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CLINICO- ELECTROPHYSIOLOGICAL AND CSF PROFILE AND PREDICTORS OF FUNCTIONAL OUTCOME IN GUILLAINE-BARRE SYNDROME- A PROSPECTIVE STUDY

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ABSTRACT **BACKGROUND** Guillain-Barre syndrome (GBS) is a rare, immune mediated disorder which is associated with demyelination of peripheral nervous system and progressive muscle weakness, with an annual global incidence of approximately 1–2 per 100,000 person-years. GBS has an unpredictable clinical course with up to 30% of patients requiring assisted ventilation during the course of their illness. Recent advances in the field of critical care has successfully improved the outcome of GBS. Successful management mandates anticipation, prompt recognition of modifiable risk factors and optimal treatment of neuromuscular respiratory failure in GBS. There is limited Indian data with regards to the early determinants and outcome of severely affected GBS patients. Knowledge of early predictors can substantially improve patient care and provides essential data for triage at an early stage in the course of the illness.

OBJECTIVE

1. To study the clinical, electrophysiological profile, progression and outcome of GBS in a tertiary care hospital.
2. To determine the factors associated with the poor functional outcome, including the need for mechanical ventilation.

MATERIALS AND METHODS This was a single centre, prospective study with 50 patients with GB syndrome, conducted from from 1st June 2021 to 30th May 2022 for a period of 1 year at Gauhati Medical College and Hospital. Their clinical, electrophysiological, CSF parameters were analysed. Hughes grading, EGRIS, mEGOS, MRC sum score were used. Any clinical deterioration and need for mechanical ventilation were noted carefully. Patients were followed up at 3 months and 6 months at assess their outcome. **RESULTS** The mean age of the patients was 30.5 years with a male female ratio of 1.3:1. AIDP was the most prevalent subtype found in 23(46%) patients followed by AMAN in 14(28%), AMSAN in 9(18%) and 4(8%) cases were unclassified. 32(64%) had severe disease with Hughes score ≥ 4 and 28(56%) had MRC score <40 at presentation. Respiratory distress was found in 17(34%) of patients, and out of which 10(20%) required mechanical ventilation. During the study 2(4%) patients died of complications. At 3 months, 30(60%) patients had complete recovery, 12(24%) had partial recovery and 6(12%) had poor recovery. At 6 months, 35(70%) had good recovery, 9(18%) had partial recovery and 4(8%) had poor recovery. **CONCLUSION** Delayed presentation, early peak of illness, prolonged Hospital stay, bulbar weakness, neck flexor weakness, bilateral facial weakness, quadriparesis, respiratory distress, need for mechanical ventilation, autonomic dysfunction; high Hughes grading, low average single breath count along with high EGRIS, mEGOS, MRC sum score, high CSF protein, albumin-cytological dissociation, presence of F-wave abnormalities and Non stimulable nerves or Inexcitable nerves on NCS, AMAN subtype and systemic complications are associated with poor outcome. The overall outcome of GBS is favourable.

KEYWORDS : Guillain- Barre Syndrome, Mechanical ventilation, early predictors.

INTRODUCTION

Guillain Barré Syndrome (GBS) is an acute, autoimmune, inflammatory disorder of the peripheral nervous system activated usually by a bacterial or viral infection or other antecedent events. It usually affects 0.9 to 2/100,000 persons in a year, and a similar distribution has been observed worldwide. A huge amount of advancements has accrued in etiopathogenetic and clinical diversity but the management part has remained the same. Due to easy availability of good supportive care and existing treatment modalities, the outcome has improved.[1-4] Modern day critical care has dramatically improved the outcome of GBS, as the mortality rate has reduced from 33% to 1-5 % after introduction of positive pressure ventilation.[5] Natural history studies show that about 10 to 20% of patients remain severely disabled and about 5% die.[1-4] Determinants of disease progression and recovery in GBS are still poorly understood. GBS is a disease of diversely distributed pathogenic and clinical subgroups in which disease onset, progression and outcome is determined by types of preceding infections, autoantibodies, genetic polymorphisms as well as clinico-electrophysiological severity. Optimal treatment of individual patients may depend on the pathogenesis and clinical severity.[1-6] Outcome in severe forms of GBS is mainly dependant on good critical care support and availability of immunomodulator. Contrary to this, those with less severe involvement although have hastened recovery, long term outcomes don't differ in patients who have received immunomodulator or not, hence judicious use is necessary. Previous studies indicate that outcome in GBS depends on a defined set of clinical, laboratory and electrophysiological features. Recently, in one of these studies, a prognostic model was postulated, the Erasmus GBS outcome score (EGOS), which was based on three clinical characteristics: age, presence of preceding diarrhoea andGBS disability score at two weeks after admission.[7] The EGOS fairly accurately predicts the probability of walking after six months. The EGOS issues a proof of principle that the variable outcome in GBS can be easily predicted in the early phase of the disease. Additional prognostic models have been developed to predict respiratory insufficiency and clinical course.[7-9]

