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PREVALENCE OF GUILLAIN-BARRE SYNDROME IN ACUTE FLACCID PARALYSIS IN PATIENTS PRESENTED TO PEDIATRIC WARD CIVIL HOSPITAL SUKKUR

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Abstract

Objective: *To determine the frequency of Guillain-Barre Syndrome (GBS) in children presenting with acute flaccid paralysis at GMC Sukkur.*

Methods: *A cross-sectional study was conducted in the Department of Pediatric Medicine at GMC Sukkur from 1st March to 31th August 2024, using non-probability consecutive sampling. The study included children aged 1–15 years of either gender with acute flaccid paralysis (AFP) of sudden onset. Children with pseudoparalysis, viral myositis, congenital neurological deficits, syndromic conditions, or congenital anomalies were excluded to reduce bias. After ethical approval, data were collected from eligible patients at GMC Sukkur. Demographic and clinical information, including age, weight, illness duration, and immunization history, was recorded. Standard tools were used for anthropometric measurements. Neurological examination and investigations like CBC, CRP, blood culture, and CPK were performed. Suspected GBS cases underwent further testing, including CSF analysis and spinal MRI. Stool samples were sent to NIH Islamabad for polio testing. Diagnoses were based on clinical and laboratory findings. All tests were free or funded, and data were documented using a structured proforma.*

Results: *The study included 149 children with acute flaccid paralysis (AFP), of whom 89 were males (59.7%) and 60 were females (40.3%). The mean age was 11.04 ± 2.50 years, with a mean weight of 35.45 ± 10.03 kg and height of 120.12 ± 23.07 cm. A majority of the children (81.9%) were from rural areas. The most common AFP diagnosis was Guillain-Barré Syndrome (GBS) at 47.0%, followed by traumatic neuritis (38.9%), transverse myelitis (12.8%), and poliomyelitis (1.3%). Maternal education levels varied, with a skew toward higher education (22.1% graduate, 24.8% matriculation). Socioeconomic status showed that 53.0% of children came from lower socioeconomic backgrounds, 26.8% from middle class, and 20.1% from upper class. The mean illness duration was 39.76 ± 10.21 days. A significant gender difference was found in AFP subtypes, with GBS more prevalent in males ($p = .027$), and transverse myelitis more common in females. Socioeconomic status was also linked to AFP patterns ($p = .011$), with more cases in lower socioeconomic groups. Females had a slightly longer illness*

duration (41.33 ± 10.44 days) compared to males (38.70 ± 9.97 days), although this difference was not statistically significant (p = .122).

Conclusion: *The study found that Guillain-Barré Syndrome (GBS) was the most common cause of acute flaccid paralysis (AFP) in the study. The higher prevalence of GBS in males, as observed in this study, suggests potential gender-related differences in susceptibility or healthcare-seeking behavior. This finding aligns with other studies, indicating that GBS is a significant contributor to AFP, particularly in regions where polio has been largely eradicated.*

INTRODUCTION

AFP stands for Acute Flaccid Paralysis, and it produces neurological effects that generate rapid paralysis throughout different territories of the body, which might damage both limb functions and respiratory muscle performance and create varying degrees of disability. The nature of AFP as a critical clinical syndrome enables it to cover a broad series of potential causes, which include both viral infections and autoimmune diseases (1). Among the various mechanisms that cause AFP Guillain-Barré Syndrome (GBS) stands as the most recurrent and essential factor, especially when affecting pediatric patients. The identification of GBS prevalence patterns within African poliomyelitis frameworks remains vital for both patient treatment improvement and correct diagnosis capabilities, and resource-efficient health care delivery in Pakistani healthcare settings (2).

Pakistan faces an important public health issue of AFP due to multiple risk factors throughout the nation. Health authorities watch AFP disease cases because they present risks for ongoing polio eradication missions, which remain central in Pakistan (3). The nationwide polio vaccination efforts of Pakistan have yielded substantial results, but AFP continues to present an active concern for public health. The World Health Organization (WHO), combined with the Pakistan Ministry of Health, reports that children between 0-15 years old experience 1-2 AFP cases per 100,000 children each year. The landscape of AFP has shown that other etiologies, such as GBS, along with several unexplained causes, are currently becoming increasingly important because poliovirus is not responsible for all AFP cases (4).

