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Original Research Article

A CROSS-SECTIONAL STUDY ON CLINICAL PROFILE OF ACUTE FLACCID PARALYSIS IN ADULT PATIENTS ADMITTED IN INTENSIVE CARE UNIT IN A TERITARY CARE HOSPITAL

B.Sivasubramanian[1], L.Senthil Raja Perumal[2], K. Palaniprabhu[3]

[1]Assistant Professor, Department of General Medicine, Tirunelveli Medical College, Tamilnadu, India
[2]Senior Resident, Department of Geriatric Medicine, Tirunelveli Medical College, Tamilnadu, India
[3]Assistant Surgeon, Department of General Medicine, Government Hospital Kamuthi, Ramanathapuram, Tamilnadu, India

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Corresponding Author:
Dr. Poonam Woike,
Email: poonamwoike20@gmail.com

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ABSTRACT

Background: Acute flaccid paralysis (AFP) is a neurological emergency with diverse aetiologies and variable clinical presentations. Early identification of the underlying cause is crucial for appropriate management and improved patient outcomes. This study evaluated the etiological spectrum, clinical profile, and outcomes of AFP in adults admitted to the intensive care unit. **Materials and Methods:** A cross-sectional study was conducted among 52 patients with AFP admitted to Tirunelveli Medical College Hospital over a two-year period. Clinical evaluation and relevant biochemical, electrophysiological, cerebrospinal fluid, and neuroimaging investigations were performed to establish the diagnosis. Patients were followed up until discharge or death. **Result:** The mean age was 44.0 ± 12.7 years, and 61.5% of the patients were male. Quadriplegia was the most common presentation (32.7%). Most patients presented within one day of the onset of symptoms (57.7%). Neurotoxic snake bites (32.7%) and Guillain-Barré syndrome (28.8%) were the leading aetiologies. Mechanical ventilation was required in 30.8% of the patients. Complete recovery occurred in 73.1% of patients, while mortality was 13.5%. Presenting illness, duration of illness, mechanical ventilation, hospital stay, and final diagnosis were significantly associated with the outcome. **Conclusion:** Neuroparalytic snake bites and Guillain–Barré syndrome were the predominant causes of AFP in this study. The requirement for mechanical ventilation was significantly associated with poor clinical outcomes, highlighting the importance of early presentation, timely diagnosis, and appropriate disease-specific management.

INTRODUCTION

Acute flaccid paralysis (AFP) is a neurological syndrome characterised by sudden onset of weakness, with reduced muscle tone and absent or diminished deep tendon reflexes. Because weakness may progress rapidly and involve the respiratory muscles, AFP remains a neurological emergency that requires early diagnosis and timely intervention. The syndrome includes a wide range of disorders affecting the peripheral nerves, neuromuscular junctions, muscles, and spinal cord, making etiological identification crucial for appropriate management and better outcomes.[1,2]

Guillain-Barré syndrome (GBS) is one of the most common causes of AFP worldwide and contributes substantially to both adult and paediatric cases.[1,2] Other important aetiologies include hypokalaemic periodic paralysis, neuroparalytic snake envenomation, myasthenic crisis, acute myopathies, transverse myelitis, and neuromyelitis optica spectrum disorders. Secondary hypokalemic paralysis, particularly thyrotoxic periodic paralysis, may closely mimic GBS but often improves rapidly after potassium replacement.[3,4] Less frequent causes, such as infectious myelitis, acute intermittent porphyria, hyperkalaemic paralysis, and toxin-induced paralysis, further widen the differential diagnosis.[5-7]

Patients commonly present with acute limb weakness, hypotonia, and areflexia, although cranial nerve, bulbar, respiratory, and autonomic involvement may also be observed. Respiratory failure remains one of the most serious complications and frequently necessitates intensive care and mechanical ventilation. Autonomic disturbances, including cardiac arrhythmias and blood pressure

instability, along with bulbar dysfunction causing dysphagia and aspiration, may significantly worsen the prognosis.[8] The overlap in clinical manifestations among various aetiologies often makes early diagnosis difficult. Conditions such as hypokalemic paralysis may resemble GBS both clinically and electrophysiologically, resulting in diagnostic uncertainty and delayed treatment.[3,6]