METHODS

This is a hospital based prospective observational study, including 50 patients, from 1st June 2021 to 30th May 2022 for a period of 1 year. Those patients who had been admitted with the diagnosis of GBS (as per Asbury and Cornblath clinical diagnostic criteria[10,11]) in Department medicine, neurology and intensive medical care unit of Gauhati Medical College and Hospital, Assam, in this period were included. The approval of the Ethical committee of our institute was obtained prior to conducting the study and written informed consent was taken from all patients/guardian of the patient.

Data regarding the demographic features like age, sex and clinical features including antecedent illness, day of hospitalisation, nadir and duration of hospitalisation were collected.

A complete neurological examination (cranial nerve examination, muscle power charting, reflexes, and sensory examination, autonomic nervous system examination), GBS disability scale[12], MRC sum score[13], mEGOS[7], Erasmus GBS Respiratory Insufficiency Score(EGRIS)[14] at admission were estimated. Single breath count was monitored from the day of admission to the peak of weakness or mechanical ventilation and average count was calculated. Nerve

conduction study(NCS)(Motor, Sensory and F response) was performed in all cases. Based on Electro-diagnostic criteria by Albers, J.W., Kelly, J.J., 1989[15] and Uncini and Yuki, 2009[16], patients were classified into AIDP(Acute inflammatory demyelinating polyradiculoneuropathy), AMAN(Acute motor-axonal neuropathy), AMSAN(Acute motor-sensory axonal neuropathy), In- excitable (absent CMAP in all motor nerves) & Equivocal group. In our study, In-excitable and Equivocal groups are regrouped together as Unclassified. Necessary investigations were done to rule out other diseases with similar presentations. CSF study was done as per convenient timing as an indicated test in GBS.

Treatment modalities were kept undisturbed. For patients with disability grade of >3 in GBS disability scale and for those with progressively increasing weakness, the definite treatment(IvIg) was started. Patients were regularly followed up throughout their stay in the hospital. Intensive medical care was provided for severely affected patients. Elective intubation was done for those patients who had poor single breath count (<8) and for those with severe bulbar weakness and poor cough reflex. Ventilatory support was provided for those in need. Complications like aspirational lower respiratory tract infection, pressure sores, urinary tract infection(UTI) and deep vein thrombosis(DVT) were noted and treated accordingly.

A record of follow up at 4 weeks, 12 weeks and 6 months was obtained for all patients using GBS disability scale (adapted from Hughes et al.,1978).[12] For patients who did not show up for review, the GBS disability score was assessed telephonically. The primary outcome measure was the GBS disability score at 3 months and 6 months. The outcome in those who were capable of performing their daily activity independently (disability score <3) were taken as complete recovery, whereas inability to do daily activity without help was taken as partial recovery and wheelchair bound or bedridden patients were taken as poor recovery. The complete recovery cases were taken as good outcome and rest were taken as bad outcome for the ease of analysis.

Association of demographic, clinical-etiological pattern, CSF profile and electro-physiological parameters with the poor outcome in form of need for mechanical ventilation and bad outcome at the end of 3 months and 6 months were tested using Fisher's exact test, X^2 text or student t-test by using IBM SPSS software.