The identified causes of Acute Flaccid Paralysis group themselves into three general categories, which include infectious and non-infectious, and post-infectious agents. The neurological complications that emerge from enterovirus and adenovirus, and influenza viral infections qualify as infectious causes of AFP (5). The three main forms of non-infectious AFP-causing are traumatic neuritis, together with transverse myelitis, while GBS also plays a role. After the infectious onset, numerous significant autoimmune disorders stem from viral infections (6). GBS stands out as the commonest non-polio cause of AFP worldwide, which affects numerous children globally. The occurrence of GBS affects AFP cases in Pakistan since non-polio infections remain the primary cause of AFP diagnoses (7).

Guillain-Barré Syndrome (GBS) produces an acute autoimmune condition that results in peripheral nerve damage, which generates a range of muscle strength decreases alongside sensory dysfunction and paralysis. GBS develops after an infectious episode, and respiratory or gastrointestinal infections are the main causes triggering its development (8). The common signs of GBS begin with symmetrical paralysis that progresses upward, starting from the legs before extending to the arms and respiratory muscles. The extreme form of GBS causes respiratory failure, which results in lasting neurological disorders unless medical intervention takes place shortly after symptom onset. The disease process of GBS activates immune cells that assault peripheral nerve myelin sheaths to generate conduction block, which results in muscle weakness (9). The condition advances quickly, so proper medical response during its course determines the severity of its results. The occurrence of GBS as a non-polio cause of paralysis stands as one of the prominent contributors to paralysis among children who display AFP presentations throughout the global healthcare spectrum. The research on GBS frequency in children with AFP in Pakistan shows that it affects approximately thirty to fifty percent of patients in certain regions (10). Regarding GBS, the high numbers of cases become worrisome because the

condition produces substantial immediate and prolonged illness effects in children, especially in resource-limited areas, which delay critical medical access. Detecting GBS as a primary factor behind AFP cases remains crucial due to its necessity for prompt diagnosis, followed by immunotherapy through IVIG and plasmapheresis to stop respiratory failure and permanent disabilities (11).

The primary contributors to AFP cases in Pakistan include GBS, along with traumatic neuritis and, very rarely, poliomyelitis after other potential causes such as transverse myelitis. However, the polio rate continues to decline throughout Pakistan. Non-polio AFP case elevations require additional investigation because viral infections and environmental elements, and autoimmune disorder conditions may serve as alternative explanations for these instances (12). Afghan Children who develop AFP primarily live in rural regions because both healthcare facilities are sparse and vaccination programs remain insufficient. The distribution of populations across regions complicates AFP observation and diagnosis distinction between polio and other causes, because society must establish advanced tracking methods for case analysis (13).

AFP poses an increased public health challenge to Pakistan because its elimination program for poliovirus needs broad surveillance and extensive vaccination efforts. Public attention toward poliovirus surveillance has resulted in non-polio causes of AFP gaining recognition as GBS and other conditions (4). Healthcare providers need to demonstrate continuous observation and perform extensive endpoint diagnosis assessments when treating cases of Acute Flaccid Paralysis, especially with child patients. Making GBS diagnoses at the right time enables treatment approaches that improve patient outcomes by minimizing disability prospects (1).

