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Clinical Spectrum and Electrophysiological Subtypes of Guillain–Barré Syndrome: A Prospective Study from Eastern India

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KEYWORDS

Guillain–Barré syndrome; AMAN; AMSAN; AIDP, MFS; electrophysiology

ABSTRACT:

Background: Guillain–Barré syndrome (GBS) shows geographic variability in clinical features and electrophysiological subtypes. Contemporary prospective data from Eastern India remain limited.

Objective: To describe the clinical spectrum, seasonal/epidemiologic patterns, and electrophysiological subtype distribution of GBS in a tertiary center in Odisha, and to explore early determinants of disability.

Methods: A prospective observational study was conducted at KIMS, Bhubaneswar (April 2023 to March 2025) including adults fulfilling Brighton criteria levels 1–3. Clinical, epidemiological, and electrophysiological data were analyzed. Subtypes were classified per revised electrodiagnostic criteria. Statistical tests included ANOVA, Tukey HSD, and χ^2 ($p < 0.05$ significant).

Results: Fifty-four patients were enrolled (mean age 40.48 ± 14.79 years; M:F = 2:1), with most patients aged 21–40 years (48.1%). Electrophysiological classification demonstrated a predominant axonal pattern (77.8%), comprising AMSAN 50.0% and AMAN 27.8%, while AIDP accounted for 14.8% and MFS for 7.4% ($\chi^2 = 21.36$, $p < 0.001$). Age differed significantly across subtypes (ANOVA $F = 2.9$, $p = 0.044$), with AMAN patients being significantly older than AMSAN (Tukey $p = 0.017$). A bimodal seasonal clustering was observed during monsoon (27.8%) and winter (25.9%) ($p = 0.698$). Antecedent infection was reported in 75.9% of cases, predominantly upper respiratory tract infection (63%), which showed a strong association with axonal subtypes ($p < 0.001$). Cranial nerve involvement was present in 51.9% and varied markedly across subtypes ($p = 0.000048$), with higher involvement in MFS and AMSAN. Autonomic dysfunction was noted in 57.4% ($p = 0.147$). Respiratory failure occurred in 38.9% of patients, most frequently in MFS (75%) and AMAN (40%), all of whom required ventilatory support.

Conclusion: This study demonstrates a clear predominance of axonal GBS variants in Eastern India, with strong association to antecedent upper respiratory infections and higher cranial and respiratory involvement in AMAN and MFS subtypes. These patterns underscore the need for early monitoring and timely supportive care in high-risk patients. While limited by single-center data, the findings highlight important regional characteristics and the need for larger multicentre studies to refine prognosis and management strategies.

Introduction -

Guillain–Barré Syndrome (GBS) is an acute, immune-mediated neuropathy characterized by symmetrical weakness, areflexia, and variable sensory/autonomic features.[1] Although globally reported, significant geographic variation exists in clinical spectrum and electrophysiological subtypes. [2,3] Western populations predominantly show Acute Inflammatory Demyelinating Polyneuropathy (AIDP), whereas axonal forms such as

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Acute Motor Axonal Neuropathy (AMAN) and Acute Motor-Sensory Axonal Neuropathy (AMSAN) are more frequent in Asia and Latin America. [4,5] In India, studies have shown heterogeneous subtype distribution, with some regions reporting axonal predominance.[6] However, data from Odisha are scarce. Understanding local epidemiology is vital for diagnosis, prognostication, and health resource allocation. [7,8] This study was conducted to systematically evaluate the clinical spectrum and electrophysiological subtypes of GBS in a tertiary care center in Eastern India.

Methods -

Study Design and Setting: A prospective observational cohort was conducted at Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, Odisha, enrolling consecutive Guillain–Barré Syndrome (GBS) patients from April 2023 to March 2025.

Eligibility: Included adults (≥18 years) fulfilling Brighton criteria (levels 1–3). Excluded were patients with alternative diagnoses (toxic, metabolic, porphyria, cervical myelopathy), pre-existing neuropathy, or those refusing consent.

