Research Article

Clinical Profile and Predictors of Outcome of Guillain Barre Syndrome Variants among Children Admitted in the Pediatric Department of a Tertiary Care Hospital, Karachi

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Abstract: Background: Guillain Barre Syndrome (GBS) is one of the leading cause of Acute Flaccid Paralysis presenting in pediatric emergency, marking incidents in Asian countries as 3-4 per 100, 000 population. To improve outcome, an accurate and early recognition of predictors of bad prognosis is required.

Objective: To identify requirement of intensive monitoring and aggressive treatment to help the health system in decreasing morbidity and mortality associated with Guillain Barre Syndrome.

Materials and Methods: This is a cross-sectional study, conducted at Dr. RKMP Civil Hospital Karachi. Medical records of patients >3 months to 12 years of age, admitted with diagnosis of Guillian Barre syndrome from Jan 2017 to June 2022 were reviewed. Data was analyzed in SPSS version 23. For independent variables, frequency and percentage was used.

Results: A total of 46 patients were enrolled in the study, mean age of study participants was 80.26 ± 31.7 months. The most common variant of GBS identified was AIDP in 19 (41.3%) followed by ASMAN 14 (30.4%). A positive association between winter season with 2.7 (95% CI 1.4-5.8) and progression within 7 days with 3.2 (95% CI 1.9-6.7) was found with mortality.

Conclusion: Acute inflammatory demyelinating polyneuropathy was the most common variant of Gullian-Barre syndrome with male predominance. Presentation in winter seasons and progression of disease in less than 7 days are risk factors for mortality. Bulbar palsy is an independent risk factor for mechanical ventilation, irrespective of GBS variant.

Keywords: Acute inflammatory demyelinating polyneuropathy (AIDP), Guillain Barre Syndrome (GBS), Pediatric population, Bulbar palsay, Areflexia, Acute motor axonal neuropathy (AMAN).

INTRODUCTION

Guillain Barre Syndrome (GBS) is one of the leading cause of Acute Flaccid Paralysis presenting in pediatric emergency [1]. Its incidence in Asian countries is 3-4 per 100, 000 population [2]. It is an autoimmune polyneuropathy involving motor, sensory, cranial and autonomic nerves in varying combinations but commonly motor nerves are involved [3]. Clinical presentation of patients depends on type of involved nerves. Progressive, symmetrical, ascending bilateral weakness with areflexia is the most common initial presentation of most patients with a male predominance [4-6]. Muscle pain is another frequent initial symptom [7]. Risk of nerve damage and complications are more common in first 2 weeks of illness. When cranial nerves are involved, patient may present with facial, oculomotor or bulbar weakness. There are patients who may need mechanical ventilation due to respiratory insufficiency [8]. When sensory or autonomic nerves are involved, patients accordingly complain of sensory signs, ataxia and autonomic dysfunction. Autonomic dysfunction could be associated with poor outcome and prolong stay [9]. Studies have shown in-hospital mortality rate of patients with GBS was 6.45% [10]. Clinical features which predict poor outcome include involvement of cranial nerves, need for mechanical ventilation and maximum disability on presentation [11]. Electrophysiological studies are commonly used for diagnosis of GBS and its variants. CSF analysis supports diagnosis if show albuminocytological dissociation. Anti ganglioside antibodies are elevated in serum.

Depending upon the type of nerves involved, Guillain Barre Syndrome (GBS) is classified into acute inflammatory demyelinating polyneuropathy (AIDP), acute motor axonal neuropathy (AMAN), acute sensory motor axonal neuropathy (ASMAN), acute sensory neuropathy and Miller Fisher syndrome. AIDP have better outcome because of less severity in disability as compare to AMAN [12]. Studies show varying results regarding the frequencies of AIDP and AMAN in Asia including Pakistan [13, 14]. Recurrence is more common in AIDP than AMAN [11].

The variations in clinical features sometimes lead to misdiagnosis with consequent delay in appropriate treatment and out-

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come. It thus emphasizes the need to know the variants and their clinical presentations for timely intervention and better outcome. The identification and prompt management of predictors of bad prognosis will go a long way to reduce the morbidity and mortality associated with the disease. In order to improve outcome in these patients, an accurate and early recognition of predictors of bad prognosis is needed for timely management. There are very few studies conducted in Pakistan to determine the clinical and laboratory predictors of outcome. Our study helps in identifying patients who need intensive monitoring and aggressive treatment which will in turn help the health system in decreasing morbidity and mortality associated with Guillain Barre Syndrome.