RESULTS

Among the 50 patients, 29(58%) were males and 21(42%) were females with M:F ratio of 1.3:1. Mean age of patients was 30.5(14-55) years. 25(50%) patients belonged to the age group (21-30) years. 26(52%) had antecedent illness within 4 weeks of onset of weakness. Fever, 10(20%) was the most common antecedent illness. The mean duration of presentation from onset of weakness was 6.7(3- 14)days and mean duration of peak illness from disease onset was 10.7(5-16) days. The mean duration of hospitalisation was 17.4days with a range of (10-41) days.

The mean Hughes disability score at admission was 3.7 with a range of (3-5). The mean MRC sum score at admission was 32.4 with a range of (6- 52). 32(64%) had severe disease with Hughes score ≥4 at presentation. 28(56%) patients had MRC sum score at admission <40 and 22(44%) had ≥40. The mean average single breath count of whole study was 22.6 with a range from 7-38. 19(38%) had an average single breath count of ≤20 and 31(62%) had an average breath count of >20.

TABLE 1- CLINICAL FEATURES

CLINICAL FEATURES	OUR STUDY
Facial weakness	23(46%)
Bulbar weakness	15(30%)
Opthalmoplegia	0
Cranial nerve involvement	23(46%)
Sensory symptoms	24(48%)
Limb weakness	
Paraparesis	21(42%)
Quadriparesis	29(58%)
Autonomic dysfunction	12(24%)
Respiratory involvement	17(34%)
Neck flexor weakness	14(28%)
Ventilatory support	10(20%)
DTR	
Areflexia/ Hyporeflexia	50(100%)
Subtype/variant	
AIDP	23(46%)
AMAN	14(28%)
AMSAN	9(18%)
UNCLASSIFIED	4(8%)
Complications	
LRTI	4(8%)
Bed sore	4(8%)
UTI	3(6%)
Sepsis	1(2%)
Death	
Sepsis	1(2%)
Ventilator associated pneumonia	1(2%)

F-Wave abnormalities were seen in 23(46%) patients and Non stimulable nerves were seen in 30(60%) patients in Nerve Conduction study(NCS).

The mean CSF cells was 3.1 cells/cumm with a range of (2-5). The mean CSF protein level was 114.5mg/dL(33-217mg/dL). 29(58%) patients had CSF protein more than 100 mg/dl. 35(70%) patients had albumin-cytological dissociation. All the patients of our study received IV immunoglobulin.

The mean Hughes grade day1 value, it was 3.7. At 4 weeks, it was 3.56, indicating a small improvement. However at 12 weeks, the mean was 2.6, indicating better and rapid improvement of functional disability

The mean mEGOS score at admission in our study was 4.4. Similarly mean EGRIS score at admission was 3.4 and MRC sum score at admission was 32.4.

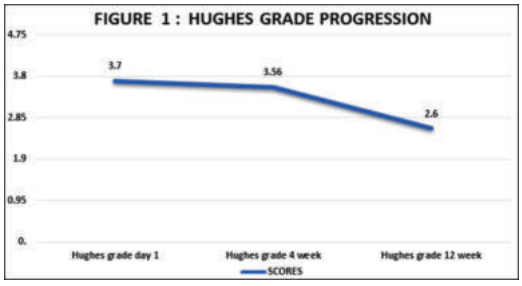

TABLE 2- DAY 1 EGRIS, mEGOS, MRC SUM SCORE

Parameters	Mean
mEGOS	4.4
EGRIS	3.4
MRC D1	32.4

OUTCOME

2(4%) out 50 patients in our study group died. One patient died of complication of sepsis while the other one died of ventilator associated lower respiratory tract infection.

A. 3 MONTHS RECOVERY

At the end of 3 months, 30(60%) patients had complete recovery, 12(24%) had partial recovery and 6(12%) patients had poor recovery. 30(60%) patients had good outcome and 20(40%) had bad outcome.

