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FREQUENCY & SPECTRUM OF GUILLAIN-BARRÉ SYNDROME IN CHILDREN PRESENTING WITH ACUTE FLACCID PARALYSIS

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Abstract

Objectives: *To determine the frequency of Guillain-Barré Syndrome in children presenting with acute flaccid paralysis and the spectrum of different types of Guillain-Barré Syndrome.*

Study Design: *Descriptive cross-sectional study.*

Place & Duration of Study: *Three months w.e.f 10-02-2025 to 10-05-2025 at the Department of Pediatric Medicine, The Children Hospital and University of Child Health Sciences, Lahore.*

Methodology: *Children presenting with acute flaccid paralysis at the Pediatric Medicine OPD & Emergency Department of The Children Hospital, Lahore were enrolled after informed consent from guardians. Guillain-Barré Syndrome was assessed clinically using the Medical Research Council (MRC) scale and confirmed through nerve conduction studies for subtype classification. All patients received standard departmental management. Data were recorded by the resident and analyzed using SPSS version 27.0 for statistical evaluation.*

Results: *In this study, 98 children with acute flaccid paralysis were evaluated. The mean age was 9.67 ± 3.23 years, with male predominance (60.2%). GBS was identified in 36 (36.7%) cases, most commonly demyelinating subtype (63.9%). Although higher frequency was observed in younger children and males, no significant associations were found.*

Conclusion: *Guillain-Barré Syndrome was identified as a significant cause of acute flaccid paralysis in children, with the demyelinating subtype being most common. Although higher frequencies were observed in younger age group and males, no statistically significant associations with age or gender were found. Early diagnosis and prompt management remain essential for better outcomes.*

INTRODUCTION

Acute flaccid paralysis (AFP) is an uncommon but clinically important neurological syndrome characterized by sudden onset of weakness with reduced muscle tone. It has a wide range of infectious and non-infectious causes that vary with age.[1,2] Historically, poliomyelitis was the leading cause; however, with vaccination efforts, its

incidence has declined, and other etiologies such as anterior horn cell lesions, GBS, diphtheria, myositis, and enterovirus D68 infections have become more relevant causes of AFP worldwide.[3,4] Globally, the incidence of AFP has shown an increasing trend, rising from 0.63 per 100,000 in 2009 to 4.96 per 100,000 in 2019.[3] In Pakistan, enhanced AFP surveillance between 2005 and 2010 has resulted in consistently high reporting rates of approximately 8 cases per 100,000 children under 15 years of age annually since 2010, which remains significantly above the WHO target of 2 per 100,000 child-years.[5]

Guillain-Barré syndrome is a leading cause of non-polio AFP and is an acute, immune-mediated, ascending neuropathy that typically follows an infectious trigger. It is characterized by progressive symmetrical limb weakness, areflexia, and cerebrospinal fluid findings of albuminocytological dissociation.[6] The global incidence of GBS ranges between 0.81 and 1.89 per 100,000 population, with a higher predilection in males, who are approximately 1.78 times more affected than females.[7] Clinically, GBS may present with muscle weakness, pain, and temporary paralysis involving facial, respiratory, limb, and bulbar muscles, which can lead to life-threatening complications if not promptly managed.[8,9]

Reported frequencies of GBS among children presenting with AFP vary widely across studies. Momen et al. reported a high frequency of 85.4% in Iran,[10] while Singh et al. documented a frequency of 56.6% in India.[11] Similarly, Sher et al. reported a frequency of 45.88% in Pakistan.[12] In contrast, lower frequencies have also been reported locally, including 21.0% by Memon et al.[13] and 18.88% by Ali et al. 2016.[14] This variability in reported data highlights a lack of consistency in the burden of GBS among AFP cases.

Inconsistent reports on the frequency of Guillain-Barré Syndrome in children with acute flaccid paralysis highlight a significant evidence gap in regional settings. In resource-limited countries like Pakistan, universal screening without firm local justification may be impractical. Therefore, reliable local data was essential to determine true burden, guide risk stratification, and ensure timely yet cost-effective management of affected children.

METHODOLOGY

This was a descriptive cross-sectional. The sample size was calculated as 98 cases using a 95% confidence level and 6% margin of error, taking an expected frequency of GBS as 85.4% in AFP patients.[10] Non-probability consecutive sampling technique was used. Children of either gender aged 5-15 years presenting with AFP, as per operational definition, were included in the study. Patients with AFP due to poliomyelitis, pre-existing neurological disorders such as cerebral palsy, muscular dystrophy, multiple sclerosis, and other known causes of peripheral neuropathy including diphtheria, HIV/AIDS, and vasculitis were excluded.