Data Collection: Demographic data, seasonal trend, comorbidities, antecedent infections, symptom profile, cranial nerve involvement, and autonomic features were recorded using a structured proforma.

Electrophysiology: Standardized nerve conduction studies (median, ulnar, tibial, peroneal, sural) were performed within 7–14 days. Subtypes were classified as AIDP, AMAN, AMSAN, or MFS using revised criteria, with follow-up for reversible conduction failure.

Statistics: Analyses in SPSS v26. Continuous data as mean ± SD/median [IQR]; categorical as n (%). ANOVA/Kruskal–Wallis and χ^2/Fisher tests used for comparisons; paired t/Wilcoxon for within-group changes; correlations by Pearson/Spearman; ($p < 0.05$ significant).

Ethics: Approved by Institutional Ethics Committee, KIMS, Bhubaneswar; written informed consent obtained

Results -

1. Age and Sex Distribution of Study Participant

Variable	Category / Statistic	Value
Age (years)	Mean ± SD	40.48 ± 14.79 year
	Range	18–72 year
Age Groups	18–20 year	6 (11.1 %)
	21–40 year	26 (48.1%)
	41–60 year	14 (25.9%)
	>60 year	8 (14.8%)
Sex Distribution	Male	36 (66.7%)
	Female	18 (33.3%)
	Male : Female Ratio	2:1
Total Patients		54

Table 1. Demographic Profile of Study Participants (n = 54)

A total of 54 patients with confirmed Guillain–Barré Syndrome were enrolled between April 2023 and March 2025. The mean age was 40.48 ± 14.79 years (range 18–72). Males constituted 66.7% of the cohort (n = 36), and females 33.3% (n = 18), yielding a male-to-female ratio of 2:1. Age distribution revealed a clustering in the 21–40 year age group (n = 26, 48.1%), followed by 41–60 years (25.9%) and >60 years (14.8%).

2. Age variation across subtypes

Subtype-specific analysis demonstrated that AMAN patients were the oldest (46.47 ± 17.99 years) and AMSAN the youngest (35.70 ± 15.02 years). ANOVA confirmed a significant difference among subtypes ($F = 2.9$, $p = 0.044$). Post-hoc Tukey HSD testing showed significance between AMAN vs AMSAN ($p = 0.017$), while other pairwise comparisons were non-significant. No sex-based differences in subtype distribution were observed.

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3. Electrophysiological Subtypes

Electrodiagnostic classification revealed a predominant axonal pattern (77.8%), (Figure 1) comprising: Acute Motor-Sensory Axonal Neuropathy (AMSAN): 27/54 (50.0%), Acute Motor Axonal Neuropathy (AMAN): 15/54 (27.8%), Acute Inflammatory Demyelinating Polyradiculoneuropathy (AIDP): 8/54 (14.8%) and Miller Fisher Syndrome (MFS): 4/54 (7.4%). The difference in frequency across subtypes was statistically significant ($\chi^2 = 21.36$, $p < 0.001$), confirming regional axonal predominance consistent with Asian epidemiology.

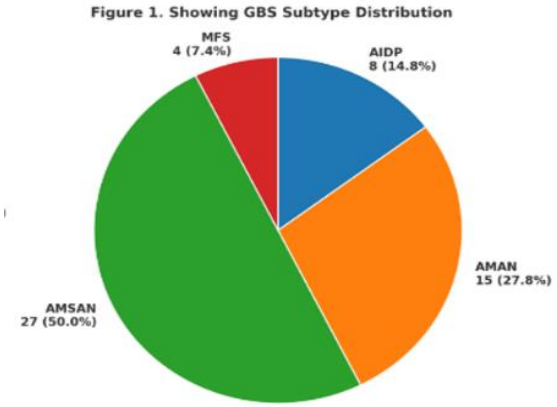

Figure 1: Pie chart showing the distribution of GBS subtypes

4. Seasonal and Epidemiologic Distribution

A bimodal seasonal trend was observed (Figure 2):

- Monsoon (July–September): 15 patients (27.8%)
- Winter (October–January): 14 patients (25.9%)
- Autumn (February): 12 patients (22.2%)

Though seasonal clustering appeared during monsoon and winter, the overall association was not significant ($p = 0.698$). Comorbidities were documented in 14 patients (25.9%), mainly type 2 diabetes mellitus (n = 5, 9.3%), hypertension (n = 3, 5.6%), and isolated cases of hypothyroidism and dyslipidaemia. A Chi-square test showed a significant association between comorbidity patterns and GBS subtypes ($p = 0.0184$), suggesting subtype-specific comorbidity trends.