TABLE 3- 3 MONTHS RECOVERY

3 MONTHS RECOVERY	OUR STUDY
Complete	30(60%)
Partial	12(24%)
Poor	6(12%)
Death	2(4%)
Total	50(100%)

B. 6 MONTHS RECOVERY

At the end of 6 months, 35(70%) patients had complete recovery. 9(18%) patients had partial recovery and 4(8%) had poor recovery. 35(70%) had good outcome and 15(30%) had bad outcome.

TABLE 4- 6 MONTHS RECOVERY

6 MONTHS RECOVERY	CASES
Complete	35(70%)
Partial	9(18%)

Poor	4(8%)
Death	2(4%)
Total	50(100%)

PREDICTORS OF OUTCOME

1)PREDICTORS FOR THE NEED OF MECHANICAL VENTILATION

TABLE 5- INDICATORS FOR THE NEED OF MECHANICAL VENTILATION(MV)

Prognostic indicator	MV Not needed	MV needed	p-value
Male	23	6	0.589
Female	17	4	0.645
Age	29.8500	33.1000	0.325
Antecedent illness	21	5	0.937
Day of presentation	6.1500	9.0000	0.001
Day of Peak	10.8500	10.2000	0.517
Bulbar weakness	5	15	<0.0001
Neck flexor weakness	5	9	<0.0001
Facial weakness	13	10	<0.0001
Upper and lower limb weakness (Quadriparesis)	19	10	0.002
Autonomic dysfunction	4	8	0.003
Respiratory distress	7	10	<0.0001
Hughes D1	3.5750	4.2000	0.002
mEGOS D1	3.9500	6.3000	0.001
EGRIS D1	2.9750	5.3000	<0.0001
MRC D 1	37.5500	11.8000	<0.0001
Average SBC	25.1000	13.4000	<0.0001
CSF cells	3.0589	3.0678	0.148
CSF protein	105.9250	148.6000	0.027
albumino-cytological dissociation	26	9	0.121
F wave abnormality	14	9	0.006
Non-stimulable nerves	22	8	0.139
AIDP	21	2	0.066
AMAN	8	6	0.02
AMSAN	8	1	0.416
UNCLASSIFIED	3	1	0.603

Delayed presentation, bulbar weakness, neck flexor weakness, bilateral facial weakness, quadriparesis, respiratory difficulties, autonomic dysfunction; high Hughes grade at day 1, low average single breath count along with high EGRIS, mEGOS, MRC sum score day 1, high CSF protein, presence of F-wave abnormalities on NCS, AMAN subtype were statistically significant for all the patients who needed mechanical ventilation with p value of less than 0.05.

2. PREDICTORS OF OUTCOME AT THE END OF 3 MONTHS

TABLE 6- INDICATORS OF OUTCOME AT THE END OF 3 MONTHS

Prognostic indicator	Good	Bad	p-value
Male	17	12	0.354
Female	13	8	0.525
Age	29.0000	32.7500	0.162
Antecedent illness	14	12	0.123
Day of presentation	5.8333	8.0500	0.002
Day of peak mean	11.1667	10.0500	0.169
Duration of Hospital stay >3 weeks	1	12	<0.0001
Bulbar weakness	2	13	<0.0001
Neck flexor weakness	2	12	<0.0001
Facial weakness	7	16	<0.0001
Autonomic dysfunction	1	11	<0.0001
Upper and lower limb weakness (Quadrparesis)	12	17	0.002
Respiratory distress	5	12	0.002
Mechanical ventilation	0	10	<0.0001
Hughes D1	3.5333	3.9500	0.011
Hughes 4 weeks	3.1333	4.2000	<0.0001
mEGOS D1	3.4667	5.8500	<0.0001
EGRIS Day 1	2.6667	4.6000	<0.0001
MRC Day 1	41.7333	18.4000	<0.0001
Average SBC	26.2667	17.5000	<0.0001
CSF cells	2.9510	3.2130	0.59
CSF protein	85.9000	157.3000	<0.0001
Albumio-cytological dissociation	17	18	0.011
F wave abnormality	9	14	<0.0001
Non-stimulable nerves	15	15	0.069
AIDP	19	4	0.381
AMAN	6	8	0.011
AMSAN	3	6	0.007
UNCLASSIFIED	2	2	0.528
Complications	3	9	0.006

