



Clinico- etiological study on acute flaccid paralysis in adults in a rural tertiary referral centre of West Bengal

Authors

Sumit Sarkar¹, Shrinwanti Karmakar², Prasenjit Sengupta³, Debal Laha⁴, Alak Pandit⁵

Departments of ^{1,3,4} Neurology and ²Biochemistry, Burdwan Medical College, Baburbag, P.O. Rajbati Burdwan – 713104, West Bengal, India, ⁵Department of Neurology, Bangur Institute of Neurology, Kolkata, West Bengal India

Corresponding Author

Dr Debal Laha

Abstract

Background and Objectives: Various studies are available regarding acute flaccid paralysis in the paediatric population regarding AFP prevalence. However, few such studies have been conducted among adults. Our aim was to study the underlying causes of acute flaccid paralysis (AFP) in adults, to study the various clinical presentation of AFP in adults, and to study the outcome of these adult patients presenting with AFP.

Methods: 100 patients presenting with acute flaccid weakness in adults more than 15 years and duration less than 4 weeks were clinically examined with proper history, followed by detailed blood tests, CSF study in selected patient, and Electrodiagnostic testing.

Results: In our study we found Hypokalemic paralysis is the most common etiology of AFP. There is male preponderance and significant seasonal variation, predominant during summer. It also shows that GB syndrome is predominant in young patient where as Hypokalemic paralysis is predominant after third decade. There are 4 deaths out of 100 AFP patients

Interpretation and Conclusion: This is one of the few studies on Acute Flaccid Paralysis in adult from Eastern India- on their etiologies and clinical features. There was no much difference in the clinical profile of the patients of AFP in our study as compared to most of the previous studies. Larger sample size and longer duration of follow-up is necessary to identify other conditions causing acute flaccid paralysis and their long-term outcomes.

Keywords: AFP, Quadriparesis, Paraparesis, Hypokalemic paralysis, GB syndrome.

Introduction

A flaccid paralysis a clinical syndrome characterized by rapid onset weakness of limbs, sometimes that may progress to involve respiratory and bulbar muscles, progressing to maximum severity within several days to weeks. Classically, in acute flaccid paralysis (AFP) there is weakness with reduced tone (flaccid weakness)

and decreased or absent reflexes. Patients presenting to the emergency department with acute onset of quadriparesis or paraparesis pose a unique challenge to the clinician. If untreated, AFP may not only persist but also lead to death due to failure of respiratory muscles.

AFP is a complex clinical syndrome with a broad array of potential aetiologies that vary remarkably with age. An accurate and early diagnosis is the key to a positive outcome.

There are several causes of AFP. It may be in the form of **Radiculopathies and neuropathies** like Guillain-Barre syndrome, infectious diseases (diphtheria, Lyme disease), Acute toxic neuropathies (heavy metals, snake toxin) etc or in the form of **Anterior horn cell diseases** like Acute anterior poliomyelitis, Vaccine-associated paralytic polio, Other neurotropic viruses (e.g. enteroviruses and herpes viruses) or **Muscle disorders** like Polymyositis, dermatomyositis, infective myositis like Trichinosis, Periodic paralyses, use of Neuromuscular blocking agents, Mitochondrial diseases (infantile type) or Post viral myositis or **Disorders of neuromuscular transmission** like Myasthenia gravis, Botulism, Neuroparalytic Snake bite, Tick bite paralysis or associated with **Systemic diseases** like Acute porphyrias, Critical illness neuropathy.

Various studies are available in the paediatric population regarding AFP prevalence and differential diagnoses, mainly as an offshoot of the global polio eradication initiative. However, few such studies have been conducted among adults.

Our aim was to study the underlying causes of acute flaccid paralysis (AFP) in adults, to study the various clinical presentation of AFP in adults, and to study the outcome of these adult patients presenting with AFP.