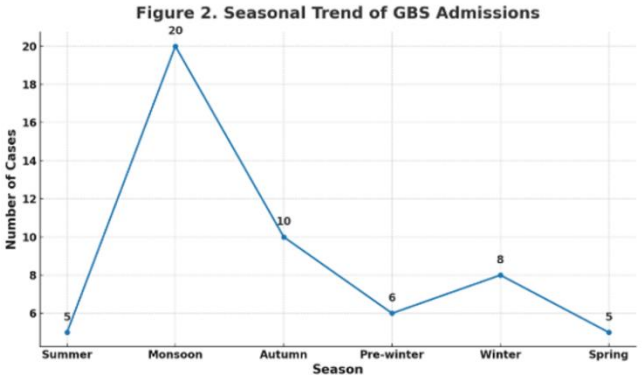

Figure 2: Line graph depicting the seasonal trend of GBS admissions

5. Antecedent Infections and Prodromal Illness Pattern

Antecedent infection was reported in 75.9% (41/54) of patients—most commonly upper respiratory tract infection (URTI) 63%, followed by gastrointestinal infection 11.1%.
The frequency of prodrome differed significantly across subtypes ($p < 0.001$). Axonal subtypes thus demonstrated a stronger association with preceding infections, especially respiratory tract involvement.

Table 2 : Association of Antecedent Infection with Electrophysiological Subtypes

Subtype	Antecedent illness (%)	Predominant type
AMSAN	81.5	URTI
AMAN	53.3	URTI
AIDP	50	MIXED (URTI + AGE)
MFS	50	URTI

6. Clinical Spectrum at Presentation in GBS Patients

Lower-limb weakness was the predominant presenting feature (74.1%), while ataxia (13%) and isolated cranial neuropathy (1.9%) were less common, with a significant association between presenting symptoms and GBS subtypes ($p = 0.0001$). Sensory symptoms were infrequent (3.7%), consistent with the predominantly motor axonal pattern. Cranial nerve involvement

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occurred in 52% of patients, most frequently affecting the facial and lower cranial nerves, with notable subtype-specific patterns: isolated ocular palsy in MFS, facial palsy in AIDP, and multiple lower cranial nerve involvement in AMSAN ($p = 0.000048$). Autonomic dysfunction was observed in 57.4% of cases, highest in MFS, though without significant inter-subtype variation ($p = 0.147$). Respiratory failure developed in 38.9% of patients, particularly among MFS and AMAN subtypes, necessitating mechanical ventilation.

Table 3: Clinical Profile and Cranial/Autonomic Dysfunction Patterns

Clinical Presentation	Initial Symptom	Lower limb weakness 74.1%; Ataxia 13%; Isolated CN palsy 1.9%
	Sensory Symptoms	3.7% (mild paresthesia)
Cranial Nerve, Autonomic & Respiratory Involvement	Cranial Nerve Involvement	28/54 (51.9%)
	CN-Specific Patterns	MFS: Oculomotor involvement 25%, Combined CN III/IV/VI/IX/X 75%; AIDP: Facial palsy 37.5%; AMSAN: Lower CN involvement 51.9%
	No CN involvement	More common in AMSAN (55.6%)
	Autonomic Dysfunction	31/54 (57.4%); highest in MFS (100%)
	Respiratory Failure	21/54 (38.9%); highest in MFS (75%) and AMAN (40%); all ventilated

Table 4: Subtype-Based Comparative Statistical Analysis in GBS (n = 54)

