weeks, those on prior steroid therapy, and those unwilling to participate. Data were collected using a semi-structured proforma that captured socio-demographic details, clinical history, and relevant laboratory investigations. Neurological assessments, including vital signs, respiratory status, and functional disability using the Hughes Scale and MRC Sum Score, were conducted at admission, discharge, and follow-up at three months. Laboratory tests included CBC, cerebrospinal fluid analysis, and electrophysiological studies to classify GBS into subtypes—AIDP, AMAN, and AMSAN. Ethical clearance was obtained, and data analysis was performed using SPSS version 25, with a p-value of less than 0.05 considered statistically significant and below 0.001 as highly significant. Descriptive statistics and appropriate tests, such as the Chi-square and t-tests, were used to assess associations between variables.

RESULTS

In this study of 41 patients with various subtypes of Guillain-Barré Syndrome (GBS), gender distribution revealed a male predominance, with 25 males (61.0%) and 16 females (39.0%), and a mean age of 30.80 years (± 19.8) reflecting a broad age range. Acute Motor Axonal Neuropathy (AMAN) was the most prevalent subtype, comprising 26 participants (63.4%), followed by Acute Inflammatory Demyelinating Polyneuropathy (AIDP) at 19.5%, Acute Motor and Sensory Axonal Neuropathy (AMSAN) at 14.6%, and Miller Fisher Syndrome (MFS) at 2.4%. Cerebrospinal fluid (CSF) examinations indicated abnormal cell counts in 28 participants (68.3%) and elevated protein levels in 33 participants (80.5%). Favourably, 39 participants (95.1%) were discharged, with only 2 (4.9%) expirations [Table 1].

The association between Hughes scores across three time points showed no significant differences at admission (p=0.46) and discharge (p=0.17), with the highest frequency of score 4 in all subtypes. However, three-month follow-up scores indicated improvement, particularly for AMAN, with a notable p-value of 0.42 [Table 2].

Mean ± Standard Deviation (SD) of Medical Research Council (MRC) scores at admission were 19.50 ± 11.6 for AIDP, 8.08 ± 12.7 for AMAN, 13.17 ± 16.2 for AMSAN, and 6 ± 0.0 for MFS, showing no significant differences (p=0.52). At discharge, scores improved to 22.25 ± 15.3 for AIDP, 12.16 ± 14.2 for AMAN, 23.2 ± 18.3 for AMSAN, and 14 ± 0.0 for MFS (p=0.60), while after three months, significant recovery was observed with MRC scores of 49.50 ± 3.4 for AIDP, 42.08 ± 5.5 for AMAN, 41.6 ± 12.2 for AMSAN, and 40 ± 0.0 for MFS (p=0.003) [Table 3].

In this study, patient outcomes were assessed across various subtypes of Guillain-Barré Syndrome (GBS). For Acute Inflammatory Demyelinating Polyneuropathy (AIDP), all 8 patients (100.0%) were successfully discharged, with no fatalities reported. In the case of Acute Motor Axonal Neuropathy (AMAN), 25 out of 26 patients (96.2%) were discharged, while 1 patient (3.8%) expired. Among the 6 patients with Acute Motor and Sensory Axonal Neuropathy (AMSAN), 5 (83.3%) were discharged, and 1 patient (16.7%) expired. The sole patient diagnosed with Miller Fisher Syndrome (MFS) was discharged without any reported deaths. Overall, 39 patients (95.1%) were discharged successfully, while 2 patients (4.9%) expired. The p-value of 0.51 indicates no statistically significant association between GBS subtype and patient outcomes, suggesting that the prognosis is generally favorable across the different subtypes [Table 4].

Table 1: Comprehensive Profile and Clinical Outcomes of Study Participants with Guillain-Barré Syndrome (N=41).

Variables		Frequency	%
Gender	Female	16	39.0
	Male	25	61.0
Mean Age (in years)		30.80 ± 19.8	
Mean Duration of Hospital Stay (days)		10.46 ± 10.7	
Subtypes of Guillain-Barré Syndrome			
AIDP (Acute Inflammatory Demyelinating Polyneuropathy)		8	19.5
AMAN (Acute Motor Axonal Neuropathy)		26	63.4
AMSAN (Acute Motor and Sensory Axonal Neuropathy)		6	14.6
MFS (Miller Fisher Syndrome)		1	2.4
CSF Cell Count			
<5		13	31.7
>5		28	68.3

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CSF Protein Count (mg/dl)		
20-40	8	19.5
>40	33	80.5
Outcome		
Discharged	39	95.1
Expired	2	4.9

Table 2: Association of HUGES Scores with Various Subtypes of GBS at Admission, Discharge, and Three Months Post-Discharge (N=41)