Materials and Methods

Our present study was conducted in Burdwan Medical College from patients of Indoor & outdoor of the Department of Neurology and the indoor of The Dept. of General Medicine of Burdwan Medical College & Hospital, Purba Bardhaman, West Bengal. The present study is a prospective single centre observational study done over a period of one year and six months from January 2018 to July 2019. This teaching hospital

mostly caters for the rural population in the eastern parts of India in West Bengal.

Patients of either sex having age >15 years who presented with acute (less than 4 weeks duration) flaccid paraparesis or quadriparesis to indoor and outdoor of Neurology Dept and indoor of Medicine Dept were selected.

Patients with age <15 years, duration of the illness > 4 weeks, having any upper motor neuron signs or hemiparesis, with history of trauma, and any Altered Signal intensity of spinal cord in MRI were excluded from our study.

100 adult patients (age >15 years) with AFP of less than 4 weeks duration were selected.

A detailed history was taken which include duration of weakness, progression, associated sensory, autonomic, bulbar or any other cranial nerve symptoms, dyspnoea, diarrhoea, vomiting, fever, convulsion, history of trauma, similar episode in past, history of snake-bite, preceding history of fever, respiratory tract, urinary tract or gastrointestinal tract infections, vaccination, diurnal variation of weakness.

Thorough clinical examination including general survey and other systemic examinations were done. In neurological examination, muscle bulk, power, tone, DTR, superficial reflex, touch, pain, temperature, vibration, JPS, plantar reflex, cerebellar and autonomic tests were done. Blood examination for sodium, potassium, sugar, urea, creatinine, lipid profile, CPK, phorphobilinogen, ANA with ANA profile has been done. CSF examination for cell type, cell count, protein, sugar has been done to see specially the Albuminocytological dissociation, which is characteristic of the Guillain-Barré syndrome. Electro diagnostic testing in the form of nerve conduction studies (NCS) and needle electromyography (EMG) were performed by RMS Machine after taking proper consent. Standard nerve conduction studies included motor nerve conduction, sensory nerve conduction, F waves, and H reflexes were performed. Few patients having history of diurnal variation of weakness were sent for Repetitive Nerve

Stimulation (RNST) to look for Myasthenia Gravis.

Muscle biopsy sent for suspected inflammatory myopathy patients.

Statistical analysis: Results were analyzed by SPSS 17 statistical software SPSS (version 17) for Microsoft software (IBM, Illinois, Chicago, USA). Mean and standard deviations were done and analyzed by Chi-square test.

Results & Analysis

Demographic profile of the study population showed the mean age of the study population was 42.82 (range 16-82) years with a maximum of 82 years and minimum 16 years and Median 42.00. There were total of 100 patients in our study and were divided into three different age groups as below.

There were Three groups of age population - 35% in age group of 15-35 years, 38% in age group of 36-55 years and 27% in age group of more than 55 years .

Out of the total 100 patients, male patients constituted for 76 cases (76%) and the number of female patients was 24 (24%).

The most common aetiology of acute flaccid paralysis in this study population was **Hypokalemic paralysis** which was responsible for 53% of the cases, followed by the Guillain Barre Syndrome (28%) and Neuroparalytic snake bite (12%). These three aetiologies accounted for 93% of all patients and myasthenia gravis accounted for 5%.

Most common cause of acute flaccid paralysis in this study among **the age group of 15-35 years** (N=35) was **GB syndrome** (68.6%) followed by Hypokalemic paralysis (28.6%) followed by neuroparalytic snake bite 1(2.9%). Most common cause of acute flaccid paralysis in this study among the **age group of 36-55years** (N=38) was **Hypokalemic paralysis** which was singly responsible for 50% followed by neuroparalytic snake bite which is responsible for 26.3%, GB syndrome 4(10.5%), Myasthenia gravis 3(7.9%) Inflammatory myopathy 2(5.3%). Most common

cause found among the patients who **are above 55 years of age** (N=27) was **Hypokalemic paralysis** (88.9%) followed by Myasthenia gravis ((7.4%) and snake bite 1(3.7%).