Methods:

A cross-sectional study was conducted in the Department of Pediatric Medicine at GMC Sukkur from 1st March to 31th August 2024, using non-probability consecutive sampling. The study included children aged 1-15 years of either gender presenting with acute flaccid paralysis (AFP) of sudden onset. Children with pseudoparalysis, viral myositis, congenital neurological deficits (e.g., hydrocephalus, meningomyelocele), syndromic conditions, or congenital anomalies such as Down syndrome were excluded to minimize bias. After approval from the CPSP and the ethical review committee, data were collected from eligible patients admitted to the Department of Pediatric Medicine, GMC Sukkur. Demographic and clinical information, including age, weight, illness duration, immunization history, and prior illnesses, was recorded. Weight and height were measured using standard tools. All patients underwent neurological examination, and relevant investigations such as CBC, CRP, blood culture, and CPK were performed. For suspected GBS, additional tests included serum electrolytes, cerebrospinal fluid analysis (elevated protein with normal WBC), and MRI of the spine. Similar evaluations were done for transverse myelitis. For polio diagnosis, two stool samples were collected 24 hours apart within 14 days of onset and sent to the NIH in Islamabad per WHO guidelines. A history of recent intramuscular injections was documented. Final diagnoses were based on clinical, laboratory, and epidemiological data. Investigations were performed either freely at the civil hospital or supported by Zakat welfare funds. All findings were documented on a structured proforma, and strict adherence to exclusion criteria ensured reliability.

RESULTS

Of 149 children with acute flaccid paralysis (AFP) of sudden onset of duration enrolled in the study, 89 were males and 60 were females, which constitutes about 59.7% males and 40.3% females. The mean age of the children was 11.04 ± 2.50 years, while the mean weight and height were found to be 35.45 ± 10.03 kg and 120.12 ± 23.07 cm respectively (Table-1).

In terms of demographic distribution, a substantial majority of the participants were from rural areas (81.9%), with only 18.1% residing in urban settings, indicating a rural predominance among reported cases (Table-1). When evaluating the type of Acute Flaccid Paralysis (AFP), the most common diagnosis was Guillain-Barré Syndrome (GBS), accounting for 47.0% of cases, followed by traumatic neuritis (38.9%), transverse myelitis (12.8%), and a small proportion of Poliomyelitis (1.3%), highlighting that non-polio causes constitute the vast majority of AFP presentations in this cohort (Figure-1).

Maternal level of education varied, with graduate (22.1%) and matriculation (24.8%) being the most frequently reported levels, followed by intermediate (21.5%), secondary (16.8%), and Primary education (14.8%), suggesting a fairly balanced distribution with a moderate skew toward higher educational attainment. Regarding socioeconomic status (SES), more than half of the participants (53.0%) belonged to the lower socioeconomic group, while 26.8% were from the middle class, and only 20.1% represented the upper class, reflecting the socioeconomic disparities commonly observed in healthcare access and reporting patterns in developing regions. The mean duration of illness among children with AFP was found to be 39.76 ± 10.21 days (Table-1).

Socio-Demographics	**N (%) / Mean ± SD Total=149**
Gender	
Male	89 (59.7%)
Female	60 (40.3%)
Anthropometric measurements	
Age (in years)	11.04 ± 2.50
Weight (in kg)	35.45 ± 10.03
Height (in cm)	120.12 ± 23.07
Residential status	
Urban	27 (18.1%)
Rural	122 (81.9%)
Maternal Education Level	
Primary	22 (14.8%)
Secondary	25 (16.8%)
Intermediate	32 (21.5%)
Matriculation	37 (24.8%)
Graduate	33 (22.1%)
Socioeconomic Status (SES)	
Upper	30 (20.1%)
Middle	40 (26.8%)
Lower	79 (53.0%)
Mean Duration of Illness (days)	39.76 ± 10.21

Table-1: Socio-Demographic and Clinical Characteristics of Children with Acute Flaccid Paralysis (n = 149)

Further analysis revealed meaningful associations between AFP subtypes and key demographic and socioeconomic variables. A significant association was observed between gender and type of AFP, with Guillain-Barré Syndrome (GBS) being more prevalent among males (n = 50) compared to females (n = 20), while Transverse myelitis was more frequently seen in females. This association was statistically significant (p = .027), suggesting potential gender-related differences in susceptibility or healthcare-seeking behavior (Table-2).

