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A Study of Guillain-Barre Syndrome With Reference To Clinical CSF & Electro Diagnostic Features

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Abstract
Introduction: *Guillain-Barré Syndrome is the commonest cause of acquired demyelinating disorders affecting the peripheral nervous system in any part of the world. It is a spectrum of illness of diverse etiology with a common pathological process. It is a non-seasonal illness affecting persons of all age groups.*
Materials and Methods: *Detailed neurological examination including higher mental functions, cranial nerves, motor system, sensory system and autonomic system was done for all 50 patients. Motor power in these patients were assessed according to Medical Research Council grading. Autonomic dysfunction was looked for in all these patients. History of dryness of mouth, postural giddiness and defective sweating over the body were specifically asked for. Blood pressure was routinely taken in lying and sitting posture and if possible in standing posture to bring out orthostatic hypotension. Sympathetic skin response was not done due to technical problem.*
Results: *4 patients were on treatment for diabetes mellitus, 3 patients were on treatment for hypertension, 2 patients were on treatment for pulmonary tuberculosis and ischemic heart disease. In 50 patients studied, 42 patients had weakness of both upper and lower limbs; 15 patients had neck muscle weakness; 8 patients had features suggestive of bulbar weakness; 2 patients had ocular muscle involvement. 15 patients gave history suggestive of sensory disturbance and 12 patients had electrophysiological evidence of sensory involvement. 7 patients had bilateral lower motor neuron type of facial weakness. 4 patients developed altered sensorium for a short.*
Conclusion: *The incidence of Guillain-Barré Syndrome in our study was around 1% among total hospital admissions in neurology ward. There was no significant sex preponderance in our study. 80% of Guillain-Barré Syndrome patients recovered smoothly without going for complications. 16% of patients developed bulbar weakness of varying severity. 30% of patients developed neck muscle weakness of varying severity. 30% of Guillain-Barré Syndrome patients developed respiratory muscle weakness of varying severity. 10% of patients needed ventilatory support to maintain oxygen saturation. 40% of patients showed features of autonomic disturbance of varying severity.*

Key Words: *Guillain-Barré Syndrome, peripheral nervous system, severity.*

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I. Introduction

Guillain-Barré Syndrome is the commonest cause of acquired demyelinating disorders affecting the peripheral nervous system in any part of the world. It is a spectrum of illness of diverse etiology with a common pathological process. It is a non-seasonal illness affecting persons of all age groups.[1]

The severity of Guillain-Barré Syndrome varies from mild weakness to total paralysis and respiratory failure, sometimes leading to death.[2]

Proper understanding of pathology, clinical presentation, appropriate investigations and interventions when needed may save these patients from mortality and severe morbidity.[3]

Prathima Institute of Medical Sciences predominantly covers rural population of Telangana. It offers medical management to all economic status of people, all religions and all age groups. It is more ideal to conduct a study in this institution.[4]

The diagnosis of Guillain-Barré Syndrome is made predominantly by clinical methods and aided by investigations like cerebrospinal fluid analysis and electrodiagnostic studies.[5]

II. Aim And Objectives

- To evaluate the types and antecedent events of Guillain-Barre syndrome.
- To find out incidence of Guillain-Barre syndrome.
- To analyse the temporal profile of illness and its clinical features.
- To assess the severity of illness with reference to CSF analysis and electrodiagnostic studies.
- To assess the prognostic outcome with electro-diagnostic studies.

III. Materials And Methods

Guillain-Barré Syndrome is a monophasic illness; often it is self-limiting. The initial assessment was based on clinical history, detailed neurological examination, routine investigations and special investigations like cerebrospinal fluid analysis and electro diagnostic studies.

Number of cases studied: 50

Duration of study: August 2018 – August 2020

Type of study: Observational study

SELECTION OF PATIENTS

INCLUSION CRITERIA

- Any patient admitted with features suggestive of flaccid progressive weakness affecting all the four limbs were included.
- Any patient admitted with progression of weakness of less than 4 weeks duration were included.
- Any patient admitted with reduced or absent deep tendon reflexes were included.