Diagnosis requires a systematic approach that combines clinical evaluation with focused investigations. Neurological examination remains central to identifying patterns of weakness, sensory involvement, cranial nerve deficits, and autonomic dysfunction. Laboratory tests, particularly serum electrolyte and thyroid function studies, are important for detecting reversible metabolic causes.3,4 Electrophysiological studies help differentiate demyelinating and axonal neuropathies, whereas magnetic resonance imaging is useful for identifying spinal cord lesions and inflammatory myelopathies.[7,9] Cerebrospinal fluid analysis provides additional diagnostic support, especially for GBS and inflammatory disorders of the central nervous system.[2]

The epidemiology of AFP varies by region. While GBS predominates in many developed countries, hypokalaemic paralysis and neuroparalytic snakebites remain important causes in developing nations, particularly in the Indian subcontinent.[1,10] Gupta and Daid reported GBS in more than half of AFP cases, followed by hypokalemic paralysis and snakebite. Environmental exposure, rural occupation, nutritional status, and healthcare accessibility contribute to regional differences.[1] Similar trends have been observed in other South Asian countries, where GBS remains predominant, but metabolic and infectious causes continue to contribute significantly.[11,12]

Despite advances in diagnostics and critical care, AFP remains a major challenge in resource-limited settings. Most available studies focus on individual disorders, such as GBS, hypokalaemic paralysis, or neuroparalytic snakebites, rather than AFP as a unified clinical syndrome.[12,13] Furthermore, comprehensive ICU-based studies evaluating the full etiological spectrum, clinical profile, and outcomes of AFP in adults are limited, particularly in South India. Therefore, region-specific data are essential for improving diagnostic accuracy, guiding timely treatment, optimising resource utilisation, and enhancing patient outcomes in this population.

Aim: This study aimed to evaluate the aetiology, clinical profile, clinical course, and outcomes of acute flaccid paralysis in patients admitted to the intensive care unit.

MATERIALS AND METHODS

This cross-sectional study was conducted among adult patients with AFP admitted to the Emergency Department of Tirunelveli Medical College Hospital, a tertiary care centre in South Tamil Nadu, over a period of 2 years. The study was approved by the Tirunelveli Medical College Institutional Research Ethics Committee (ECR/1227/Inst/TN/2019). Written informed consent was obtained from all participants before enrolment into the study.

Inclusion and Exclusion criteria:

This study included all patients aged > 12 years who presented with weakness for a duration of less than 6 weeks. Patients with a longer duration of illness, upper motor neuron involvement on clinical examination, and traumatic causes of weakness were excluded.

Materials: The materials used in the study included standard clinical examination tools, biochemical investigations, neuroimaging studies, cerebrospinal fluid analysis, nerve conduction studies, magnetic resonance imaging, and other relevant diagnostic investigations required for etiological evaluation of AFP.

Methods: All patients who fulfilled the inclusion criteria and were admitted during the study period were enrolled in the study. After obtaining informed consent, 52 patients were included according to the inclusion and exclusion criteria. A detailed history and clinical examination were performed by a single examiner, and relevant biochemical and neuroimaging studies were performed. A predefined diagnostic algorithm was used for the evaluations. Patients were initially categorised according to the onset and progression of weakness. Serum potassium levels, thyroid function tests, nerve conduction studies, magnetic resonance imaging, cerebrospinal fluid analysis, and other relevant investigations were performed to establish the etiological diagnosis. Magnetic resonance imaging and cerebrospinal fluid analysis were performed on patients suspected of having Guillain–Barré syndrome and other relevant neurological disorders. The patients were followed up during their hospital stay until discharge or death.

Statistical analysis: Continuous variables were summarized as mean ± standard deviation (SD), whereas categorical variables were presented as frequencies and percentages. Categorical variables were compared using the Pearson chi-square test. Where applicable, Fisher's exact test was used. Significance was defined by P values less than 0.05 using a two-tailed test. Data analysis was performed using IBM SPSS version 23.0 (IBM SPSS Science Inc., Chicago, IL, USA).

