Bangladesh Crit Care J September 2023; 11 (2): 95-102

Original Article

Effectiveness of Plasmapheresis and IVIG in the Treatment of Guillain-Barre Syndrome: A Cross-Sectional Observational Study

Md Hasibuddin Khan[1], Md Khairul Islam[2], Sonia Rahman[3], AKM Ferdous Rahman[4], Mohammad Mohsin[4], Subroto Kumar Sarker[4], Mohammad Salim[4], Sardar Mohammad Tanvir[4], Md Habibullah[4], Md Mozaffer Hossain[5]

DOI: https://doi.org/10.3329/bccj.v11i2.69194

Abstract:

Background: *Plasma exchange and intravenous immunoglobulin (IVIG) are the most effective treatments for Guillain-Barre syndrome; both can improve patients' symptoms. However, limited clinical research is available in Bangladesh to compare the effectiveness of both treatment modalities.*

Aims: *This study aimed to compare the effectiveness of plasmapheresis and IVIG in the treatment of Guillain Barre Syndrome*

Method: *It is a prospective analytical study carried out in the ICU at the Department of Anesthesia, Analgesia, Palliative & Intensive Care Medicine, Dhaka Medical College Hospital, Dhaka, and Transfusion Medicine Department, NINS. Study subjects were patients with GBS, irrespective of gender, race, ethnic group, and age. For this study, they were divided into Group A (treated by IVIG) and Group B (treated by plasmapheresis). The clinical outcome & disability grade were evaluated and compared between groups.*

Result: *In this study plasmapheresis was associated with more improvement compared to IVIg, moreover there was a significant difference in the disability scores between the two groups after 12 weeks of treatment. Group B with plasmapheresis had a significantly lower mean disability score (1.26 ± 0.06) compared to Group A with IVIg (3.05 ± 0.17) with a p-value of 0.011 At presentation and immediate post-therapy, there was no statistically significant difference between the two treatment groups in terms of MRC grade. However, at the later time points (6 and 12 weeks), Group B (plasmapheresis) was associated with a statistically significant improvement in MRC grade compared to Group A (IVIg). Specifically, at six weeks, the mean MRC grade was 3.18 for Group A and 4.04 for Group B (p=0.038), and at 12 weeks, the mean MRC grade was 3.52 for Group A and 4.87 for Group B (p=0.019). The mechanical ventilation rate was higher in IVIg (51.4% vs 14.2%, respectively) group. The difference was statistically significant (p=0.017). The proportion of individuals with complete recovery was significantly higher in Group B (60%) compared to Group A (22.8%) with an odds ratio of 5.06 (95% CI: 1.79-14.31) and a risk ratio of 1.959 (95% CI: 1.24-3.01). The proportion of individuals with residual deficit was significantly lower in plasmapheresis (25.71%) compared to Group A (57.1%) with an odds ratio of 3.85 (95% CI: 1.40-10.59) and a risk ratio of 2.22 (95% CI: 1.18-4.18), and this was statistically significant. There was no statistically significant difference in the proportion of individuals who died between the two groups, with a p-value of 0.530.*

Conclusions: *In point of comparison, plasmapheresis has a potential benefit over intravenous immunoglobulin.*

Key words: *Guillain–Barré syndrome (GBS), Intravenous immunoglobulin (IVIG), Plasmapheresis.*

Introduction:

Guillain Barre syndrome (GBS) is an immune-mediated peripheral neuropathy preceded by a triggering event, most often an infection. Generally, it manifests as symmetric motor weakness. The annual incidence of GBS is 1 to 3 per 100,000 persons annually.[1] The diagnosis of GBS is based on the history and clinical examination. Although cerebrospinal fluid analysis and electrodiagnostic testing usually provide evidence supporting the diagnosis.[2] Molecular mimicry[3], antiganglioside antibodies and, likely, complement activation are involved in the pathogenesis of GBS; a potential role for genetic susceptibility requires further investigation. The pathogens that cause antecedent infections related to GBS are cytomegalovirus, Epstein–Barr virus, Mycoplasma pneumonia, Hemophilus influenzae, and influenza A virus. Laboratory investigations include blood tests, cerebrospinal fluid (CSF) study and Electromyography EMG.[4] Albumino-cytological dissociation of CSF is the hallmark of CSF findings in the case of GBS.[5]

