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Outcome of patients with Larry Guillian-Barré syndrome

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Abstract: Background: GBS is an acute-onset, monophasic immune-mediated disorder of the peripheral nervous system that often follows an antecedent infection.
Objectives: To assess the factors (clinical, investigatory tools, and therapies) that may affect the outcome of patients with GBS.
Methods: This is an analytical observational study that was conducted at Tertiary care Hospital including thirty patients with the diagnosis of GBS in the duration from May 2018 to December 2021 after the patients or their relatives signed an informed consent. Included patients from both genders aged from 16 to 70 years old who were diagnosed as GBS within two weeks from onset of neurologic symptoms, depending on the history, clinical examination and investigatory tools. Hughes scales was used for outcomes, SPSS (Version 22.0).
Results: the study was female preponderance as compared to males (60%). Mean age was 36.18 years and the most common age group was found to be 16-39 years (70%). 26 patients (85%) had preceding respiratory tract infection, 4 patients (15.0%) had preceding gastrointestinal tract infection. The Pattern of weakness was ascending in 26 patients (85%) and descending in 4 patients (15%). there was no statistically significant difference found between both groups regarding gender and age of the study population. But it was noticed that patients with age ranging from 16 to 39 years showed significantly good or favorable prognosis compared to those with age ranging from 40 - 59 or $\geq$60 years. There was no significant difference between both groups regarding infection preceding illness, the pattern of weakness either ascending or descending and the nature of first symptoms. As regards the treatments received during period of admission, 20 patients (50.0%) received plasma exchange sessions, 4 patients (20.0%) received IVIG only and 6 patients (30.0%) received plasma exchange session then followed by IVIG due to unsatisfactory response after sessions.
Conclusion: Ascending pattern of weakness was more common than descending pattern in this study population and was not related to prognosis. High Hughes score at admission was associated with poor outcome at 8 weeks.

Keywords: Guillain-Barre syndrome; Nerve conduction studies and electromyography; Demyelinating and axonal neuropathy; Hughes functional score; Plasma exchange; IVIG.

1. Introduction

Acute post infectious immune mediated peripheral neuropathy known as Guillain Barre syndrome (GBS) is characterized by fast progressing weakness and sensory loss, typically followed by a sluggish clinical recovery [1]. The progressive phase can cause varying degrees of weakness, from aberrant gait to total paralysis, as well as cranial nerve weakening, discomfort, compromised respiratory function, and autonomic instability. It peaks in 7 to 14 days. One to two cases of GBS are reported for every 100,000 people. GBS can happen at any age and is equally prevalent in both men and women [2]. According to one theory, the myelin sheath and axon of peripheral nerves, as well as other immune-mediated mechanisms, are directly involved in the etiopathogenesis of GBS [3]. Fifty to seventy percent of the cases are preceded by respiratory or gastrointestinal infectious episodes either bacterial or viral, less likely by vaccination.

The outcomes of GBS patients have improved as a result of improvements in general healthcare facilities and the accessibility of particular treatments. The form and severity of the disease appear to be influenced by the type of prior infection and patient-related host factors. When using clinical, biological, or biochemical criteria to diagnose GBS, an electrodiagnostic investigation is crucial [4]. Due to the autoimmune nature of

GBS, immunotherapy aims to reduce nerve and myelin damage, promoting the survival and regeneration of peripheral nerves. If administered within the first few weeks of the onset of the illness, plasma exchange (PE) and intravenous immunoglobulins (IVIG) are efficient immunotherapies for adult and pediatric patients with GBS [5].

2. Material and Methods

This is an analytical observational study that was conducted at Tertiary care Hospital including thirty patients with the diagnosis of GBS in the duration from May 2018 to December 2021 after the patients or their relatives signed an informed consent.

2.1. Inclusion criteria

Included patients from both genders aged from 16 to 70 years old who were diagnosed as GBS within two weeks from onset of neurologic symptoms, depending on the history, clinical examination and investigatory tools.

2.2. Exclusion criteria

Patients with other causes of polyneuropathy such as diabetic, uremic, hypothyroidism, drug-related neuropathy, para neoplastic neuropathy or hereditary neuropathy.