RESULTS

The majority of patients belonged to the 51-60 years age group (32.7%), followed by 31-40 years (30.8%), 41-50 years (15.4%), 21-30 years (13.5%), >60 years (5.8%), and <20 years (1.9%). The mean age of the patients was 44.0 ± 12.7 years old. Male patients comprised 61.5% of the study population, whereas females comprised 38.5%. With respect to comorbidities, 61.5% of patients had no comorbid

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illnesses. Among those with comorbidities, diabetes mellitus was the most common condition, observed in 15.4% of patients, followed by coronary artery disease and combined diabetes mellitus with hypertension, each reported in 7.7% of patients. Hypertension alone and combined hypertension with coronary artery disease were reported in 3.8% of patients each [Table 1].

Table 1: Baseline demographic characteristics and comorbidities among patients

Parameters		**N (%)**
Age group (years)	<20	1 (1.9%)
	21-30	7 (13.5%)
	31-40	16 (30.8%)
	41-50	8 (15.4%)
	51-60	17 (32.7%)
	>60	3 (5.8%)
	Mean ± S.D.	44.0 ± 12.7
Gender	Male	32 (61.5%)
	Female	20 (38.5%)
Comorbidities	No comorbidity	32 (61.5%)
	Coronary artery disease	4 (7.7%)
	Diabetes mellitus	8 (15.4%)
	Hypertension	2 (3.8%)
	Diabetes mellitus + Hypertension	4 (7.7%)
	Hypertension + coronary artery disease	2 (3.8%)

Quadriplegia was the most common clinical presentation, observed in 32.7% of patients, followed by quadriparesis (23.1 %), diplopia (19.2 %), paraplegia (15.4 %), and paraparesis (7.7 %). Quadriplegia with dysphagia was the least common presentation, occurring in 1.9% of patients. Regarding the duration of illness, the majority of patients presented within one day of symptom onset (57.7%), while 32.7% presented between 2 and 5 days, and 9.6% presented after more than 5 days of illness.

In final diagnosis, neurotoxic snake bites were most common aetiology, reported in 32.7% of patients, followed by Guillain-Barré syndrome in 28.8%. Hypokalaemia with distal renal tubular acidosis and hypokalaemic periodic paralysis each contributed to 11.5% of cases, whereas hypokalaemia with gastrointestinal loss was observed in 7.7% of cases. Myasthenia gravis was reported in 3.8% of cases. Hyperthyroid hypokalaemic paralysis and seasonal myasthenic syndrome were the least common aetiologies, each reported in 1.9% of patients [Table 2].

Table 2: Clinical presentation, duration of illness, and etiological diagnosis among patients

Parameters		**N (%)**
Clinical presentation	Diplopia	10 (19.2%)
	Paraparesis	4 (7.7%)
	Paraplegia	8 (15.4%)
	Quadriparesis	12 (23.1%)
	Quadriplegia	17 (32.7%)
	Quadriplegia with dysphagia	1 (1.9%)
Duration of illness	<1 day	30 (57.7%)
	2-5 days	17 (32.7%)
	>5 days	5 (9.6%)
Final diagnosis	Neurotoxic snake bite	17 (32.7%)
	Guillain-Barre syndrome	15 (28.8%)
	Hypokalaemia with distal renal tubular acidosis	6 (11.5%)
	Hypokalaemia periodic paralysis	6 (11.5%)
	Hypokalaemia with gastrointestinal loss	4 (7.7%)
	Myasthenia gravis	2 (3.8%)
	Hyperthyroid hypokalemic paralysis	1 (1.9%)
	Seasonal myasthenic syndrome	1 (1.9%)

Anti-snake venom with neostigmine-atropine and intravenous potassium chloride infusion were the most frequently administered treatments, each used in 30.8% of the patients. Plasma exchange was performed in 25.0% of patients, whereas intravenous immunoglobulin and mechanical ventilation were used as the primary interventions in 3.8% of patients. Anti-snake venom alone, intravenous potassium chloride with antithyroid therapy, and intravenous methylprednisolone were administered to 1.9% of patients each.

Mechanical ventilation was required in 30.8% of the patients, whereas 69.2% did not require ventilatory support. Among the ventilated patients, the duration was most commonly 3 and 5 days (25.0% each), followed by 1 and 4 days (12.5% each). Ventilation for 2, 11, 12, and 24 days was noted in 6.2% of the cases. Most patients stayed in the hospital for 7–14 days (48.1%), followed by less than 7 days (44.2%) and more than 14 days (7.7%). The mean hospital stay was 8.7 ± 4.0 days. Complete recovery occurred in 73.1% of the patients, whereas partial recovery and

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death were observed in 13.5% of the patients [Table 3].