EXCLUSION CRITERIA

- Any patient admitted with features of hypokalemic periodic paralysis.
- Any patient admitted with features of upper motor neuron signs and symptoms
- Any patient admitted with severe protopathic sensory symptoms
- Any patient admitted with history of bite preceding the illness
- Any patient admitted with history of exposure to toxins like organophosphates
- Any patient with severe terminal illness
- Patients admitted with history of suspected food poisoning
- Patients in whom the weakness progressed for more than 4 weeks

Detailed neurological examination including higher mental functions, cranial nerves, motor system, sensory system and autonomic system was done for all 50 patients. Motor power in these patients were assessed according to Medical Research Council grading.

Autonomic dysfunction was looked for in all these patients. History of dryness of mouth, postural giddiness and defective sweating over the body were specifically asked for.

Blood pressure was routinely taken in lying and sitting posture and if possible in standing posture to bring out orthostatic hypotension. Sympathetic skin response was not done due to technical problem.

Respiratory function tests were done in all patients, everyday during hospitalization, including breath-holding time, single breath count, blowing candle at one arm length, chest expansion, Litten's phenomenon.

Likewise, basic investigations like complete blood count, peripheral smear, blood sugar and urea, serum creatinine and electrolytes, erythrocyte sedimentation rate, daily electrocardiogram, chest x-ray were done for all the 50 patients.

Lumbar puncture was done for 42 patients and Cerebrospinal Fluid was sent for Gram's stain, biochemical and cytological analysis.
Electrophysiological studies were conducted by using the machine RMS ADVANCE TESTING LAB. Nerve conduction studies were done in both upper and lower limbs.

- In upper limbs, proximal latency, distal latency, motor nerve conduction velocity, F-response were studied in ulnar, median and radial nerves.
- In lower limbs, similarly proximal latency, distal latency, motor nerve conduction velocity, F-response, H -reflex were studied in sciatic, lateral popliteal and posterior tibial nerves.
- Sensory Nerve conduction velocities were studied in median nerve, ulnar nerve and sural nerve.
- Electromyography was done with surface electrodes in thenar and hypothenar muscles, quadriceps, calf muscles, extensor digitorum.
- Insertional activity was recorded.
- Resting activity was recorded. Fibrillation potential, fasciculation potential, positive sharp waves were looked for.
- Recruitment and interference pattern were looked for.
- Compound muscle action potential was recorded.

Magnetic Resonance Imaging was done in 4 patients who presented with altered sensorium, sensory disturbance and urinary retention.

IV. Results

Table 1: Sex Incidence
In the 50 patients studied, 30 were male and 20 were female.

SEX	NO. OF PATIENTS	PERCENTAGE
Male	30	60%
Female	20	40%

Figure 2: Sex Incidence

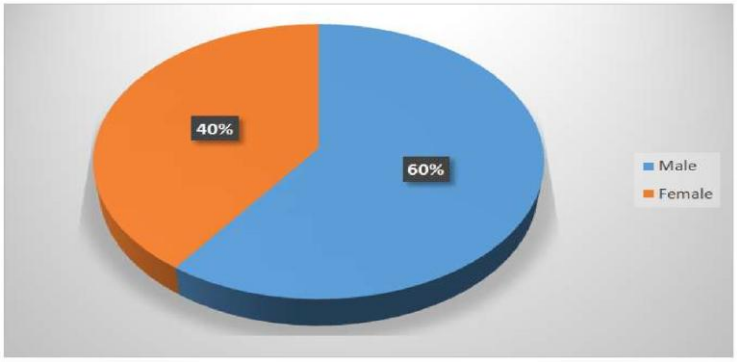


Table 2: Age Incidence

AGE IN YEARS	NO. OF PATIENTS	PERCENTAGE
< 40	26	52%
40-60	15	30%
> 60	9	18%

All the 50 patients were above the age of 15; among which 26 (52%) patients were below the age of 40, 15 patients (30%) were between 4060years, 9 patients (18%) were above the age of 60.