Patients having history of AFP of less than 4 weeks duration have been included in this study. The mean duration of presentation is 6.61days (range is 1-26 days). Considering the season of Presentation, we found that the maximum number of cases of acute flaccid paralysis were encountered during the summer season (61%), followed by rainy season 26% and winter 13%

Most common cause of AFP found in our study is Hypokalemic paralysis which is also found to be predominant during summer (36 cases - 67.92%), followed by rainy season (10 cases -18.87%), then winter (7cases -13.21%). Out of the total number of Total 100 patients, 93(93%) presented with Quadriparesis and 7(7%) had Paraparesis . 15% of the patients presented with sensory symptoms in the form of tingling, numbness, paresthesias (all these were diagnosed as having GB syndrome) and 85% patients had no sensory symptoms. 13% of the patient presented with AFP had bulbar symptoms and 87% had no bulbar symptoms. Respiratory involvement was found in 14% of patients out of 100 patients.

In our study, 28 patients (28%) were diagnosed as GB syndrome on the basis of clinical features and Electrodiagnostic criteria. Among them, 71.42% were demyelinating and 28.58% were axonal GB syndrome. Among 100 patients presented with AFP death occurs in 4(4%) patients who were having severe respiratory paralysis and 96 (96%) patients have been discharged in a stable condition. Among 28 patients having Hypokalemic paralysis, 9 patients had history of similar episode in past. A significant association was found between hypokalemia with CPK level. 67.9% of patients with hypokalemia have elevated CPK level as compared to 4.3% elevated CPK in patients with normal potassium, $p < 0.001$ as computed by chi-square test.

Discussion

Acute flaccid paralysis (AFP) is a clinical syndrome characterized by rapid onset of weakness of lower motor neuron type, including weakness of the respiratory and pharyngeal muscles, progressing to maximum severity within several days to weeks.

The availability of an effective poliovirus vaccine led to a dramatic decline in poliovirus infections worldwide. Since the elimination of poliovirus from large parts of the world, Guillain-Barré syndrome (GBS) has become the most important clinical cause of AFP^[1]. Various studies around the world have found prevalence of GBS among acute flaccid paralysis patients of 42- 47%.^[2]

Higher prevalence has been reported from Honduras (72%).^[3] Studies around the world have identified envenomation, porphyria, hypokalemia, early acute transverse myelitis, rhabdomyolysis, botulism, and myasthenia gravis as other causes of acute flaccid paralysis. In a study conducted by Ashoke K Kayal et al in 2012 found 56 cases of Hypokalemic paralysis within a short span of 2 years from North-East India.^[4]

Our study shows a male preponderance among patients with acute flaccid paralysis due to higher proportion of males in Hypokalemic paralysis, snake envenomation and GB Syndrome groups. In the study area which is a very well known rural belt of West Bengal, most of the people (mainly males) are farmer by occupation. So often they are exposed to heavy work load in humid weather. That is why they frequently suffered from hypokalaemic attack. Males are at a higher risk for snake envenomation due to occupational and recreational outdoor activities that predispose them to encounters with venomous snakes. Male preponderance in GBS cases has been reported to be 1.36-2: 1 in various studies and our study reflects similar results (GB syndrome cases, male 18 and female 10).^{[5],[6]} The reasons for such a predilection are not clear.

The most common aetiology of acute flaccid paralysis in this entire population was Hypokalemic paralysis, which was responsible for

53% of the cases This is because people working in a hot humid weather frequently developed hypokalemia due to excessive sweating leading to dehydration. Also, rice is the staple food of the region, which is high in carbohydrate content and thus can be a precipitating factor for hypokalemia. In one of the largest study on HPP from Taiwan by Lin *et al.*,^[7] a total of 97 cases of Hypokalemic paralysis were reported over a period of 10 years. Various series of HPP cases has been reported from different parts of India also.