Although many patients with GBS recover spontaneously, 10-23% patients require mechanical ventilation, 7-22% is left with some disability, 3-10% relapses and 2-5% die. The likelihood of permanent disability increases with the severity and duration of the disease, and patients may require prolonged stays in the hospital. Therefore, keeping the disability and prognosis in view, the disease needs specific treatment. After explaining the modalities, the selection of plasmapheresis or intravenous Immunoglobulin (IVIG), the management modality was always decided based on their preference and consent.[6]

Received : May 02, 2022; Accepted : July 26, 2023

The European Academy of Neurology reported that Intravenous immunoglobulin (IVIg) and plasma exchange (PE) is effective in Guillain-Barré syndrome (GBS). Despite current treatment, GBS remains a severe disease, and 20% are still unable to walk after half a year; many patients have pain, fatigue or other residual complaints that may persist for months or years.[4]

It has been shown that PE is beneficial when applied within the first four weeks from onset, but the most significant effect was seen when it started early (within the first two weeks). The study reported that plasmapheresis is the best treatment modality for GBS as it reduces the duration of hospital stay and hastens the recovery of those children.[7] The usual regimen is five times PE for two weeks, with a full exchange of about five plasma volumes. However, other work reveals a meaningful difference between the MV weaning and precocious recovery in the IVIg group compared to the PE group.[8] The Cochrane review on the use of IVIg in GBS showed no difference between IVIg and PE concerning the improvement in disability grade after four weeks, the duration of mechanical ventilation, mortality, or residual disability.[9]

All patients with mild, moderate, and severe GBS benefited from treatment. Patients who need even minimum assistance for walking, who are steadily progressing and those who are bed-and ventilator-bound should be advised PE. AAN in 2003 concluded that PE hastens recovery in non-ambulant patients who got treatment within four weeks of onset, and PE hastens recovery in ambulant patients with GBS who are examined within two weeks.[5]

In our country, fewer studies on Guillain Barre syndrome found plasmapheresis, and IVIG was offered to patients admitted to tertiary care hospitals. However, different factors and issues are involved in the treatment protocol for this patient. For example, IVIg treatment in GBS patients is costly; sometimes, patients in low-resource countries cannot afford to maintain it. On the other hand, plasma exchange is cost-effective & establishment is essential in tertiary care hospitals in this country. Therefore, this study aimed to compare the effectiveness of plasmapheresis in Guillain Barre Syndrome compared to IVIg in our setting.

1. Junior Consultant. Department of Anesthesia, Pain, Palliative and Intensive Care. Dhaka Medical College Hospital
2. Junior Consultant, Medicine.Department of Medicine, Dhaka Medical College Hospital
3. Junior Consultant Surgery, NICHR, Dhaka
4. Assistant Professor, Critical Care Medicine, Dhaka Medical College Hospital
5. Professor and Head of department, Department of Anesthesia, Pain, Palliative and Intensive Care, Dhaka Medical College Hospital

Corresponding Author:
Dr. Md Hasibuddin Khan
Junior consultant
Dept of Anesthesia, pain, palliative & intensive care
Dhaka Medical College Hospital
E-mail: drhasibsidrat29@gmail.com

Methodology:

Population selection and objectives of the study: This prospective analytical study was conducted at the Department of Anesthesia, Analgesia, Palliative & Intensive Care Medicine, Dhaka Medical College Hospital, Dhaka, from July 2019 to June 2020. The study aimed to compare the effectiveness of plasmapheresis and IVIG in the treatment of patients with Guillain-Barre Syndrome (GBS) admitted to the intensive care unit (ICU). Data collection was carried out following approval from the ethical review committee. Patients meeting the inclusion criteria; aged 12 years or older, confirmed diagnosis, and admission to the ICU who agreed to participate were included in the study and patients with known IgA deficiency and allergies to blood preparations, as well as those with severe cardiovascular disease were excluded from the study.

The general objective of this study was to compare the effectiveness of plasmapheresis and IVIG in Guillain-Barre Syndrome patients. The specific objectives were assessing disability grading, observing the Medical Research Council (MRC) grade of muscle weakness and power, the rate of complete recovery, requirement of mechanical ventilation in patients treated with plasmapheresis and IVIG.