Figure 3: Age Incidence

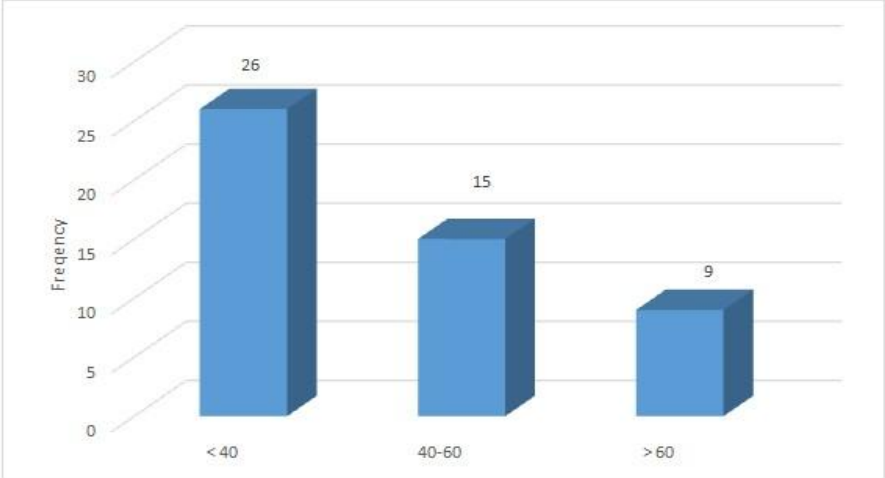
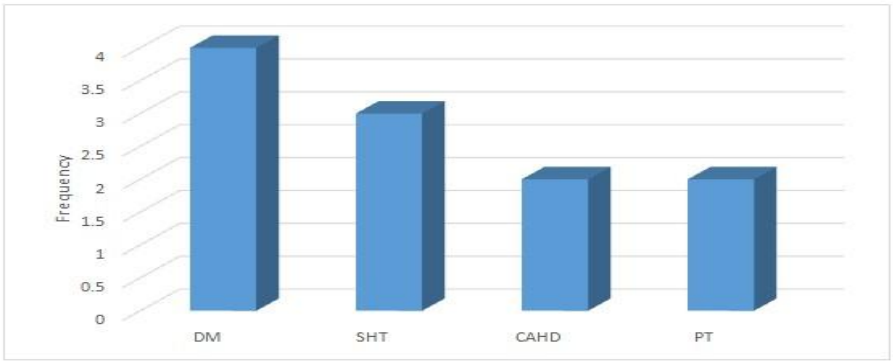


Table 3: Co-existing Medical Illness

S.No	ILLNESS	NO. OF PATIENTS	PERCENTAGE
1	DM	4	8%
2	SHT	3	6%
3	CAHD	2	4%
4	PT	2	4%

4 patients were on treatment for diabetes mellitus, 3 patients were on treatment for hypertension, 2 patients were on treatment for pulmonary tuberculosis and ischemic heart disease.

Figure 4: Co-existing Medical Illness



S.No.	ANTECEDENT EVENTS	NO. OF PATIENTS	PERCENTAGE
1	RESPIRATORY ILLNESS	7	14%
2	GASTROINTESTINAL ILLNESS	5	10%
3	VACCINATION	1	2%
4	HODGKIN'S LYMPHOMA	1	2%
5	HIV	1	2%

Table 4: Antecedent Events

7 patients gave history of upper respiratory tract infection preceding the neurological illness. 5 patients gave history of gastroenteritis preceding the illness. 1 patient gave history of vaccination for dog bite preceding the illness. 1 patient was reactive for HIV. 1 patient was found to have generalised lymphadenopathy and mild hepatosplenomegaly, and Fine Needle Aspiration Cytology proved to be Hodgkin's lymphoma.

Figure 5: Antecedent Events

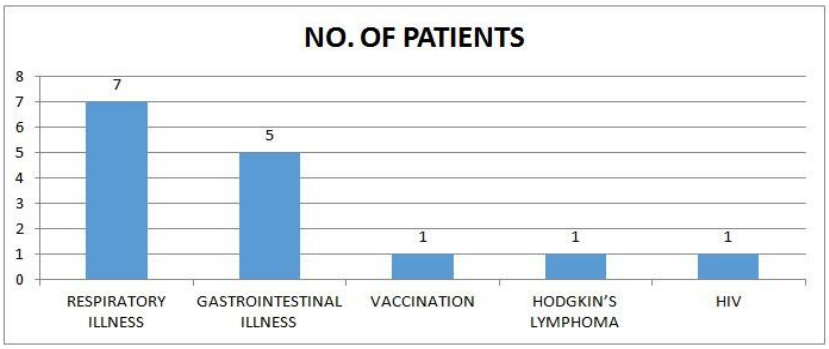
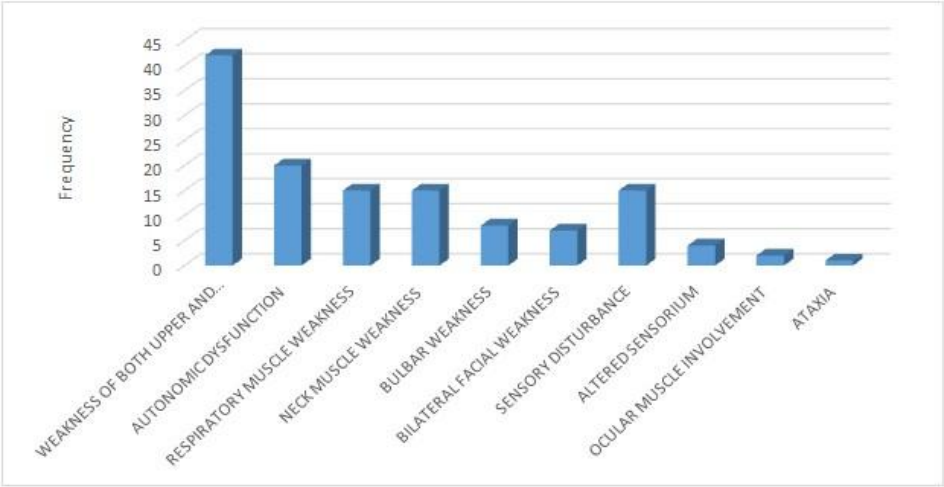