MATERIALS AND METHODS

This is a retrospective, descriptive, observational, cross-sectional study, conducted at the Department of Pediatrics, Dr. RKMP Civil Hospital Karachi, a tertiary level hospital affiliated with Dow University of Health and Sciences. Exemption from institutional review boards was taken prior to the study. The duration of data review period was from January 2017 till June 2022. Medical records of patients aged > 3 months to 12 years, with a confirmed diagnosis of Guillain Barre Syndrome on the basis of nerve conduction velocity (NCV) study were reviewed and included in the study, using convenience sampling. Patients with Acute Flaccid Paralysis secondary to causes other than Guillain-Barre Syndrome were excluded.

Data were extracted in two parts, part-I had Demographic details such as age and gender, while part-II had clinical presentation including duration of illness, pattern of disease progression, association with pain, sensory, autonomic or cranial nerve involvement and variant of GBS as found on NCV study. We also recorded data regarding any complication during hospital stay, need of inotrope and /or mechanical ventilator and final outcome (discharged or expired) of the patient.

STATISTICAL ANALYSIS

Data was entered and analyzed in SPSS version 23. For independent variables, frequency, percentage, mean value, and standard deviation was used. For the assessment of odds to get an outcome, odds ratio test was calculated, using binary logistic regression to determine predictor with the value of 1 keeping as positive odds. The chi-square test was used to assess the significance of the data, p-value ≤ 0.05 was considered significant.

RESULTS

A total of 46 patients were enrolled in the study, mean age of study participants was 80.26 ± 31.7 months with a minimum of 36 months and a maximum of 138 months age. Gender distribution indicated male dominance n=29(63%). 41(89.1%) were from urban residences while only 05 (10.9%) were reported as rural residents. Maximum cases were reported during winter 31 (67.4%) while 15 (32.6%) were reported in summer. The most common variant of GBS identified was AIDP in 19 (41.3%) followed by ASMAN 14 (30.4%), AMAN 12 (26.1%) and Miller Fischer 1 (2.2%) (Fig. **1**).

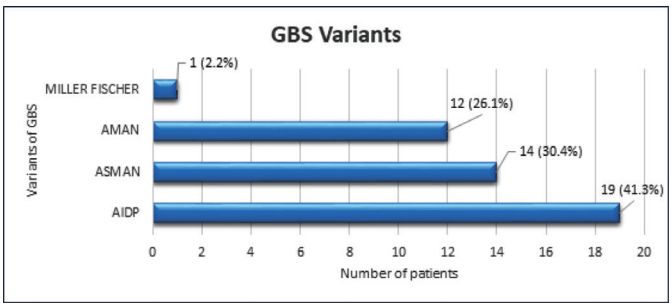

Fig. (1). Frequency of GBS Variant in Study Participants.

The mean duration of illness at the time of admission was documented as 4.0 ± 1.2 days. The progression of disease was categorized into two groups with equality of 7 days, as 7 days are known for ≤ 7 days and > 7 days indicating 21 (45.7%) and 25 (54.3%) of study participants in both groups respectively. Muscle pain and sensory involvement were identified in 32 (69.6%) and 9 (19.6%) study participants respectively. Cranial nerve and autonomic involvement were noted in 13 (28.2%) and 7 (15.2%) of patients respectively, while Bowel bladder control was lost in 8 (17.4%). Involved cranial nerves included Bulbar palsy in 7 (15.2%), Facial nerve palsy in 5 (10.9%), and opthalmoplegia in 1 (2.2%). 02 (4.3%) patients expired during the study period, rest were all managed and discharged.

Upon assessing the correlation between different variants of GBS and clinical features, we identified that disease progression of more than 7-days was most commonly reported in AIDP in 12 (26.0%), the reported p-value was insignificant with 0.75. There was highest frequency of muscle pain and mechanical ventilation in AIDP in 12 (26%) and 4 (8.6%) respectively. Sensory involvement was most frequenct in ASMAN in 6 (13%). A total of 02 patients expired during the study duration, 01 (2.17%) each belonged to AIDP and AMAN variant with a p-value of

Table 1. Details of Disease Presentation according to Variants of GBS in Study Participants.