3. Methodology

A thorough medical history, a neurological history, and the history of any antecedent events that occurred in the few weeks before to the development of neurologic symptoms were given to all patients. Complete neurological evaluation at the time of presentation and laboratory tests, including erythrocyte sedimentation rate, C-reactive protein, random blood sugar, complete blood count, serum urea, serum creatinine, serum electrolytes (sodium, potassium, and calcium), liver function tests, and urea nitrogen (quantitative). Within two weeks of admission, nerve conduction tests and electromyography were completed. For the median and ulnar nerves in both upper and lower limbs, the posterior tibial and common peroneal in both lower limbs, and the sural nerve's sensory conduction. Various forms of treatment, including PE, IVIG, or both, were given during the hospital stay. The Hughes functional score (F-score), which was applied to patients upon admission, at the conclusion of four weeks following the beginning of neuropathy, and at the conclusion of eight weeks for follow-up and result assessment, was used to measure outcome [6]. Hughes functional grading scale consists of Grade 6: dead, Grade 5: requires assisted respiration, Grade 4: bed bound, Grade 3: able to walk 5 meters with aid, Grade 2: ambulates independently, Grade 1: minimal signs and symptoms, able to run and grade 0: normal.

4. Statistical Analysis

All data collected were tabled and statistically analyzed by Microsoft Office 2003 (excel) and Statistical Package for Social Science (SPSS) version 22. Parametric data were expressed as mean and SD, and non-parametric data were expressed as number and percentage of the total. SD of 2 groups was done using the paired student's t-test. P value < 0.05 is considered significant.

5. Result

As per Table 1 the study was female preponderance as compared to males (60%). Mean age was 36.18 years and the most common age group was found to be 16-39 years (70%).

As per Table 3 As regards the clinical characteristics of the study population, 26 patients (85%) had preceding respiratory tract infection, 4 patients (15.0%) had preceding gastrointestinal tract infection. The Pattern of weakness was ascending in 26 patients (85%) and descending in 4 patients (15%). The first symptoms were motor symptoms in 4 patients (15.0%), sensory symptoms in 5 patients (19%) and mixed motor and sensory symptoms in 22 patients (66%).

As regards Hughes scale of the studied population, on presentation one patient (5.0%) was Grade 1, 3 patients (10.0%) was Grade 2, 6 patients (30.0%) was Grade 3, 6 patients (40.0%) was Grade 4 and 4 patients

(15.0%) was grade 5. After 4 weeks from onset of symptoms 2 patients (15.0%) was Grade 2, 6 patients (40.0%) was Grade 3, 5 patients (25.0%) was Grade 4, 5 patients (15.0%) was Grade 5 and 6 patients (18.0%) was Grade 6. After 8 weeks from onset of symptoms 5 patients (25.0%) was grade 0, 8 patients (40.0%) was Grade 1, 2 patients (10.0%) was grade 2, 3 patients (15.0%) was Grade 3, one patient (5.0%) was grade 4 and one patient (5.0%) was grade 6. The prognosis of patients after 8 weeks of from onset of symptoms was classified as group I; good or favorable prognosis (Hughes score < 3) in 20 patients (65.0%) of the study population and group II; poor or unfavorable prognosis (Hughes score $\geq$ 3) in 10 patients (35.0%).

As per Table 4 there was no statistically significant difference found between both groups regarding gender and age of the study population. But it was noticed that patients with age ranging from 16 to 39 years showed significantly good or favorable prognosis compared to those with age ranging from 40 - 59 or $\geq$60 years. There was no significant difference between both groups regarding infection preceding illness, the pattern of weakness either ascending or descending and the nature of first symptoms.

As regards the treatments received during period of admission, 20 patients (50.0%) received plasma exchange sessions, 4 patients (20.0%) received IVIG only and 6 patients (30.0%) received plasma exchange session then followed by IVIG due to unsatisfactory response after sessions. The sessions of PE ranged from 3 to 9 sessions with mean of 5.44 $\pm$ 1.55 sessions. 11 patients (68.8%) received less than 5 plasma exchange sessions while 5 patients (31.3%) received 5 or more sessions.