AFP was defined as acute onset weakness with associated clinical features including limb weakness, difficulty in breathing, speech impairment, urinary or bowel disturbances, blurred vision, and difficulty in walking, with at least four criteria fulfilled. Guillain-Barré Syndrome was diagnosed in patients with AFP based on clinical evaluation and Medical Research Council (MRC) scale for muscle strength, with a score ≤30 considered suggestive of GBS. Electrophysiological studies were used to classify GBS into demyelinating and axonal types. Demyelinating neuropathy was defined by reduced conduction velocity with prolonged distal and F-wave latencies, whereas axonal neuropathy was characterized by reduced amplitude of nerve action potentials.

Data were collected from patients presenting to the outpatient and emergency department after obtaining informed written consent from parents or guardians. Each patient was evaluated for GBS, and subtype classification was confirmed through nerve conduction studies (NCS). All patients received standard departmental management without any intervention from the researcher. To minimize observer bias, assessments were performed by a single senior consultant, and data were recorded by the resident.

All collected data were entered and analyzed using SPSS version 27.0. Quantitative variables such as age, duration of symptoms, and MRC score were presented as mean ± standard deviation. Categorical variables including gender, presence of GBS, and its types were expressed as frequency and

percentages. Stratification was performed for age and gender to control effect modifiers, and post-stratification chi-square test was applied. A p-value ≤0.05 was considered statistically significant.

RESULTS

A total of 98 children presenting with acute flaccid paralysis were included in the study. The mean age of the patients was 9.67 ± 3.23 years. Most of the children (56.1%) belonged to the 5–9 years age group, while 43.9% were between 10-15 years of age. There was a male predominance, with 59 (60.2%) males and 39 (39.8%) females. The mean duration of symptoms at presentation was 8.40 ± 3.73 days. The mean Medical Research Council (MRC) score among the study participants was 31.87 ± 13.69 as given in Table I.

Out of 98 children presenting with acute flaccid paralysis, GBS was diagnosed in 36 (36.7%) patients. Among them, the demyelinating type was the most common, observed in 23 (63.9%) cases, whereas the axonal type was identified in 13 (36.1%) patients. Data is shown in Table II.

As presented in Table III, the frequency of GBS was 22 (40.0%) in children aged 5–9 years and 14 (32.6%) in those aged 10-15 years, with no statistically significant association (p = 0.448). Similarly, GBS was observed in 23 (39.0%) males and 13 (33.3%) females, showing no significant gender-based difference (p = 0.570). As illustrated in Table IV, the demyelinating subtype of GBS was identified in 13 (59.1%) children aged 5-9 years and 10 (71.4%) aged 10-15 years, with no significant association (p = 0.452). With respect to gender, demyelinating GBS was observed in 13 (56.5%) males and 10 (76.9%) females, also demonstrating no statistically significant difference (p = 0.221).

Table I: Demographic Characteristics Children Presenting with Acute Flaccid Paralysis

Characteristics	Total (n=98)
Age (years)	9.67±3.23
• 5-9 years	55 (56.1%)
• 10-15 years	43 (43.9%)
Gender	
• Male	59 (60.2%)
• Female	39 (39.8%)
Duration of Symptoms	8.40±3.73
MRC Score	31.87±13.69

Table II: Frequency of GBS in Children Presenting with Acute Flaccid Paralysis

Characteristics	n, %age
GBS	
• Yes	36 (36.7%)
• No	62 (63.3%)
Type of GBS	
• Demyelinating GBS	23 (63.9%)
• Axonal GBS	13 (36.1%)

Table III: Frequency of GBS Stratified for Various Sub Groups

Characteristics	Yes	No	p-value
Age (years)			
• 5-9 years	22 (40.0%)	33 (60.0%)	0.448
• 10-15 years	14 (32.6%)	29 (67.4%)	

Gender			
• Male	23 (39.0%)	36 (61.0%)	0.570
• Female	13 (33.3%)	26 (66.70%)	

Chi Square test, taking p-value ≤0.05 as significant.

Table IV: Type of GBS Stratified for Various Sub Groups

Characteristics	Demyelinating GBS	Axonal GBS	p-value
Age (years)			
• 5-9 years	13 (59.1%)	9 (40.9%)	0.452
• 10-15 years	10 (71.4%)	4 (28.6%)	
Gender			
• Male	13 (56.5%)	10 (43.5%)	0.221
• Female	10 (76.9%)	3 (23.1%)	

Chi Square test, taking p-value ≤0.05 as significant.