Table 3: Treatment modalities, ventilatory support, duration of mechanical ventilation, length of hospital stays, and clinical outcomes among patients

Category		N (%)
Treatment received	Anti-snake venom (ASV)	1 (1.9%)
	ASV + Neostigmine-Atropine	16 (30.8%)
	Intravenous potassium chloride infusion	16 (30.8%)
	Intravenous potassium chloride infusion + antithyroid therapy	1 (1.9%)
	Intravenous methylprednisolone	1 (1.9%)
	Intravenous immunoglobulin	2 (3.8%)
	Mechanical ventilation	2 (3.8%)
	Plasma exchange (PLEX)	13 (25.0%)
Mechanical ventilation	Yes	16 (30.8%)
	No	36 (69.2%)
Duration of mechanical ventilation (n = 16) (in days)	1	2 (12.5%)
	2	1 (6.2%)
	3	4 (25.0%)
	4	2 (12.5%)
	5	4 (25.0%)
	11	1 (6.2%)
	14	1 (6.2%)
	24	1 (6.2%)
Length of hospital stay (in days)	<7	23 (44.2%)
	7 to 14	25 (48.1%)
	>14	4 (7.7%)
	Mean ± S.D.	8.7 ± 4.0
Clinical outcome	Complete recovery	38 (73.1%)
	Partial recovery	7 (13.5%)
	Death	7 (13.5%)

Among the patients who died, quadriplegia (42.9%) was the most frequent presenting illness, followed by quadriparesis (28.6%). A similar pattern was observed among those who achieved complete recovery, with quadriplegia and quadriparesis reported in 31.6% and 26.3% of cases. Presenting illness was significantly associated with clinical outcomes (p=0.05). Patients presenting within one day of symptom onset had a higher rate of complete recovery (71.1%), whereas death was observed in those with illness duration greater than one day (42.9%) (p<0.001).

Complete recovery was observed commonly among patients who did not require mechanical ventilation (84.2%), whereas only 15.8% of ventilated patients recovered completely. Mechanical ventilation was significantly associated with the outcome (p<0.001). Similarly, complete recovery was more frequent among patients with a hospital stay of less than 7 days (50.0%), whereas 28.6% of deaths occurred in those hospitalised for > 14 days (p<0.05). Neurotoxic snake bites were reported in 39.5% of complete recoveries and 28.6% of deaths, with diagnosis showing a significant difference in outcome (p<0.001). Age, sex, and comorbidities were not significantly associated with the outcomes (p>0.05) [Table 4].

Table 4: Factors associated with clinical outcomes among patients

Parameters		N (%)	P value
Presenting illness	Death-Quadriplegia	42.90%	0.05
	Death-Quadriparesis	28.60%	
	Complete recovery-Quadriplegia	31.60%	
	Complete recovery-Quadriparesis	26.30%	
Duration of illness	Complete recovery-Illness <1 day	71.10%	<0.001
	Death-Illness >1 day	42.90%	
Mechanical ventilation	Complete recovery-Mechanical ventilation present	15.80%	<0.001
	Complete recovery-Mechanical ventilation absent	84.20%	
Length of hospital stay	Complete recovery-Hospital stay <7 days	50.00%	<0.05
	Death-Hospital stay >14 days	28.60%	
Final diagnosis	Complete recovery-Neurotoxic snake bite	39.50%	<0.001
	Death-Neurotoxic snake bite	28.60%	
Age	No significant association with outcome	-	NS
Gender	No significant association with outcome	-	NS
Comorbidities	No significant association with outcome	-	NS

DISCUSSION

The epidemiological and etiological spectrum of AFP in adults varies considerably across regions, with recent studies demonstrating the predominance of GBS, hypokalaemic paralysis, or neurotoxic snake envenomation, depending on the local disease burden. In contrast to many AFP studies that focus

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predominantly on a single aetiology, our study represents a mixed intensive care unit (ICU)-based AFP population, allowing comparison across multiple etiological categories.