Study procedure: This prospective observational study was conducted in the ICU, Department of Anesthesia, Analgesia, Palliative & Intensive Care Unit, DMCH and National Institute of neuroscience hospital, INS. Ethical approval was obtained from the DMCH ethical review board and IRB of NINS. Both males and females, fulfilling the inclusion and exclusion criteria, were included in the study. Informed consent was obtained before enrollment in the study.

Data collected included age, sex, season, antecedent infection, the need for mechanical ventilation, length of stay in the intensive care unit, the clinical outcome of cases and the investigation performed. The diagnosis of acute GBS was based on the following criteria:

An acute progressive symmetric weakness of the extremities with areflexia or hyporeflexia, the cerebral spinal fluid (CSF) shows albumin cytological dissociation.

Electrophysiological studies reveal features of demyelinating/axonal neuropathy.

Albumin-cytological dissociation was defined as CSF with a raised protein and total cell count of ≤ 10 per mm3. Nerve conduction velocity and electromyography were performed according to hospital protocol. The treatment of GBS in our hospital started after clinical manifestations and investigations confirmed the diagnosis.

Treatment: Patients were treated with either IVIG (Group-A) or plasmapheresis (Group-B) on the basis of computerized randomization. IVIG was given a 0.4 g/kg/day dose for five consecutive days. Plasmapheresis consists of exchanging 200–250 ml/kg over 7–10 days.

The plasma exchange was started within seven days of symptoms of GBS appearing, with a median difference of 2

days between the initiation of plasma exchange and IVIg. The patient's clinical features of respiratory distress and abnormalities on arterial blood gas analysis were intubated and provided with mechanical ventilation. The outcome parameters analyzed included in-hospital, recovery, mortality, and residual disability.

Follow-up: We recorded data on age, sex, seasons of disease, H/O antecedent events, mean length of hospitalization, the requirement of ventilation, the onset of motor recovery, and complications. Follow-up was done at first weeks (1st follow-up) and 6 weeks (2nd follow-up) and 12 weeks(3rd follow-up). Patients with a vital capacity of <15 mL/kg, partial pressure of oxygen of <70 mmHg or partial pressure of carbon dioxide of >45 mmHg were placed on a mechanical ventilator.

All the information was collected in the datasheet. Data will be collected by using a preformed data sheet. After editing and coding, the coded data will be cleaned, validated, and analyzed using SPSS. Data is presented as a table, graph, and charts. All collected questionnaires were checked very carefully to identify errors in the data. Data processing consists of registration schedules, editing computerization, preparing dummy tables, and analyzing and matching data.

Ethical consideration:

Strict confidentiality and security of data related to the patient were maintained. There was no risk or safety concern to either the patient or researcher. This study has no potential conflict of interest and is entirely an academic research project.

Statistical analysis: Following the data collection, all data were edited and encoded into a statistical software named 'statistical program Statistical Package for Social Science' (SPSS) version 22.0.

Descriptive statistics were used to summarize and describe the characteristics of the sample, such as the mean, standard deviation, median, range of age, sex, duration of symptoms, severity of the disease, and other relevant factors. A t-test was used to compare the mean scores of the two treatment groups, and the chi-square test was used to compare two categorical variables. 2.7.

Operational definitions:

Intravenous immunoglobulin (IVIG): A sterile solution of concentrated antibodies extracted from healthy people administered directly into a vein (IVIG) is used to treat immune system disorders. Also known as intravenous gamma globulin

Plasmapheresis: Plasmapheresis is the removal, treatment, and return or exchange of blood plasma or components thereof from and to the blood circulation. It is thus extracorporeal therapy (a medical procedure performed outside the body).

Disability grade[9]: The degree of motor function will be expressed on a seven-point functional scale used in previous trials, on which.

0 - denotes healthy.

1 - Having minor symptoms and signs but fully capable of manual work.

2 - able to walk 10 m without assistance.

3 - able to walk 10 m with a walker or support.