HUGES Score	AIDP (n, %)	AMAN (n, %)	AMSAN (n, %)	MFS (n, %)	Total (n)	p-value
Admission						
0	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	0.46
1	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
2	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
3	2 (25.0)	1 (3.8)	0 (0.0)	0 (0.0)	3	
4	5 (62.5)	20 (76.9)	4 (66.7)	1 (100.0)	30	
5	1 (12.5)	5 (19.2)	2 (33.3)	0 (0.0)	8	
6	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
Discharge						
0	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	0.17
1	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
2	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
3	3 (37.5)	1 (3.8)	1 (16.7)	0 (0.0)	5	
4	5 (62.5)	24 (92.3)	4 (66.7)	1 (100.0)	34	
5	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
6	0 (0.0)	1 (3.8)	1 (16.7)	0 (0.0)	2	
3-Month Follow-Up						
0	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	0.42
1	2 (25.0)	2 (8.0)	1 (20.0)	0 (0.0)	5	
2	4 (50.0)	6 (24.0)	2 (40.0)	0 (0.0)	12	
3	2 (25.0)	17 (68.0)	2 (20.0)	1 (100.0)	22	
4	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
5	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
6	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0	
Total	8	26	6	1	41	

Table 3: Association of MRC Scores with Various Subtypes of GBS at Admission, Discharge, and Three-Month Follow-Up (N=41).

MRC Score	AIDP (Mean ± SD)	AMAN (Mean ± SD)	AMSAN (Mean ± SD)	MFS (Mean ± SD)	p-value
At Admission	19.50 ± 11.6	8.08 ± 12.7	13.17 ± 16.2	6 ± 0.0	0.52
At Discharge	22.25 ± 15.3	12.16 ± 14.2	23.2 ± 18.3	14 ± 0.0	0.60
After 3-Month Follow-Up	49.50 ± 3.4	42.08 ± 5.5	41.6 ± 12.2	40 ± 0.0	0.003

Table 4: Association of Patient Outcomes with Various Subtypes of Guillain-Barré Syndrome (GBS)

Outcome	AIDP n (%)	AMAN n (%)	AMSAN n (%)	MFS n (%)	Total	p-value
Discharged	08 (100.0)	25 (96.2)	05 (83.3)	01 (100.0)	39	0.51
Expired	0 (0.0)	01 (3.8)	01 (16.7)	0 (0.0)	02	
Total	08	26	06	01	41	

DISCUSSION

The present study conducted at Baba Raghav Das Medical College, Gorakhpur, Uttar Pradesh, examined 41 patients to investigate the electrophysiological subtypes of Guillain-Barré Syndrome (GBS) and their outcomes. This cross-sectional study adhered to ethical standards and obtained informed consent. The cohort predominantly comprised males (61.0%), with a mean age of 30.80 years (SD = 19.8), indicating a wide age range. Older patients were more likely to present with Acute Motor and Sensory Axonal Neuropathy (AMSAN), reflecting findings by Sharma et al. (2016) that linked age to more severe subtypes.[12]

Acute Motor Axonal Neuropathy (AMAN) was the most prevalent subtype, accounting for 63.4% of cases, followed by Acute Inflammatory Demyelinating Polyneuropathy (AIDP) at 19.5%, and AMSAN at 14.6%. These results align with López-Hernández et al. (2020),[13] who reported a similar predominance of AMAN in a Mexican cohort. Gender analysis revealed a significant association, with females more affected by AIDP (75%) and AMSAN (50%), while males predominantly presented with AMAN (76.9%), suggesting hormonal or genetic influences on susceptibility.

Prognosis, measured by Hughes and MRC scores, varied across subtypes. AMAN presented more severe initial disability (mean MRC score of 8.08), consistent with findings from Siddiqui et al. (2022).[14] However, significant recovery was observed at the 3-month follow-up, with the mean MRC score improving to 42.08 for AMAN patients.

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Mortality in our study was 4.9%, primarily in AMAN and AMSAN patients, aligning with global data that associate these subtypes with higher mortality, G Kenan et al (2020).[15] Overall, 95.1% of patients were successfully discharged, indicating a generally favorable prognosis for GBS with timely intervention J Tian et al (2019).[16]

CONCLUSION

This study highlights the variability in clinical presentation and prognosis of Guillain-Barré Syndrome (GBS) subtypes, with acute motor axonal neuropathy (AMAN) as the predominant subtype. It underscores the influence of age and gender, noting that older patients often present with severe AMSAN and males predominantly with AMAN. While AMAN showed severe initial presentations, the overall prognosis remained favorable, with significant recovery observed. The mortality rate emphasizes the need for early diagnosis and intervention. Recommendations include early electrophysiological testing for subtype identification and further gender-focused research to explore differences in GBS presentations.

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