Delayed presentation, prolonged Hospitalisation, bulbar weakness, neck flexor weakness, bilateral facial weakness, quadriparesis, respiratory distress, need for mechanical ventilation, autonomic dysfunction; high Hughes grading at day 1, 4weeks, low average single breath count along with high EGRIS, mEGOS, MRC sum score day 1, high CSF protein, albumino-cytological dissociation, presence of F-wave abnormalities on NCS, AMAN, AMSAN subtype and non-neurological complications were statistically significant for outcome measures at the end of 3months with p value of less than 0.05.

3. PREDICTORS OF OUTCOME AT THE END OF 6 MONTHS

TABLE 7- INDICATORS OF OUTCOME AT THE END OF 6 MONTHS

Prognostic indicator	Good	Bad	p-value
Male	18	11	0.130
Female	17	4	0.245
Age	29.7429	32.266	0.382
Antecedent illness	14	12	0.348
Day of presentation	5.9714	8.46667	0.001
Day of Peak	11.3429	9.2667	0.015
Duration of Hospital stay >3 weeks	1	12	<0.0001
Bulbar weakness	3	12	<0.0001
Neck flexor weakness	3	11	<0.0001
Facial weakness	10	13	<0.0001
Autonomic dysfunction	4	8	0.003
Upper and lower limb weakness	15	14	0.001
Respiratory distress	6	11	<0.0001
Mechanical ventilation	1	9	<0.0001
Hughes grade Day 1	3.5429	4.0067	0.003
Hughes 4weeks	3.2571	4.2667	<0.0001
Hughes 12 weeks	2.0857	3.8000	<0.0001
MRC Day 1	39.7714	15.2000	<0.0001
mEGOS day 1	3.7429	6.0000	<0.0001
EGRIS day 1	2.8286	4.8667	<0.0001
Average SBC	26.0571	15.0067	<0.0001
CSF cells	2.9768	3.2100	0.590
CSF protein mean	91.4857	168.0067	<0.0001
albumino-cytological dissociation	20	15	0.001
F wave abnormality	13	10	0.006
Non-stimulable nerves	16	14	0.001
AIDP	21	2	0.200
AMAN	6	8	0.013
AMSAN	6	3	0.549
UNCLASSIFIED	2	2	0.346
Complications	3	9	<0.0001

Delayed presentation, early peak of illness, prolonged Hospitalisation, bulbar weakness, neck flexor weakness, bilateral facial weakness, quadriparesis, respiratory distress, need for mechanical ventilation, autonomic dysfunction; high Hughes grading at day 1, 4weeks, 12 weeks, low average single breath count along with high EGRIS, mEGOS, MRC sum score day 1, high CSF protein, albumino-cytological dissociation, presence of F-wave abnormalities and Non stimulable nerves or Inexcitable nerves on NCS, AMAN subtype and non-neurological complications were statistically significant for outcome measure at the end of 6months with p value of less than 0.05.

DISCUSSION

In our study, there was a slight male preponderance with a M:F ratio of 1.3:1. The patients were relatively younger with mean age of 30.5(14-55) years. A recent study from India by Dhadke et al., 2013, also showed higher prevalence in males.[17] Hughes et al. study showed a male: female ratio of 1.5:1.[1] Study by Verma R. et al.,2013, with 90 patients, had a mean age of 29.3±15.2 years[18], also study by Kalita J. et al., the median age of patients was 30 years with 75.3% of males and 24.7% of females.[19] 26(52%) of patients in our study had antecedent illness, Fever being the most common. Similar results were found by Shrivastava et al. in form of fever in 24.2% and diarrhoea in 13.6%.[20]. The mean duration of presentation from onset of disease was 6.7 days with a range of (3-14) days. The mean duration of presentation in the study by Sharma et al.[21], was 5.7 days and 10.6 days by Kalita J. et al.[19] The mean duration of peak illness or nadir was 10.7 days with a range of 6- 16 days. The time to reach maximal impairment varied from one day to 4 weeks (mean 9 ±5.7; median 8 days) was found by A. Bersano M., Carpo. et al.,2006.[22] 32(64%) patient presented with Hughes grade 4 or more disability at admission in our study. A study by A. Bersano M. Carpo.et al.,2006.,showed that at the time of admission most patients (53/70,76 %) were severely disabled (grades 4 or 5 of the Hughes 'scale; mean 3.7 ±0.9; median 4).[22] This distribution of disability score was also similar to another study by van Koningsveld et al.[7] Mean duration of hospitalisation was 17.4 days with a range of (10-41) days. In a recent study by Leuween et al., the mean duration of hospital stay was 17 days.[23]