Clinical Features		Variants of GBS				P-Value
		ASMAN Count(%)	AIDP Count(%)	AMAN Count(%)	MILLER FISCHER Count(%)	
Disease Progression	≤ 7 days (n=21)	7 (15.2)	7 (15.2%)	6 (13.0%)	1 (2.1%)	0.817
	> 7 days (n=25)	7 (15.2%)	12 (26.0%)	6 (13.0%)	0 (0%)	

Continued Table 1

Muscle Pain	**Yes (n=32)**	11 (23.9%)	12 (26%)	8 (17.3%)	1 (2.1%)	0.821
	No (n=14)	3 (6.5%)	7 (15.2%)	4 (8.6%)	0 (0)	
Sensory Involvement	**Yes (n=9)**	6 (13%)	2 (4.3%)	1 (2.1%)	0 (0)	0.574
	No (n=37)	8 (17.3%)	17 (36.9%)	11 (23.9%)	1 (2.1%)	
Autonomic Involvement	**Yes (n=7)**	1 (2.1%)	3 (6.5%)	3 (6.5%)	0 (0)	0.709
	No (n=39)	13 (28.2%)	16 (34.7%)	9 (19.5%)	1 (2.1%)	
Mechanical Ventilation	**Yes (n=9)**	3 (6.5%)	4 (8.6%)	2 (4.3%)	0 (0)	0.078
	No (n=37)	11 (23.9%)	15 (32.6%)	10 (21.7%)	1 (2.1%)	
Cranial Nerve Involvement	**Yes (n=13)**	4 (8.6%)	4 (8.6%)	4 (8.6%)	1 (2.1%)	0.591
	No (n=33)	10 (21.7%)	15 (32.6%)	8 (17.3%)	0 (0%)	
Loss of Bowel Bladder Control	**Yes (n=8)**	3 (6.5%)	2 (4.3%)	3 (6.5%)	0 (0%)	0.875
	No (n=38)	11 (23.9%)	17 (36.9%)	9 (19.5%)	1 (2.1%)	
Nerves Involved	**Bulbar Palsy (n=7)**	2 (4.3%)	2 (4.3%)	3 (6.5%)	0 (0)	0.766
	Facial Palsy (n=5)	2 (4.3%)	2 (4.3%)	1 (2.1%)	0 (0)	
	Opthal-moplegia (n=1)	0 (0)	0 (0)	0 (0)	1 (2.1%)	
Prognosis	**Discharge (n=44)**	14 (30.43%)	18 (39.13%)	11 (23.91%)	1 (2.17%)	0.684
	Expired (n=2)	0 (0)	1 (2.17%)	1 (2.17%)	0 (0)	

0.68. Details of the correlation between individual variants and clinical features are given in Table **1**. P-value turned out insignificant for all clinical features.

We determined the association of demographic and clinical features with mortality, as shown in Table 2, by using odds ratio to measure association between prognosais and determinants along with Chi square to assess significance. This indicated a positive association between winter season with 2.7 (95% CI 1.4-5.8) and progression within 7 days with 3.2 (95% CI 1.9-6.7). Other factors did not show association with increased chances of mortality (Table **2**).

The need for mechanical ventilation was linked with cranial nerve involvement with the help of correlation, and indicated the independent risk of mechanical ventilation with bulbar palsy involvement in 6 (13%) patients, while only 1 (2.1%) patient needed ventilation with facial nerve involvement. All patients in our study were given Intravenous Immunoglobulin as treatment as per institutional protocol.

DISCUSSION

Guillain-Barre Syndrome is an acutely debilitating condition, causing great deal of misery and distress to the patient as well as the family [15]. It is a treatable condition with an effective treat-

Table 2. Association of Demographic and Clinical Features with Risk of Mortality.