Table 5: Clinical Presentation

S. No.	CLINICAL PRESENTATION	NO. OF PATIENTS	PERCENTAGE
1	WEAKNESS OF BOTH UPPER AND LOWER LIMBS	42	84%
2	AUTONOMIC DYSFUNCTION	20	40%
3	RESPIRATORY MUSCLE WEAKNESS	15	30%
4	NECK MUSCLE WEAKNESS	15	30%
5	BULBAR WEAKNESS	8	16%
6	BILATERAL FACIAL WEAKNESS	7	14%
7	SENSORY DISTURBANCE	15	30%
8	ALTERED SENSORIUM	4	8%
9	OCULAR MUSCLE INVOLVEMENT	2	4%
10	ATAXIA	1	2%

In 50 patients studied, 42 patients had weakness of both upper and lower limbs; 15 patients had neck muscle weakness; 8 patients had features suggestive of bulbar weakness; 2 patients had ocular muscle involvement.
15 patients gave history suggestive of sensory disturbance and 12 patients had electrophysiological evidence of sensory involvement. 7 patients had bilateral lower motor neuron type of facial weakness. 4 patients developed altered sensorium for a short.

Figure 6: Clinical Presentation



Among these 50 patients, 15 patients developed respiratory distress in some form and 5 of them were provided ventilator for life support. 3 out of the 5 patients on ventilator died without improvement. Remaining 2 patients were weaned from ventilator after 4 days with favorable outcome.

Two patients died due to respiratory distress, before giving ventilatory support. 2 patients who developed severe respiratory distress were discharged as against medical advice and follow up was not recorded.

20 patients presented with some form of autonomic dysfunction. Orthostatic hypotension was found in 8 patients. Cardiac arrhythmias in electrocardiogram including ventricular, atrial ectopics, sinus tachycardia and ST-T changes were noted in 7 patients. Remaining 5 patients had features of bladder disturbance in the form of urinary retention in whom catheterisation was done.

Among 15 patients who had respiratory distress, 11 patients showed autonomic disturbance. All patients who expired and who were on ventilator had autonomic disturbance.

Cerebrospinal fluid analysis was done for 42 patients. Cerebrospinal fluid protein was increased in all the 42 patients ranging from 260mgs% to 1.5gms%. Cerebrospinal fluid cell count was within normal limits, i.e, less than 50 mononuclear cells per cubic millimeter. Cell count was 250 in one patient with HIV infection.

Table 6.1: Cerebrospinal Fluid Analysis

CELL COUNT per cubic mm	< 10	10-20	21-30	31-40	41-50	>50
NO. OF PATIENTS	5	9	19	7	1	1