4 - Bedridden or chair bound (unable to walk 10 m with a walker or support);

5 - Requiring assisted ventilation for at least part of the day; and

6 - Dead

MRC scale for muscle power: This is a reliable and validated scale for assessing muscle weakness. Each muscle group is graded as follows:

0 - No movement

1 - Flicker is perceptible in the muscle

2 - Movement only if gravity eliminate

3 - Can move limb against gravity

4 - Can move against gravity & some resistance exerted by the examiner

5 - Normal power

Results

The study demonstrates that the maximum number of patients, 22(31.4%), were between 31-40 years old (Table 1). The mean age of the patient was 32.37 ± 11.50 years in IVIG group and 33.31 ± 16.86 years in plasmapheresis group and there was male predominance. 58 patients had H/O antecedent events. Therefore, the maximum number of patients had a history of illness for 2-4 w

Table I: Demographic Distribution of the study subjects (N=70)

Age (years)	Group A IVIg n=35 (%)	Mean± SD	Group B plasmapheresis n=35 (%)	Mean ± SD	p-value
12 - 20	7 (20.0)		9 (25.7)		
21 - 30	7 (20.0)		2 (5.7)		
31 - 40	11 (31.4)	32.37 ± 11.50	11 (31.4)	33.31 ± 16.86	0.786[a]
41 - 50	8 (22.9)		4 (11.4)		
>50	2 (5.7)		9 (25.7)		

Gender			
Male			
Female	29 (82.9)		
6 (17.1)			
29 (82.9)			
6 (17.1)		1.000[b]	
H/O antecedent events			
Present	27 (77.1)		31 (88.6)
Absent	8 (22.9		4 (11.4)
Time elapsed since onset of symptoms			
≤1 weeks	12 (34.2)		10 (28.5)
2-4 weeks	17 (48.5)		18 (51.4)
>4 weeks	6 (17.1)		7 (20.0)

a. Unpaired t-test was used to compare continuous variables between two groups.

b. Chi-square test was used to compare categorical variables between two groups.

Common manifestations were Paresthesia, numbness, Symmetrical limb weakness, Facial droop, Pain, Visual disturbance, Sphincter problem, and Dysphagia. No significant difference in either group based on clinical manifestations (Table lI).

Table II: Clinical manifestation of both group (N=70)

Clinical manifestation	Group A (n=35) n (%)		Group B (n=35) n (%)		p-value
Paresthesia, numbness	35	100.0	35	100.0	1.000
Symmetrical limb weakness	35	100.0	35	100.	1.000
Facial droop	23	65.7	25	71.4	0.614
Pain	28	80.0	32	91.4	0.173
Slurred speech	15	42.8	12	34.2	0.462
Dysarthria	11	31.4	10	28.5	0.792
Dysphagia	18	51.4	14	40.0	0.341
Visual disturbance	13	37.1	9	25.7	0.307
Ophthalmoplegia	8	22.8	5	14.2	0.357
Sphincter problem	11	31.4	8	22.8	0.421
Respiratory distress	12	34.2	11	31.4	0.804

Nerve conduction studies were carried out in 70 patients of the GBS (Table III). In both groups demyelinating type of polyneuropathy were predominant type of GBS, 57.1% and 54.2% respectively.

Table III: Distribution of respondents according to nerve conduction study (N=70)

Nerve conduction studies	Group A (n=35)		Group B (n=35)	
	No.	%	No.	%
Demyelinating	20	57.1	19	54.2
Axonal	13	37.1	15	42.8
Equivocal	2	5.7	1	2.8

We observed on the comparison that both modalities of treatments were found to be significant in improving the patient's disability grade (Table IV). However, plasmapheresis was associated with more improvement compared to IVIg with the application of hypothetical testing in both the groups after six weeks (p=0.016) and 12 weeks (p=0.013).

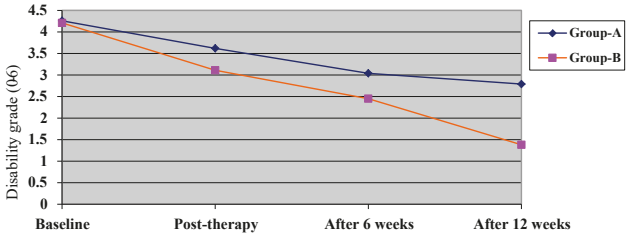
Table IV: Assessment of the effect of treatments on the disability grade at different time points (N=70)

Duration	Group A IVIg (n=35) Mean±SD	Group B plasma pheresis (n=35) Mean±SD	p-value
Disability grade at presentation	4.28 ± 0.14	4.21 ± 0.19	1.205[ns]
Disability grade at 1week post-therapy	3.62 ± 0.15	3.11 ± 0.08	0.083[ns]
Disability grade at after 6 weeks	3.04 ± 0.11	2.45 ± 0.05	0.016[s]
Disability grade at after 12 weeks	2.79 ± 0.12	1.38 ± 0.04	0.013[s]

An unpaired t test was done to measure the level of significance.