Demographic and Clinical Features		Alive	Expired	P-value	Odds Ratio	CI (95%)
Gender	**Male**	28 (60.8%)	1 (2.1%)	0.07	0.7	0.04-1.4
	Female	16 (34.7%)	1 (2.1%)			
Residence	**Urban**	40 (86.9%)	1 (2.1%)	1.51	0.9	0.2-1.1
	Rural	4 (8.6%)	1 (2.1%)			
Season	**Summer**	15 (32.6%)	0	0.04	0.5	2.4-2.8
	Winter	29 (63%)	2 (4.3%)			
Progression	**≤ 7 days**	19 (41.3%)	2 (4.3%)	0.01	3.2	1.4-3.9
	> 7 days	25 (54.3%)	0			
Variants of GBS on NCV	**ASMAN**	14 (30.4%)	0	0.87	0.5	0.5-1.8
	AIDP	18 (39.1%)	1 (2.1%)			
	AMAN	11 (23.9%)	1 (2.1%)			
	Miller Fischer	1 (2.1%)	0			

ment modality, intravenous immunoglobulin, which is though costly but is available widely and all patients in our study population received the treatment [16]. The risk of complication of disease which is respiratory failure is present despite timely institution of treatment. Patients with respiratory failure ultimately need mechanical ventilation which is itself associated with its own complications and risk of mortality. Thus we performed this research in an effort to identify the predictors of mortality to improve the management of these patients.

The mean age of patients in our study was 80.26 ± 31.7 months. Identical results have also been seen in other research conducted on the Asian population [17]. Male prevalence and patients presenting more in winter was reported in our study as well as in other published studies investgating GBS determinants. According to a study from Southern Iran, there are substantial seasonal and monthly variations, with maximal prevalence in spring and winter and 50% of patients admitted from February to June [18].

The reported mortality of study participants in our study was 2 (4.34%), which is comparatively lower than similar studies conducted in the Asian and American population [19]. The most commonly reported variant of GBS in our study was AIDP in 41.3% which was similar to the study conducted in India reported AIDP as most frequently reported variant with frequency of 13 (43.3%) out of 30 patients [20]. The insignificant association of mortality with variant of GBS in our study results is also similar to this study as well as another study conducted in China reported 18% of mortality [21].

There was a positive correlation of mortality with presentation of patients in winter season and rapid progression of disease in < 7 days. Previous study conducted in finland has evaluated similar results and indictaed higher mortality rate during winter season. However, <7 days progression is known as indepdnet risk factor for worst outcomes after GBS has been reported from studies of Asian countries including china and India [22, 23].

We tried to find the association of various clinical features with variants of GBS including , but the P-value was not significant for any of the features. Similar results were concluded in an indian study of GBS clinical profile evaluation. That indian study evaluated variants of GBS, invovment of cranial, autonomic and sensory nerves along with muscle pain and reported p-values as insignificant [24].

Numerous indicators, such as progressively rapid muscular weakening, an ineffective cough, bulbar involvement, and a quick decline in vital capacity, appear to be predictors of respiratory difficulties and, consequently, mechanical ventilation [25]. Bulbar palsy, as seen in the current cohort, has been proven to be an independent marker of the need for ventilation in both adults and children. Higher chances of mechanical ventilation requirments in patients with bulbar palsy is reported in our study as 06 (13%) of patients with bulbar palsy required mechanical ventilation.

LIMITATION

This is a single centre, retrospective study, which is limited to the duration of the hospital stay. Multicentre studies with a larger sample size and prospective designs are needed where the follow-up after discharge might give a more detailed perspective on the outcomes of various variants of GBS.

CONCLUSION

Acute inflammatory demyelinating polyneuropathy was the most common variant of guillian-barre syndrome with male predominance. Presentation in winter seasons and progression of disease in less than 7 days are risk factors for mortality. Bulbar palsy is an independent risk factor for mechanical ventilation, irrespective of GBS variant. Thus children with these presentations should be kept under strict monitoring and early shifting

to intensive care setting, to reduce the ultimate morbidity and mortality.

AUTHORS' CONTRIBUTION

- **Muhammad Rafique**: Conceived the idea, Reviewed the article critically, Final approval.
- **Sharmeen Nasir**: Interpreted the data, Drafted the article, Final approval.
- **Zareen Qasmi**: Contributed to acquisition of data, Reviewed the article, Final approval.
- **Waseem Jamalvi**: Analyzed the data, Drafted the article, Final approval.

CONFLICT ON INTEREST

Declared none.

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