Figure 7.1: Cerebrospinal Fluid Analysis

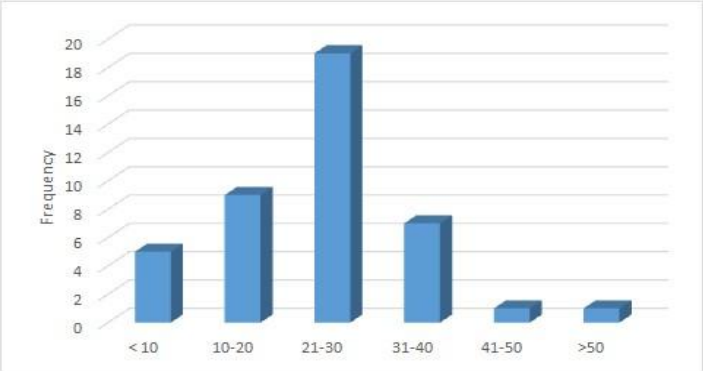
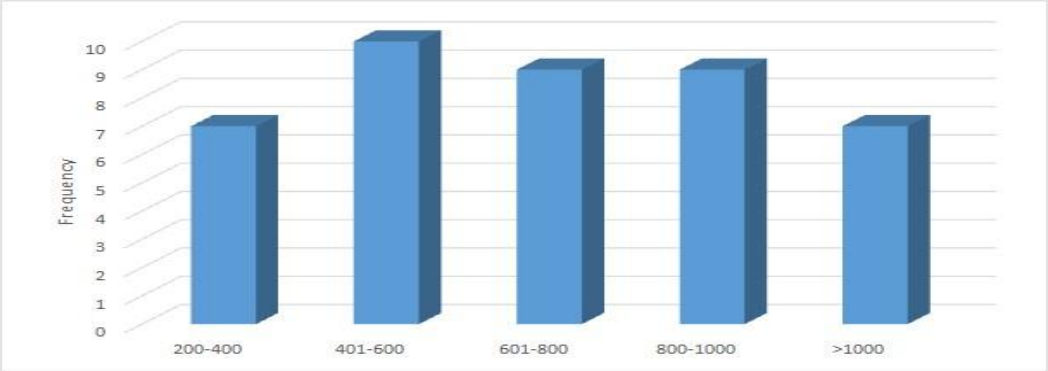


Table 6.2: Protein Distribution

PROTEIN (mgs %)	200-400	401-600	601-800	800-1000	>1000
NO. OF PATIENTS	7	10	9	9	7

Figure 7.2: Protein Distribution



All these 50 patients had abnormal electrodiagnostic studies like

1. Motor Nerve Conduction Velocity was decreased in all the 4 limbs varying from mild to severe degree.
2. Conduction block was present in 6 patients.
3. H- reflex could not be elicited in all the patients.
4. F- response was prolonged in 8 patients and absent in 42 patients.
5. Compound Muscle Action Potential was decreased in more than 40 patients.

ELECTRODIAGNOSTIC STUDIES

Table 8: Nerve Conduction Studies Upper Limbs

S. No.		NO. OF PATIENTS	ULNAR	MEDIAN	RADIAL
1	Proximal latency	37	Prolonged d	Prolonged	Prolonged
		5	Normal	Normal	Normal
2	Distal latency	40	Prolonged	Prolonged	Prolonged
		2	Normal	Normal	Normal
3	MNCV	36	Delayed	Delayed	Delayed
		6	Normal	Normal	Normal
4	F-Response	30	Absent	Absent	Absent
		12	Prolonged	Prolonged	Prolonged
5	SNCV	12	Absent	Absent	-