The downhill trend of changes of reduction of disability Score was observed in both groups with the progression of time (Figure 1). However, significantly in patients with group B. Patients in Group-A had higher disability scores during the post-therapy (p = 0.083) compared with Group B, but the difference was statistically non-significant. The mean disability score after six weeks was 3.04 ± 0.11 and 2.45 ± 0.05 in group A & group B, respectively. However, the difference was statistically significant. Twelve weeks after the treatment, the mean disability score was 2.79 ± 0.12 and 1.38 ± 0.04 in group A & group B, respectively. So the finding suggested that Plasmapheresis is better than IVIG. (Table V) At presentation and immediate post-therapy, there was no statistically significant difference between the two treatment groups in terms of MRC grade (table V). However, at the later time points (6 and 12 weeks), Group B (plasmapheresis) was associated with a statistically significant improvement in MRC grade compared to Group A (IVIg). Specifically, at 6 weeks, the mean MRC grade was 3.18 for Group A and 4.04 for Group B (p=0.038), and at 12 weeks, the mean MRC grade was 3.52 for Group A and 4.87 for Group B (p=0.019).

Figure- 1: Comparison of disability grade between groups (N=70)



Time intervals

Table V: Assessment of muscle power (N=70)

Duration	Group A IVIg (n=35) Mean±SD	Group B plasmapheresis (n=35) Mean±SD	p-value
MRC grade at presentation	1.75 ± 0.31	1.79 ± 0.26	1.006^{ns}
MRC grade at immediate post-therapy at one week	2.79 ± 0.21	2.92 ± 0.18	0.731^{ns}
MRC grade at after 6 weeks	3.18 ± 0.08	4.04 ± 0.21	0.038^{s}
MRC grade at after 12 weeks	3.52 ± 0.04	4.87 ± 0.28	0.019^{s}

An unpaired t test was done to measure the level of significance.

Figure 2 showed the requirement of mechanical ventilation. Mechanical ventilation rate was higher in group A IVIg (51.4% vs. 14.2% in group-A & B respectively).

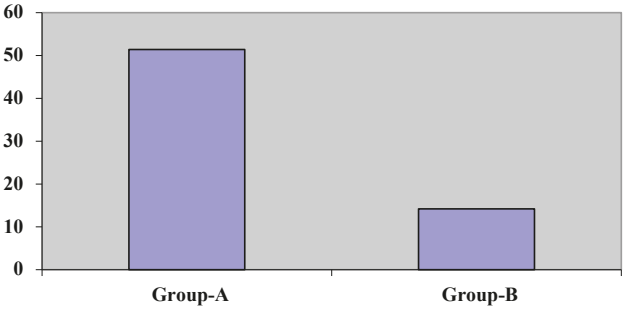


Figure- 2: Requirement of mechanical ventilation (n=70)

Data were expressed as frequency and percentage.
n= Number of the study population

After 12 weeks of treatment, there was a significant difference in the disability scores between the two groups (Table VI). Group B plasmapheresis had a significantly lower mean disability score (1.26 ± 0.06) compared to Group A IVIg (3.05 ± 0.17) with a p-value of 0.011. In terms of the specific disability score categories, plasmapheresis had a significantly higher proportion of individuals with a score of 0-1 (indicating minimal or no disability) compared to IVIg, with a p-value of 0.014. IVIg had a significantly higher proportion of individuals with a score of 2-4 (indicating moderate disability) compared to plasmapheresis, with a p-value of 0.007.