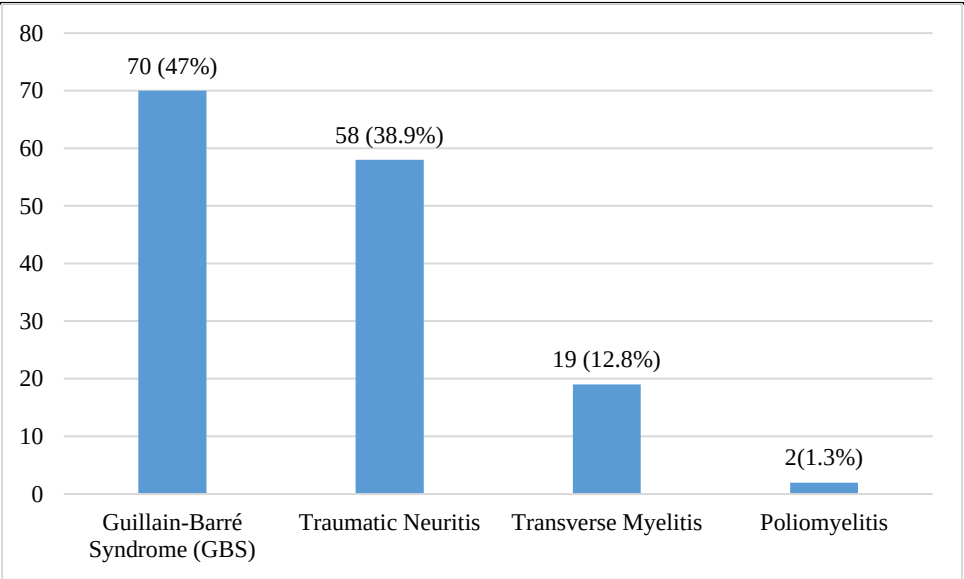

Figure-1 :-Distribution of acute flaccid paralysis (AFP) diagnoses among pediatric patients (n= 149)

In contrast, the relationship between maternal education level and AFP subtype was not statistically significant (p = .315), indicating that variations in educational background may not directly influence the type of AFP presentation in children. Similarly, no significant association was found between place of residence and AFP type (p = .731), suggesting a fairly even distribution of AFP subtypes across urban and rural populations (Table-2).

However, socioeconomic status showed a significant link with AFP patterns (p = .011). The majority of cases were reported among individuals from lower socioeconomic backgrounds, particularly in GBS and traumatic neuritis, highlighting the potential influence of socioeconomic disparities on health outcomes and disease reporting (Table-2).

Regarding the duration of illness, females had a slightly longer average duration (41.33 ± 10.44 days) compared to males (38.70 ± 9.97 days). Although this difference did not reach statistical significance (p = .122), the trend suggests that female patients may experience a more prolonged course of illness, warranting further investigation in future studies (Table-2).

Variables	Guillain-Barré (n = 70)	Transverse Myelitis (n = 19)	Traumatic Neuritis (n = 58)	Poliomyelitis (n = 2)	P-value
Gender					
Males (n = 89)	50 (56.2%)	7 (7.9%)	31 (34.8%)	1 (1.1%)	**0.027***
Females (n = 60)	20 (33.3%)	12 (20.0%)	27 (45.0%)	1 (1.7%)	
Maternal Education					
Primary (n = 22)	10 (45.5%)	1 (4.5%)	10 (45.5%)	1 (4.5%)	0.315
Secondary (n = 25)	10 (40.0%)	5 (20.0%)	10 (40.0%)	0 (0.0%)	
Matriculation (n = 37)	16 (43.2%)	8 (21.6%)	13 (35.1%)	0 (0.0%)	
Intermediate (n = 32)	13 (40.6%)	3 (9.4%)	15 (46.9%)	1 (3.1%)	

Graduate (n = 33)	21 (63.6%)	2 (6.1%)	10 (30.3%)	0 (0.0%)	
Socioeconomic Status					
Upper (n = 30)	14 (46.7%)	5 (16.7%)	9 (30.0%)	2 (6.7%)	**0.011***
Middle (n = 40)	14 (35.0%)	9 (22.5%)	17 (42.5%)	0 (0.0%)	
Lower (n = 79)	42 (53.2%)	5 (6.3%)	32 (40.5%)	0 (0.0%)	