DISCUSSION

Acute flaccid paralysis (AFP) remains a critical pediatric neurological problem with multiple etiologies, among which Guillain-Barré Syndrome (GBS) is a leading cause.[15,16] However, existing literature shows marked variability in reported frequency of GBS, ranging from low to high proportions across different populations, creating significant uncertainty.[10-14] This controversy limits accurate disease burden estimation and clinical planning. Therefore, the present study was conducted to determine the frequency and spectrum of GBS in children presenting with AFP in a local tertiary care setting.

In the present study, the mean age of children presenting with acute flaccid paralysis was 9.67 ± 3.23 years, with a slight predominance of the 5-9 years age group (56.1%). Similar age distribution has been reported in several regional studies, although some variation exists. Momen et al. also observed a higher burden of AFP in younger children, with a mean age of 5.39 ± 3.98 years, and more than half of the cases occurring below 5 years of age.[10] Likewise, El Hage et al. reported that the majority of AFP cases clustered in children under 10 years, particularly in the 5-9 years age bracket.[3] These findings are in agreement with the present study, suggesting that younger age groups remain more vulnerable to AFP-related conditions, possibly due to higher exposure to infections and immature immune responses.

Regarding gender distribution, the present study demonstrated a male predominance (60.2%), consistent with existing literature. Similar male preponderance has been reported by Ali et al. (59.57%),[14] Sher et al. (61.54%),[12] and Momen et al.,[10] where more than half of AFP cases occurred in males. This consistent pattern across studies suggests a possible biological or behavioral predisposition in males, although the exact mechanism remains unclear. However, despite male predominance, the present study found no statistically significant association between gender and occurrence of GBS, which aligns with the findings of Ali et al.,[14] where gender was not a significant determinant of specific AFP subtypes.

In terms of disease pattern, GBS was identified as the leading cause of AFP in the present study, accounting for 36.7% of cases, with demyelinating subtype being more common (63.9%) than axonal (36.1%). This is in accordance with findings by Momen et al.,[10] who reported GBS as the most common cause of non-polio AFP (21%), and Sher et al.,[12] who also identified GBS as the predominant diagnosis (45.88%) among AFP cases. Ismail et al. reported that Guillain-Barré syndrome was the most common cause of acute flaccid paralysis (40.5%), followed by transverse myelitis (15.7%) and hypokalemic paralysis (12.4%) among children.[17] Almalki et al. reported that among GBS patients with a defined electrophysiological subtype (n = 28), 13 (46.2%) had acute inflammatory

demyelinating polyneuropathy (AIDP), 11 (39%) had an axonal variant, and 4 (14%) were diagnosed with Miller Fisher syndrome (MFS).[18] Singh et al.[11] further supported this observation by reporting GBS in 30 of 53 AFP cases, highlighting its consistent role as a major etiological factor.

The subtype distribution observed in the present study is also supported by regional evidence, where demyelinating variants are generally reported as more frequent than axonal forms in pediatric populations. However, variation exists depending on geographic location and diagnostic criteria used. Despite this, the current study did not find any significant association of GBS subtype with age or gender, which is consistent with previous studies that also failed to demonstrate strong demographic predictors for electrophysiological variants.

Overall, the findings of this study reinforce that GBS remains a major contributor to AFP in children, particularly in younger age groups and males, although without statistically significant associations with demographic variables. This emphasizes the need for continued surveillance and early diagnostic evaluation in all AFP cases regardless of age or gender, to ensure timely identification and management of GBS.

This study highlights local burden of GBS in AFP with detailed electrophysiological confirmation. Limitations include single-centre design and limited sample size. Despite this, findings support early diagnosis strategies. Future multicentre studies with larger cohorts are recommended to improve generalizability and establish stronger epidemiological evidence for risk stratification and management.

CONCLUSION

Guillain-Barré Syndrome was identified as a significant cause of acute flaccid paralysis in children, with the demyelinating subtype being most common. Although higher frequencies were observed in younger age group and males, no statistically significant associations with age or gender were found. Early diagnosis and prompt management remain essential for better outcomes.

Authors Contribution

Author 1

Substantial contributions to study design, acquisition of data

Analysis & Interpretation of Data, Manuscript writing

Has given final approval of the version to be published

Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Substantial contributions to concept, study design Data Analysis, Manuscript writing, Critical Review

Has given final approval of the version to be published

Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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