Sensory involvement in our study is almost similar to Sharma et al.(68%) and Kalita J. et al.(52.7%).[21,19] Zhang et al. found sensory involvement in 51% of cases.[24] Cranial nerve involvement was present in 23(46%) of patients, which correlates well with studies by Loeffel et al.[25] and Dhadke et al.,[17]who reported cranial nerve involvement in 50% and 62.5% respectively. Zhang et al.,found cranial nerve involvement in 50.5% cases.[24] 23(46%) patients in our study were showing bilateral facial nerve palsy. Study by Winer et al., 53% had bilateral facial palsy.[26] In the another study of Kalita J. et al., facial weakness was present in 63.7% of cases.[27] Bulbar involvement was seen in 15(30%) of patients in our study was similar to 99(30.2%) by Kalita J. et al.[19] Study by Verma R. et al., revealed bulbar palsy in 21(23%).[18] Autonomic dysfunction was seen in 12(24%) of patients, resting tachycardia being the most common feature followed by fluctuations in blood pressure, which is very similar to other studies by Sharma et al.[21] and Kalita J. et al.[19] who reported autonomic dysfunction in 19.1% and 20.7% of their total cases respectively. Verma R. et al., had found autonomic disfunction in 31(34.4%) of study populations.[18]

Respiratory difficulties were seen in 17(34%) of patients in our study and 10(20%) patients subsequently needed Mechanical Ventilation. A study by Kalita J. et al., found that 30.5% patients had respiratory difficulties and 13.1% of their patients required ventilatory support.[19] Zhang et al., reported 15.3% of his cases required mechanical ventilation.[24] In a study by Walgaard C.et al., up to 22% of patients with GBS required mechanical ventilation within the first week of admission.[8] The Rong Kyo Lyu. et al. study group had 20.9% patients with ventilator dependence.[28]

The mean average single breath count of whole study was 22.6 with a range of 7-38. The mean of average single breath count of patients needing mechanical ventilation was 13.4 with a range of 7-20. In general a single breath count of <15 is consistent with significant impairment of the patient's vital capacity.[29-31] Due to lack of facilities we used serial measurement of single breath count instead of serial vital capacity measurement as a marker of severe respiratory compromise and monitoring (decline/improvement) of respiratory function.

If we see the Hughes grade or GBS disability grade progression, the mean day1 value was 3.7, at 4 weeks it was 3.56 and at 12 weeks the mean was 2.6. Most of our patients had a GBS disability score greater than 3 indicating significant disability before treatment initiation. This distribution of disability score was similar to the study by van Koningsveld R. et al.[7]

In this study, the mean day 1 EGRIS score was 3.4. 16(32%) patients of our study had score 0-2, none in this group needed mechanical ventilation; 21(42%) had score 3-4, out of which only 1(4.8%) needed mechanical ventilation. 13(26%) had a score of 5 or more, out of them 9(69.2%) needed mechanical ventilation. Walgaard C, Lingsma HF, Ruts L.et al., showed than an EGRIS of 0–2 indicates a low risk of mechanical intervention (4%), 3–4 indicates an intermediate risk (24%) and ≥5 indicates a high risk of mechanical intervention (65%), which is in accordance to our study.[8]