Table-2: - Association of Demographic and Socioeconomic Variables with AFP Subtypes

DISCUSSION: -

This study provides important insights into the demographic, clinical, and socioeconomic characteristics of children with acute flaccid paralysis (AFP), with findings that are largely consistent with previously published data, while also offering new perspectives in the local context. The observed male predominance, where 59.7% of the children were male, mirrors findings from multiple studies across different populations. For instance, studies from both Iraq and Pakistan have similarly reported a higher incidence of Guillain-Barré Syndrome (GBS) among males, with suggested explanations ranging from biological susceptibility to potential differences in healthcare-seeking behaviors among male and female children (14). The exact reasons behind this disparity are still not fully understood, but immunological and hormonal differences, as well as cultural and social biases in healthcare access, may contribute to this pattern.

The mean age of affected children was 11.04 years, which falls within the school-age group and is comparable to findings from similar studies in South Asia. For example, research conducted at the National Institute of Child Health in Karachi showed a similar age distribution for children with AFP, further emphasizing that this age group may be particularly vulnerable due to higher exposure to viral pathogens or post-infectious neurological syndromes like GBS (12). The more frequent occurrence of transverse myelitis among females, as observed in this study, is also supported by prior evidence suggesting that autoimmune conditions tend to have a higher prevalence in females, although further research is needed to confirm whether this trend is consistent across broader AFP cohorts.

The striking rural predominance (81.9%) among AFP cases is consistent with other studies conducted in low- and middle-income countries. A comparable pattern was seen in Nigeria, where a large majority of cases also came from rural settings (15). The high incidence in rural populations can likely be attributed to factors such as poor sanitation, limited immunization coverage, inadequate access to early healthcare, and lower overall health awareness. These factors not only increase the risk of infections that may precede AFP but also delay diagnosis and treatment, which may impact outcomes (16).

Regarding socioeconomic status, more than half of the participants belonged to the lower socioeconomic group. This finding resonates with global evidence that highlights the disproportionate burden of disease among disadvantaged populations. The significant association observed between socioeconomic status and AFP subtype in this study suggests that children from poorer families are more likely to present with severe forms like GBS and traumatic neuritis (17). This may reflect the compounding effects of poor nutrition, limited access to preventive services, and delayed medical attention. In contrast, maternal education did not show a statistically significant association with AFP subtype. Although education is often linked to improved child health outcomes, this result may indicate that other socioeconomic or environmental factors play a more dominant role in determining disease type and severity in the context of AFP (18).

The clinical spectrum of AFP in this cohort was led by GBS (47.0%), followed by traumatic neuritis (38.9%) and transverse myelitis (12.8%), with only 1.3% of cases attributed to poliomyelitis. This confirms the global trend that non-polio causes of AFP now dominate, especially in regions where poliomyelitis has been largely eradicated due to successful vaccination campaigns (3). Similar distributions have been reported in multiple international studies, such as those from Honduras and Iraq, where GBS was also the most frequently diagnosed cause of AFP (14, 19).

The low incidence of polio-related AFP in the current study supports the effectiveness of polio eradication efforts but also underscores the need for robust surveillance systems to monitor and manage non-polio AFP etiologies.

In terms of disease duration, female patients experienced a slightly longer course of illness than males, though the difference was not statistically significant. This trend, however, may point toward possible delays in healthcare access or biological differences in disease progression that deserve further exploration in future longitudinal studies.

CONCLUSION: -

Altogether, the present study underlines the relevance of SES and gender factors in determining the pattern and prognosis of AFP and calls for appropriate health services and policies addressing the rural and low-income groups. The future monitoring and auditing of AFP cases remain an essential activity not only in the endeavor to maintain poliomyelitis eradication campaign but also in identifying other severe neurological illnesses that child patients suffer from.

CONFLICT OF INTEREST: - The authors declare no conflict of interest.

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