Table VI: Assessment of the Guillain-Barre Syndrome Disability Scale (Hughes) for Group A and Group B at baseline and after 12 weeks of treatment. (N=70)

Score	Group A (n=35) n (%)	Group B (n=35) n (%)	p-value
Baseline			
0-1	0	0	
2-4	35 (100.0)	35 (100.0)	
5-6	0	0	
Mean±SD	4.86 ± 0.25	4.74 ± 0.32	1.000^{ns}
At Discharge/ 12 week later			
0-1	11 (31.4)	25 (71.4)	
2-4	17 (48.5)	5 (14.2%)	
5-6	7 (20.0)	5 (14.2%)	
Mean±SD	3.05 ± 0.17	1.26 ± 0.06	0.011^{s}

The proportion of individuals with complete recovery was significantly higher in Group B plasmapheresis compared to Group A IVIg, Group B plasmapheresis were 5.06 times more likely to experience a complete recovery than individuals in Group A, and the chance of complete recovery was almost twice as high in Group B compared to Group A. Finding was statistically significant.

The proportion of individuals with residual deficit was significantly lower in Group B (25.71%) compared to Group A (57.1%) with an odds ratio of 3.85 (95% CI: 1.40-10.59) and a risk ratio of 2.22 (95% CI: 1.18-4.18).

There was no significant difference in the proportion of individuals who died between the two groups, with a p-value of 0.530. The odds ratio for death was 1.50 (95% CI: 0.43-5.28), indicating that individuals in Group B were 1.50 times more likely to die than individuals in Group A, but the difference was not statistically significant. The risk ratio for death was 1.40 (95% CI: 0.49-3.99). (Table VII)

Table VII: Outcome of the cases (N=70)

Outcome	Group A (n=35) n (%)	Group B (n=35) n (%)	Odds ratio 95%CI	Risk ratio 95%CI	p-value
Complete recovery	8 (22.8)	21 (60.0)	5.06 (1.79-14.31)	1.959 (1.24-3.01)	0.0017[s]
Residual deficit	20 (57.1)	9 (25.71%)	3.85 (1.40-10.59)	2.22 (1.18-4.18)	0.008[s]
Death12week	7 (20.0)	5 (14.2%)	1.50 (0.43-5.28)	1.40 (0.49-3.99)	0.530[ns]

Data were expressed as frequency and percentage n= Number of the study population

ns=Not significant s=Significant

Discussion

Plasmapheresis and IVIg have been widely used in clinical practice in GBS treatment and recommended by the European guidelines.[10]

In our study we tried to compare the effectiveness of both modalities of treatment in the purpose of clinical outcome. A total seventy patients with GBS were included, of whom 35 received IVIG and 35 underwent plasmapheresis, both modalities of treatments were found to be significant in improving the patient's disability grade and motor function improvement (by MRC scale). However, plasmapheresis was associated with more improvement than IVIg, especially after 6 week following treatment. The mean disability score after six weeks is slightly higher in plasmapheresis. The difference was statistically significant. But immediately after treatment at one week difference is not significant. This is very similar to various studies.[11-14]This is also true in case of children, where plasmapheresis is more effective than IVIg.[15]However, one study found IVIG treatment had more effective than plasmapheresis.[16] Interestingly many studies found no significant difference between the two treatments.[17] A meta-analysis[18] of 5 randomized trials, which reported that IVIG and PE showed a similar effect on the improvement of disability scores (RR: -0.02; 95%CI: −0.25, 0.20; p = 0.83).

IVIg and plasmapheresis appear to have approximately equal efficacy for treating GBS, but this is influenced by type of GBS. The therapeutic response to IVIg is good in the case of AIDP but is unsatisfactory in patients with the axonal forms;[19]some studies found plasmapheresis is superior to IVIg in case of axonal variant.[21] In our study we cannot check the efficacy of the treatment modalities in sub type of GBS due to lack of time and small sample size.

A downhill trend of reduced disability score changes was observed in both groups with the progression of time. However, significantly in patients treated with plasmapheresis. Patients treated with IVIg had higher disability scores post-therapy (p = 0.083) than plasmapheresis, but the difference was statistically non-significant. On time progression disability score at improve and Twelve weeks after the treatment. The finding suggested that plasmapheresis is better than IVIG in comparison to some clinical outcomes. This was similar to previous studies. One study[22] found that plasmapheresis significantly improved both GBS disability and MRC muscle strength scores compared with scores prior to treatment. The mean GBS disability score before TPE was 3.75±0.48 (range: 3–5) decreasing to 2.44±0.96 after TPE, range: 1 to 6 (p=0.0001). The MRC muscle strength score before TPE was 2.07±0.89 (range: 0–3 and this increased to 3.54±0.88 after TPE, range:0–5 (p=0.0001).