In an earlier series reported by Arya *et al.*,^[8] a total of 22 cases of Hypokalemic paralysis were reported over 30 years. In retrospective study from South India by Rao *et al*^[9] 31 patients were detected over a period of 6 years. A recent prospective study from North India by^[10] Maurya and colleagues 91 reported 30 patients of HPP over a period of 3 years. Hypokalemic paralysis was found as the most common aetiology of AFP in patients with age > 36 years whereas a preponderance of younger individuals was observed in GB syndrome patients. The later part of the said comment is supported by a study done by Rupesh Kaushik *et al.*, from North-West India.^[11]

There was a seasonal variation in the incidence of Hypokalemic attacks; highest numbers of cases (67.92%) were detected during the summer season in the month from March to June, when the average temperature in this region ranges from 26-42°C and an average humidity of 75%. These findings in our study are consistent with an earlier Indian study.^[12] Most of the patients presented with quadriparesis (93%) and only few patients (7%) presented with paraparesis. This finding is also similar with the findings that found in the above mentioned study.^[11] Only 15% of the patients presented with sensory symptoms as most of the aetiologies of AFP found in this study are (Hypokalemic paralysis, neuroparalytic snake bite, MG) pure motor disease. 13 patient presented with AFP had bulbar symptoms in our study. Of them 4 patients had GB syndrome, 7 had snake bite, 1 had MG and 1 had IM. So out of total 28

GBS patients, 4 patients (14.29%) had bulbar involvement which is lower than that reported in previous studies^{[13],[14]} and out of 12 snake-bite patients, 7 patients (58.33%) had bulbar involvement which comes in range of other reported study.^[15]

Respiratory involvement was found in 14% of patients out of 100 patients. Among them 9 patients out of 12 snake bite patients (75%) and 4 patients out of 28 GBS patients (14.28%) had respiratory paralysis and needed mechanical ventilation, this later value is lower than previous study^[6]

The ratio of demyelinating and axonal GB syndrome were compatible with the study done by Hadden RD *et al.*,^[16] previously. In the present study, there is no death among Hypokalemic paralysis patients. Previous study in Hypokalemic paralysis showed similar result.^[4] There are 4 deaths out of 100 AFP patients (4% in-Hospital mortality) in the present study of which 3 patients had severe respiratory failure due to neuroparalytic snake bite and 1 patient had respiratory paralysis due to GBS.

Except the above mentioned 3 patients all other snake bite patients (9 out of 12) were managed successfully (75%). Other studies also showed similar results.^{[15],[17]} A significant association was found between hypokalemia with CPK level in this present study. 67.9% of patients with hypokalemia have elevated CPK level as compared to 4.3% elevated CPK in patients with normal potassium – indirectly due to damage to muscle membrane. This has also been infrequently reported in earlier Indian studies^{[4],[12]}

Summary and Conclusions

This is one of the few studies on Acute Flaccid Paralysis in adult from eastern India. Various studies are available in the paediatric population regarding AFP prevalence and differential diagnoses, mainly as an offshoot of the global polio eradication initiative. However, few such studies have been conducted among adults..

The study was done to find out the etiologies of AFP in adult population and to know their clinical profile and also to find out the in-Hospital mortality of those patients.

In our study we found Hypokalemic paralysis is the most common etiology of AFP in adult population contributing up to 53% of cases. Next common aetiology is GBS. The study shows male preponderance and significant seasonal variation of AFP cases. It also shows that GB syndrome is predominant in young patient where as Hypokalemic paralysis is predominant after 3 rd decades.

There was 4% in-Hospital mortality during the entire period of this study, thereby suggesting that a timely intervention can be life-saving in this treatable but potentially fatal disease.

There was no much difference in the clinical profile of the patients of AFP in our study as compared to most of the previous studies. The parameters assessed were mostly subjective and reporting of which is influenced by many confounding factors including the age, educational status and co-morbidities. Being a single-centre study in Eastern India, our observations may not be representative of the entire country. Larger sample size and longer duration of follow-up is necessary to identify other conditions causing acute flaccid paralysis and their long-term outcomes.

In spite of all these limitations, we can conclude that the data obtained from our study will be useful for the physicians who work in resource-limited settings.

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Conflict of Interest: None

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