Figure 8: Nerve Conduction Studies Upper Limbs

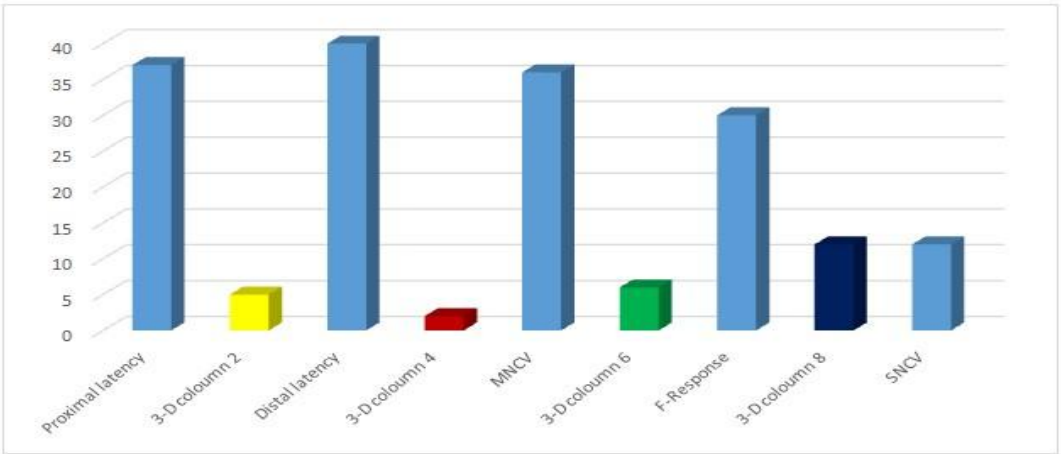
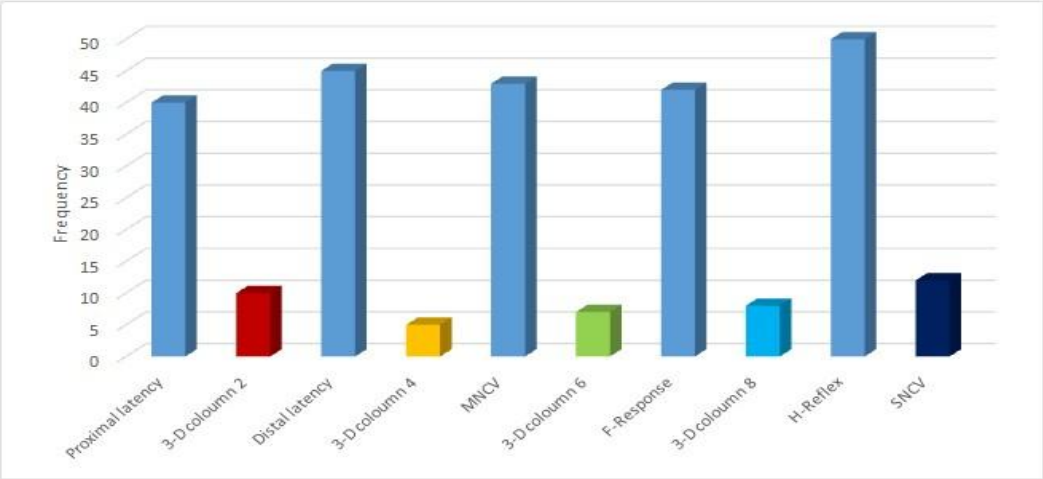


Table 9: Nerve Conduction Studies Lower Limbs

S. No.		NO. OF PATIENTS	COMMON PERONEAL	POSTERIOR TIBIAL	SURAL
1	Proximal latency	40	Prolonged	Prolonged	
		10	Normal	Normal	-
2	Distal latency	45	Prolonged	Prolonged	
		5	Normal	Normal	-
3	MNCV	43	Delayed	Delayed	
		7	Normal	Normal	-
4	F-Response	42	Absent	Absent	
		8	Prolonged	Prolonged	-
5	H-Reflex	50	Absent	Absent	-
6	SNCV	12	-	-	Absent

Figure 9: Nerve Conduction Studies Lower Limbs



The disease progressed in 40 patients up to 14 days. 35 patients worsened in the first week. 15 patients worsened after the first week. 40 patients had shown some improvement during hospital stay itself.

10 patients did not show any improvement during hospital stay. Among 40 patients in whom improvement had seen, recovery was rapid during the first week in 35 patients.

Cerebrospinal fluid analysis and electrodiagnostic studies were done only once during their hospital stay and follow up study could not be done.

Magnetic resonance imaging was done in 4 patients which showed no evidence for cord compression or myelitis.

Table 10: Types of Guillain-Barré Syndrome

S.No	Types	No. of Patients	Percentage
1	AIDP	25	50%
2	AMAN	12	24%
3	AMSAN	10	20%
4	MFS	1	2%
5	SENSORY GBS	2	4%