The overall mean mEGOS of our study is 4.4. At 3 months, the mean mEGOS Day1 of patients who had good outcome was 3.67 and bad outcome was 5.85. At the end of 6 months, the patients with good outcome, mean mEGOS day1 was 3.85 and bad outcome was 6.00. This is in accordance with the study by Walgaard et al.[9]

The average CSF protein of whole study population was 114.5 mg/dL with a range of (33-217)mg/dL. 35(70%) patients had albumino-cytological dissociation when CSF analysis done after 1 week of neurological illness. In the study by Verma et al., mean CSF protein value was 108.60±53.24.[18] The study of 61 GBS patients by Bhargava A. et al., cerebrospinal fluid analysis was showing albumino-cytological dissociation in 49 (80%) patients, in which protein level ranged from 48 to 242 mg/dl.[32] Kalita J. et al. study found albumino-cytological dissociation in 223(68%) of patients.[19]

AIDP was the most common subtype followed by AMAN and AMSAN. Zhang et al. found AIDP as most common subtype with 67(60.36%) out of 111 patients.[24] This was also consistent with previous studies by Hughes et al., Mishra et al., Gupta D. et al. and Sharma G. et al., where AIDP was most commonly seen followed by axonal variant.[1,33-35] F-wave abnormalities were seen in 23(46%) of study populations. 19(82.6%) out of 23 patients with F-wave abnormalities are found to be AIDP on NCS study. Paul H. Gordon et al.[36] and Ranka Baraba et al.,[37] also showed similar pattern F-wave abnormalities in AIDP. Non stimulable/inexcitable nerves were seen in 30(60%) patients of our study. The presence of inexcitable motor nerves is associated with a poor outcome (Feasby 1986, Miller 1982, 1988).[38,39]

All of our patients, at presentation, had a GBS disability score ≥3, still progressing, and presenting within 2 weeks of onset. This may be because our institute is a tertiary care hospital and all serious cases are referred to us. Also IV immunoglobulin(IVIg) is available free cost at our institute. Therefore we have provided the benefit of IV immunoglobulin to all of our patients. 2(4%) patients of our study group expired during the period of study. In a analysis done by Rajabally et al., 61(4.4%) out of 1391 patients died.[40]

At 3 months, 30(60%) patients had complete recovery. In a study by Walgraad et al., 30% of the patients had a bad outcome (Hughes 3 or above) at 12 weeks.[8] In an observational study conducted by Saravanan et al., the 39% patients had a bad outcome.[41] Study by Kalita J. et al. shows at 3 months follow up, 32 (43%) patients recovered completely, 37 (39.4%) partially and 25 (26.6%) had poor recovery.[19]

At the end of 6 months, 35(70%) had complete recovery. Studies by Hughes et al., Hughes R.A. et al., vanDoorn et al., Doets A.Y. et al., Drenthen J. et al., Merkies IS. et al., shows almost 80% of patients with GBS regain the ability to walk independently at 6 months after disease onset.[1,2,4,42,43,44] Also, 100(82%) out of 122 in analysis done by Rajabally et al., were able to walk unassisted by the end of 6 months.[40] Clinical Age >40 or 50 years, need for mechanical ventilation, Preceding diarrhoea, Low MRC Sum Score at admission, Short interval between weakness onset and admission, Facial and/or bulbar weakness, electrophysiological Inexcitable nerves were indicators of poor outcome in pooled analysis done by Rajabally et al.[40] Kalita J. et al. also found similar outcome predictors like cranial nerve involvement, bulbar weakness, higher disability grade, dysautonomia, generalised hyporeflexia, inexcitable nerves, mechanical ventilation as statistically significant, where as day of admission, use of IVig was nonsignificant.[19] Zhang et al., found low MRC sum score, antecedent illness, requirement of mechanical