Table 1. Demographic details of study patients

Variables	N (%)
Gender Males	10 (40)
Females	20 (60)
Age (years) Mean$\pm$SD	36.18$\pm$16.08
16-39 years	22 (70)
40-59 years	4 (15)
>60 years	4 (15)

Table 2. Clinical Features and Pattern of Weakness

Variables	N (%)
Infection	
RTI	26 (85)
GE	4 (15)
Pattern of weakness	
Ascending	26 (85)
Descending	4 (15)
Nerve involvement	
Sensory	3 (15)
Motor	5 (19)
Autonomic	22 (66)

Table 3. Hughes scale for study cases

Hughes Scales	N (%)
At presentation	
Grade 1	1
Grade 2	3
Grade 3	6
Grade 4	6
Grade 5	4
At 4 weeks	
Grade 0	1
Grade 2	2
Grade 3	6
Grade 4	5
Grade 6	6
At 8 weeks	
Grade 0	5
Grade1	8
Grade 2	2
Grade 3	3
Grade 4	1
Grade 6	1

Table 4. Association of Prognosis with demographic data

	Group I (20)	Group II (10)	p-value
Gender			
Males	7	3	0.12
Females	13	7	
Age	36.11±16.11	35.45±16.08	0.22
Pattern of weakness			
Ascending	18	8	0.17
Descending	2	2	
RTI/GE	20/0	6/4	0.11
Nerve involvement			
Sensory	2	1	
Motor	2	3	0.11
Autonomic	16	6	

6. Discussion

GBS is an acute-onset, monophasic immune-mediated disorder of the peripheral nervous system that follows an antecedent infection [7]. Prognosis is usually good, but residual motor and sensory deficits may occur. Nonetheless, about 20%of patients die from the complication of GBS or remain disabled. Outcome from GBS is determined by the extent of nerve damage in the acute phase and the capacity to recover in the convalescent phase [8]. In this study twenty patients with the diagnosis of Guillain Barre Syndrome within two weeks from onset of neurologic symptoms were included, whom their diagnosis based on the established clinical criteria and verified by investigations. Outcome was assessed on the Hughes scales

The results of this study showed no statistical significant difference between the studied groups as regard demographic data; sex and age. However, the group age ranging from 16 to 39 years reported significantly

favorable prognosis. Similar findings were reported by van Koningsveld *et al.,* (2017) and Munayco *et al.,* (2019) [9,10]. This may be due to the occurrence of higher incidence of complications during hospitalization in elderly patients, such as lymphocytopenia, hyponatremia, hypoalbuminemia, hyperglycemia, dysautonomia and pneumonia [11]. This study showed no significant differences as regard the type of antecedent illness for both groups. The most common illness reported was upper respiratory tract infection. But Hadden *et al.,* (2011) and Zhang *et al.,* (2018) reported that antecedent illness of gastroenteritis was a predictor of poor prognosis in their studies [12,13]. Also, Campylobacter jejuni infections are associated with more severe types of GBS with axonal involvement rather than demyelinating peripheral nervous system involvement [11,14].This discrepancy from present study can be explained by small sample number in the current study and small number of patients with antecedent gastroenteritis infection.

The current study results showed that patients who started treatment earlier had significant good prognosis. Similar findings were reported by van Doorn (2013) and Christine *et al.,* (2017) [15,16]. Asearly treatment will probably reduce the incidence of patients who required assisted ventilation, and decrease in the time to onset of motor recovery. The present study reported that patients with long duration stay in hospital showed significant poor prognosis. This might be due to the high incidence of complications associated with long stay duration such as hospital acquired pneumonia, sepsis, adult respiratory distress syndrome, DVT, pulmonary embolism and dysautonomia [17]. The current study results showed the patients who needed mechanical ventilation had significantly poor prognosis.

7. Conclusion

In this study, an older age group was a predictor of poor outcome. An antecedent infection was seen in all cases as gastroenteritis and respiratory tract infection. Ascending pattern of weakness was more common than descending pattern in this study population and was not related to final outcome. High Hughes score at admission was associated with poor outcome at 8 weeks. In this study, various lines of treatment such as PE, IVIG or both showed a similar outcome. Thus early diagnosis, early management in high-quality ICU to avoid complications and the use of PE or IVIG or both in GBS are of utmost important.

Conflicts of Interest: "Author declares no conflict of interests."

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