Figure 10: Types of Guillain-Barré Syndrome

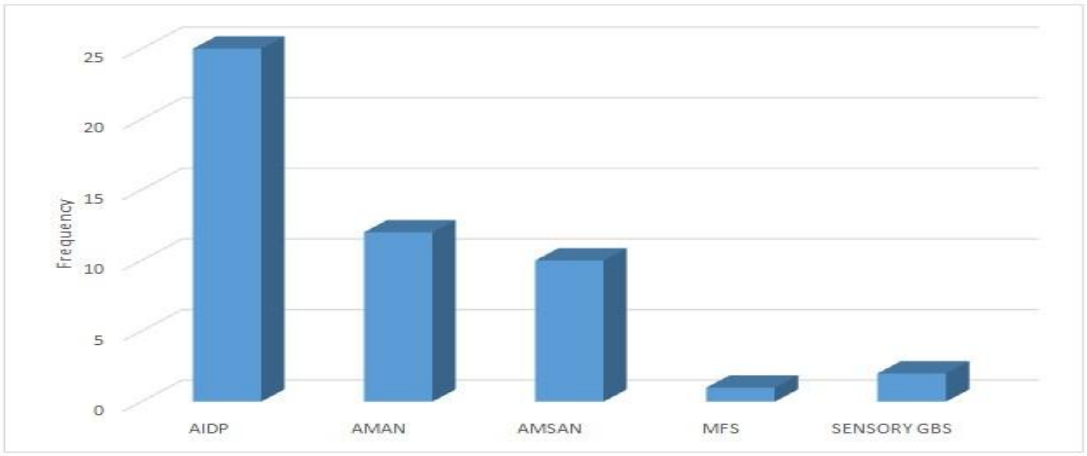
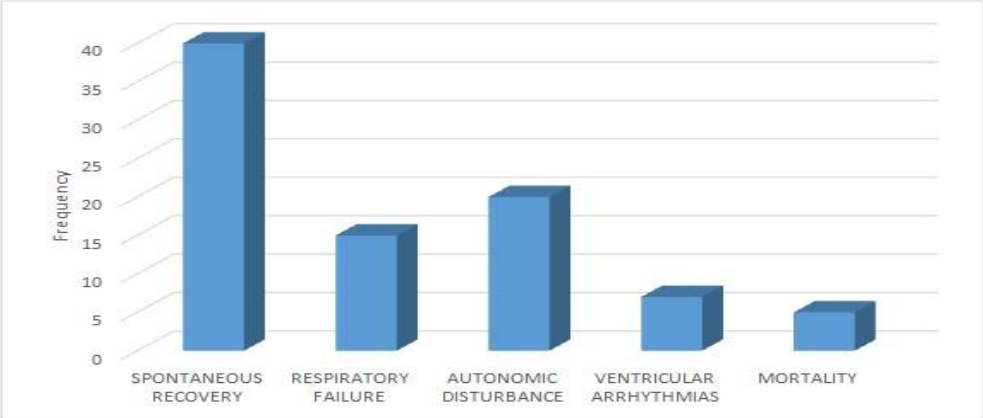


Table 10: Outcome

S.NO	OUTCOME	No. of Patients	PERCENTAGE
1	SPONTANEOUS RECOVERY	40	80%
2	RESPIRATORY FAILURE	15	30%
3	AUTONOMIC DISTURBANCE	20	40%
4	VENTRICULAR ARRHYTHMIAS	7	14%
5	MORTALITY	5	10%

Figure 11: Outcome



V. Discussion

50 patients were included in our study. The incidence of Guillain-Barré Syndrome was around 1% in total hospital admissions in neurology ward.

Sex prevalence in our study was 60% (30) for men and 40% (20) for women. The study conducted by Zhang et al.[51] supported the study for sex distribution. Seasonal variation was observed in our study, between July and October. This observation is supported by reports from India and China.[6]

Among the 50 patients studied, 52 % (26) of patients were below 40 years, 30% (15) of patients were between 40-60 years and 18% (9) of patients were above the age of 60. The age range of our consecutive patients has been 16 years to 78 years, with attack rates highest in persons less than 50 years of age.[7]

Those patients with coexisting illness like diabetes mellitus, systemic hypertension, ischemic heart disease and pulmonary tuberculosis were above the age of 40 and they had delayed recovery. Approximately one third of patients reported a history of an antecedent event. According to the study by Rees et al, 1995 preceding diarrhoeal illness, especially Campylobacter jejuni infection was documented in cases of acute motor axonal neuropathy; supporting our study.[8]

30% (15) of patients developed respiratory muscle weakness in some form. Diaphragmatic movement was assessed by Litten's phenomenon. Diaphragmatic weakness was increased during the second week and began to recover after the third week.