Domain	Parameter	Findings	Statistical Notes
Comparative Statistics Across Subtypes	Age Difference	AMAN older than AMSAN	ANOVA $p = 0.044$; Tukey $p = 0.017$
	Electrophysiological Pattern	Axonal subtypes significantly more common than AIDP	$\chi^2 = 21.36$, $p < 0.001$
	Seasonal Association	No significant seasonal variation in subtype distribution	$p = 0.698$
	Comorbidities vs Subtype	Significant association, comorbidities more common in axonal forms	$p = 0.0184$
	Antecedent Infection vs Subtype	Axonal variants strongly linked to URTI prodrome	$p < 0.001$
	Presenting Symptom vs Subtype	Weakness pattern significantly different across variants	$p = 0.0001$
	Cranial Nerve Involvem	Markedly varied, highest in MFS and AMSAN	$p = 0.000048$

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	ent vs Subtype		
	Autonomic Dysfunction vs Subtype	Occurrence similar across groups	Not significant (p = 0.147)
	Respiratory Failure vs Subtype	More common in MFS and AMAN	Trend noted; clinically relevant

Discussion –

This prospective study highlights the clinical spectrum and electrophysiological subtypes of Guillain–Barré Syndrome (GBS) in Eastern India. Consistent with several Eastern Indian and Asian reports, axonal variants (AMSAN and AMAN) were the predominant subtypes in our cohort (77.8%), while AIDP accounted for a smaller proportion (14.8%), highlighting a region-specific axonal predominance in GBS expression**.** [4,5,7,8] The clustering of cases during the monsoon and post-monsoon months likely reflects seasonal infection patterns, particularly gastrointestinal illnesses, which showed a significant association with AMAN and AMSAN subtypes. [10] This finding aligns with earlier Indian and East Asian reports where enteric pathogens such as *Campylobacter jejuni* have been implicated in axonal forms of GBS. [7,8] Time to nadir was significantly shorter in axonal variants compared with AIDP, reinforcing previous observations that axonal injury is characterized by rapid progression and often predicts poorer outcomes. [1] Cranial nerve involvement was frequent, particularly among axonal forms, consistent with the findings of Sardana et al[5].

When compared with other Indian cohorts (Nagappa et al[4]; Sardana et al[5]), the distribution of subtypes and frequency of cranial/autonomic involvement in our series were broadly similar, though the relatively higher proportion of axonal variants in our region is notable. Internationally, studies from China and Japan also report a higher prevalence of axonal subtypes[7,8], whereas European cohorts predominantly describe AIDP[2], suggesting important geographic and possibly pathogen-driven differences in disease expression. The strengths of this study include its prospective design, use of standardized Brighton and Rajabally criteria[2,3,6], and regional focus, providing valuable epidemiological insights from Eastern India. However, limitations include the relatively small sample size, single-center nature, and short-term follow-up, which may limit the generalizability of the findings.

Our observations reinforce the importance of early recognition and electrophysiological classification of GBS, as subtype strongly influences clinical course, need for intensive care, and long-term recovery. [1,3] Larger multicentre studies with longer follow-up are warranted to better define prognostic factors and optimize region-specific management strategies.

Conclusion -

This study demonstrates a clear axonal predominance (AMSAN and AMAN) among GBS patients in Eastern India, with AIDP representing a smaller subset. Seasonal clustering during monsoon and winter and the strong association of antecedent URTI with axonal variants suggest infection-linked immune activation as a major trigger. Cranial nerve and autonomic involvement were frequent, and respiratory failure occurred predominantly in MFS and AMAN subtypes, emphasizing the need for early monitoring. Electrophysiological subtype showed significant influence on clinical severity and progression. These findings highlight the importance of region-specific awareness, early diagnosis, and timely supportive care to improve outcomes in GBS. This institute functions as a tertiary referral center, where milder AIDP cases are often managed locally and more severe, rapidly progressive cases are referred, explaining the higher axonal predominance. Although limited by single-center design and sample size, the study provides important regional insights and highlights the need for larger multicentre research to refine outcome prediction and guide management strategies.

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