The age distribution in our study showed a predominance of middle-aged adults, similar to the findings of Mohsin et al., who reported a mean age of 37.3 ± 16.2 years, with mean ages of 40.2 ± 17.1 years among men and 33.4 ± 14.1 years among women. In their series, GBS was reported in 54.7% of all AFP cases.14 González et al. reported a higher mean age of 54 years among critically ill GBS patients, whereas Gupta et al. observed a younger snakebite population with a mean age of 32.14 years.[15,16] Govil et al. further noted that 56.7% of neurotoxic snakebite patients belonged to the 25-50-year age group.[17] Similar to our findings, age was not a major determinant of outcomes in these studies.

Male predominance observed in our study was comparable to that reported by Mohsin et al. (57.5%), Agarwal et al. (81.7%), González et al. (68%), and Gupta et al., who documented a male-to-female ratio of 2.44:1.14-16,18 Likewise, sex did not appear to significantly influence the outcome. The clinical profile in our study was characterised predominantly by severe motor weakness, with quadriplegia and quadriparesis being the most common presentations. Gupta et al. reported that neuroparalytic manifestations occurred in 95.35% of patients, ptosis and diplopia were present in 100% of patients, and respiratory distress in 95.34% of patients.[16] In contrast, Agarwal et al. found lower limb weakness in 100% and upper limb weakness in 33.3% of AFP cases, with GBS reported in 75% of the diagnoses.[18] Manju et al. reported antecedent illness in 48%, limb weakness in 77%, autonomic dysfunction in 35.8%, sensory symptoms in 16%, and bulbar palsy in only 6% of patients with GBS.[19]

Early presentation following symptom onset was common in our study and was significantly associated with the outcome. This aligns with Gupta et al. who reported that 61.6% of snakebite patients reached the hospital within six hours, while Govil et al. reported a significant association between time to hospital arrival, duration of mechanical ventilation, and symptom resolution ($p<0.05$).16,17 In contrast, González et al. found that 60% of critically ill patients with GBS presented between 3 and 7 days after symptom onset.[15] Overall, clinical outcome in our study was influenced primarily by diagnosis, timing of presentation, and ventilatory requirement, findings that closely parallel those reported by González et al., Gupta et al., Paudel et al., and Laha et al., who recorded four deaths among 100 AFP patients.[15,16,20,21]

The etiological profile of our study differed from that of many published AFP series. Mohsin et al. reported GBS in 54.7% of cases, followed by hypokalaemic paralysis (14.2%), myasthenia gravis (7.5%), thiamine deficiency (7.5%), transverse myelitis (4.7%), and cord compression (1.9%). Agarwal et al. similarly identified GBS in 75% of AFP cases.[14,18] In contrast, Laha et al. found hypokalaemic paralysis to be the most common aetiology and reported a mortality rate of 4%.[21] In contrast to these studies, neurotoxic snakebites constituted a major component of our population, showing regional epidemiological differences. Hospital stay in our study was generally longer than that reported by Paudel et al., where 68.52% of patients stayed for less than five days.[20]

The management patterns in our study were consistent with the underlying diagnoses, with antivenom therapy for snake bites, plasma exchange or intravenous immunoglobulin (IVIG) for GBS, and potassium replacement for hypokalaemic paralysis. Manju et al. showed the effectiveness of IVIG, with only one patient requiring prolonged ventilation for 23 d.[19] Gupta et al. reported mechanical ventilation in 97.67% of snakebite patients, whereas Paudel et al. documented ventilator support in 27.78% of ICU admissions.16,20 Similar to our findings, the requirement for mechanical ventilation was significantly associated with clinical outcome. Gupta et al. reported mortality of only 2.32% despite ventilation rates exceeding 97%, while Paudel et al. observed a mortality rate of 9.26%.16,20 González et al. also emphasised that disease severity at admission largely determined outcome, which is consistent with the poorer outcomes observed among patients requiring ventilatory support in our study.[15]

CONCLUSION

Neuroparalytic snake bites emerged as the leading cause of AFP in our intensive care unit, with GBS being the next most frequent aetiology. The need for mechanical ventilation was significantly associated with unfavourable clinical outcomes, highlighting the importance of early recognition of patients requiring respiratory support. Patients requiring ventilatory support were more likely to experience incomplete recovery or death. Favourable outcomes were more commonly observed among patients who presented early and received appropriate disease-specific treatment. Early presentation, prompt etiological diagnosis, disease-specific therapy, vigilant respiratory monitoring, and adequate intensive care support are important for improving clinical outcomes in patients with acute flaccid paralysis.

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