In patients with respiratory distress, need for ventilatory support was assessed by respiratory rate, single breath count, chest expansion, oxygen saturation and appearance of central cyanosis. In a study by Sharshar et al, 2003, short disease duration, inability to lift the head, and a vital capacity of less than 60% predicted the need for mechanical ventilation in 85% of patients. Accordingly, 10% (5) of our patients were put on ventilator. Zhang et al.[51] also supported the study.[9]

Autonomic dysfunction was observed in 40% (20) of patients. Orthostatic hypotension was detected in 8 patients; Abnormal sweating either increased or decreased sweating was looked for in the trunk and limbs. Arrhythmias were found in 7 patients. Benign arrhythmias like ventricular and atrial ectopics, and non specific ST-T changes, sinus tachycardia, less often sinus bradycardia were noted in 5 patients, which persisted for less than a week. Fatal ventricular arrhythmias were found in 2 patients.

In a study by Zochodne et al in 1994, autonomic dysfunction was observed in 65% of patients and in another study by Winner and Hughes in 1998, cardiac arrhythmias due to autonomic dysfunction was the leading cause of death, which contributed by 7 percent. As per the above study major causes of death in our study were due to respiratory failure and cardiac arrhythmias. Study conducted by Zhang et al in 2018.[51] found approximately to our study.

Most of the patients with respiratory failure were found to have autonomic dysfunction and recovery was delayed. Mortality was increased in patients who have combined respiratory failure on ventilatory support and autonomic dysfunction, especially orthostatic hypotension and ventricular arrhythmias.

Bladder disturbance was one of the clinical presentations in 5 patients, all of them were above the age of 60 for whom catheterisation was not needed for more than a week.
15 patients had sensory disturbance in the form of impaired position and vibration sense. Study by Winner et al in 1998 support this study. 12 patients were found to have sensory involvement on electrodiagnostic studies.

Most of the studies do not recommend the use of steroids. Yet many centers use high dose oral prednisolone or methylprednisolone. In our hospital, we do not use steroids routinely, some patients included in our study, had been treated with steroids outside.

6% (3) of patients on steroids developed peptic ulceration and gastrointestinal bleeding, with delayed recovery. 2% (1) of patients with diabetes mellitus who were put on steroids developed ketoacidosis and turned out with delayed recovery.

In our study, there was no significant difference in the outcome of patients treated with or without steroids, similar to the word literature. A randomized trial of oral prednisolone therapy by Guillain-Barré Syndrome steroid trial group in 1993, showed no benefit. A study by Hughes et al 1978, suggested that steroids might increase the subsequent relapse rate. In study conducted by Sinan et al in 2017 found that there was not significant difference in the outcome of the patients treated with or without steroid.
Those patients above the age of 60 without any medical illness also, showed delayed recovery. The North American Guillain-Barré Syndrome study group support our study.
4% (2) of the patients presented with ocular muscle involvement; 2% (1) of the patients had ataxia, with favorable outcome.
Prognosis in patients with Guillain-Barré Syndrome varied linearly with severity of demyelination or axonal degeneration detected by electrodiagnostic studies.
Recovery was delayed in patients with conduction block than in patients with delayed motor nerve conduction velocity alone.

Recovery was earlier and favorable in patients with absent H-reflex and F- response and delayed motor conduction than in patients with conduction block. A distal CMAP amplitude of less than 20% of the lower limits of normal was associated with poor outcome in the North American Guillain-Barré syndrome study group.

In our study, mortality was around 10 percent. Commonest cause of mortality were respiratory failure and ventricular arrhythmias. In Study conducted by Zhang et al.[51] mortality was found to be 8.3% which was less than found in our study.

Patients with high protein content in cerebrospinal fluid indicating demyelination of nerve roots showed delayed recovery. In a study by Ropper and Marmarou, the increase in cerebrospinal fluid protein had no clinical or prognostic significance. In study conducted by Sinan et al.[52] found similar results to our study. [10]

VI. Conclusion

The incidence of Guillain-Barré Syndrome in our study was around 1% among total hospital admissions in neurology ward. There was no significant sex preponderance in our study. 80% of Guillain-Barré Syndrome patients recovered smoothly without going for complications. 16% of patients developed bulbar weakness of varying severity. 30% of patients developed neck muscle weakness of varying severity. 30% of Guillain-Barré Syndrome patients developed respiratory muscle weakness of varying severity. 10% of patients needed ventilatory support to maintain oxygen saturation. 40% of patients showed features of autonomic disturbance of varying severity. 2 patients had features suggestive of ocular muscle involvement and in 1 patient features of incordination was present. Prognostic outcome in our study is somewhat poor with increasing age. Prognostic outcome is poor when there is co-existing illness like diabetes mellitus or ischemic heart disease.

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