ventilation statistically significant as prognostic indicator.[24] Increased CSF protein has been reported as an indicator of poor prognosis, found in a study by Sahin S. et al. [45] An Indian study by Archana B Netto et al., has shown poor outcomes with inexcitable nerves.[46] Study from Egypt by El-Khayat NM. et al., shows High Hughes scores at onset(mean=4.4), Cranial nerve affection, respiratory involvement, autonomic disturbances at first assessment, High CSF proteins, Presence of axonal affection in the nerve conduction study in the first presentation is significantly associated with poor prognosis at 3 months and 6 months.[47] A clinical prognostic model proposed by Walgaard et al., revealed that higher age, preceding diarrhoea, and low MRC sum score on admission and at 1 week were independently associated with inability to walk at 4 weeks, 3 months, and 6 months.[9] In our study these factors were seen to be associated with a poor outcome. In addition neck flexor weakness and autonomic dysfunction was also associated with poor outcome, similar to the study by Verma R. et al.[18] At presentation, most of our patients had a GBS disability score greater than 3 and was progressing, indicating a significant disability before treatment initiation. Gauhati Medical college & Hospital, being a centre of excellence, more complicated cases were being referred from other health institutions in North-eastern part of India.

Wen et al. in their analysis of 155 GBS patient who were admitted to the Affiliated Yantai Yuhuangding Hospital of Qingdao University between 2014-2020, severe GBS (Hughes score >3), older age, low MRC sum score at admission and at nadir, cranial nerve involvement, dysautonomia was significantly associated with mechanical ventilation; and sex was not found to be significantly associated.[48] The results from Bangladesh by Islam, Z. et al., that identified bulbar involvement, autonomic dysfunction, and severe muscle weakness as important risk factors for MV among Bangladeshi GBS patients.[49] Kanikannan et al. found that low single breath count, neck weakness, and bulbar palsy is significantly associated with the mechanical ventilation.[50] Low MRC sum score at admission, facial and/or bulbar weakness, inability to lift elbow, inability to lift head(neck flexor), early admission after weakness onset were indicators for the need of mechanical ventilation in a pooled analysis done by Rajabally et al.[40]

AMAN AND POOR PROGNOSIS

A study by Gang Zhang et al., of 139 patients were followed up in their research, prognosis of AMAN group was poorer than that of AIDP group at 3 month and 6 month follow-up.[51] In the study of Gazioglu et al., found that axonal forms of GBS subtypes had a worse prognosis.[52] It has been debated whether AMAN carries or not a worse prognosis. In a previous study of 41 GBS cases by Kuwabara S.1998, et al., the anti-GM1 positive patients—most of whom had AMAN— had two patterns of clinical recovery: rapid and prolonged.[53] Again on 2001, a study by Kuwabara S. et al., found that AMAN patients may either rapidly and fully recover or improve very slowly and incompletely.[54] According to Kuwabara and Yuki, who in 2013 did a review about the AMAN form, this variant has a worse functional prognosis and a longer time for recovery and continue to recover even after 1 year.[55] A Hiraga, M Mori. et al., found that most of the severely disabled AMAN patients who are unable to walk six months after onset, may still show improvement over a period of years and may ultimately be able to walk independently,[56] for that we need to conduct study for long duration.

CONCLUSION

Overall outcome of GBS is favourable. The patients were relatively younger with male preponderance. During the disease course, 20% patients of our study needed mechanical ventilation. Good outcome at the end of 3 months and 6 months were 60% and 70% respectively. 4% patients expired during the period of the study.

Delayed presentation, early peak and prolonged of Hospitalisation, bulbar weakness, neck flexor weakness, bilateral facial weakness, quadriparesis, respiratory distress, need for mechanical ventilation, autonomic dysfunction; high Hughes grading at day 1, low average single breath count along with high EGRIS, mEGOS, MRC sum score day 1, high CSF protein, albumino-cytological dissociation, presence of F-wave abnormalities, Inexcitable nerves on NCS, Axonal subtype and non neurological complications were the early predictors of poor outcomes in our study. AMAN subtype was significantly associated with poor outcomes even at the end of 6 months.

Early identification of the severely affected group with the above mentioned clinico-electrodiagnostic and CSF profile can be helpful for prompt treatment, anticipation of complication and adequate rehabilitation of the patients and thereby attenuating the morbidity and mortality associated with the same.

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CONFLICTS OF INTEREST

None

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