The most devastating consequence of GBS is respiratory failure for this patient, who needs urgent mechanical ventilation. On the other hand, bulbar palsy and dysautonomia deteriorate the secretion clearing process and further increase the risk of pulmonary infection and respiratory failure.[23]

However, in low-resource countries, mechanical ventilation is very costly and not available. In our study more patients need mechanical ventilation who were treated with IVIg and lower rate in case plasmapheresis. These findings were supported by previous studies. A meta-analysis published in 2012 that included 649 patients enrolled in six trials showed that plasmapheresis decreased the need for ventilation support compared with controls (RR: 0.53). But based on comparative study we cannot draw a conclusion that plasmapheresis can

reduce this urgency in our study. For this conclusion further head to head cohort study is needed. One study reported that the patients treated with IVIG were weaned from MV earlier than the patients treated with PE (p = 0.002).[25] Complete recovery was significantly higher in cases treated with plasmapheresis compared with the other group (p <0.001). A residual deficit was higher in cases who did not receive plasmapheresis, but the difference was non-significant (p > 0.05). lower in Group B (25.71%) compared to Group A (57.1%) with an odds ratio of 3.85 (95% CI: 1.40-10.59) and a risk ratio of 2.22 (95% CI: 1.18-4.18).

There was no significant difference in the proportion of individuals who died between the two groups, with a p-value of 0.530. The odds ratio for death was 1.50 (95% CI: 0.43-5.28), indicating that individuals in plasmapheresis were 1.50 times more likely to die than individuals in IVIg, but the difference was not statistically significant. The risk ratio for death was 1.40 (95% CI: 0.49-3.99). These findings were similar to Cea G et al. in a retrospective analysis, included 41 patients with GBS regarding 28-day mortality, no differences were noted between immunoglobulin and plasmapheresis. However, they found a trend toward lower mortality in the plasmapheresis group (OR 0.78; 95% CI 0.62-0.97; p=0.062) compared with the immunoglobulin group.[26] Other studies, most of them with a retrospective design and carried out in different latitudes, have evaluated different aspects of mortality related to GBS and findings are heterogeneous.[27]

Guillain–Barré syndrome is mediated by a monophasic IgM, anti-peripheral nerve myelin antibody and anti-ganglioside antibody. Plasma exchange can remove these antibodies from the plasma of the affected individual, creating a concentration gradient. After 2-3 weeks, the concentration of antibodies declines near about 20%. Duration of starting plasma exchange is crucial, and the best results get when started within seven days of disease onset, but it is also efficacious when started after 30 days.[28] The results suggested that the plasmapheresis was marginal and superior to the IVIg in improving the disability grading and MRC scale in the entire group and respiratory (mechanical ventilation) patients. In addition, management with plasmapheresis is comparatively cheaper than IVIg.

Limitation

The study did not examine long-term outcomes or adverse effects of the treatments. Further studies with larger sample sizes and longer follow-up periods are needed to confirm these findings and explore the safety and efficacy of these treatments further.

Conclusion

Both IVIg and plasmapheresis were found to be significant in improving the patients' disability grade, but plasmapheresis associated with more improvement than IVIg. The results suggest that both treatments are effective in treating GBS, with plasmapheresis showing a slight advantage over IVIg.

References:

1. Lindenbaum Y, Kissel JT, Mendell JR. Treatment approaches for Guillain-Barré syndrome and chronic inflammatory demyelinating polyradiculoneuropathy. Neurologic clinics. 2001 Feb 1;19(1):187-204.
2. Winer JB. Guillain Barré syndrome. Mol Pathol. 2001 Dec. 54(6):381-5
3. Yuki, N. & Hartung, H. P. Guillain–Barré syndrome. N. Engl. J. Med. 366, 2294–2304 (2012)
4. van Doorn PA. Current treatment in Guillain-Barré Syndrome and myasthenia gravis. In4th congress of the European Academy of Neurology, Lisbon-Portugal 2018 Jun 16.
5. Meena AK, Khadilkar SV, Murthy JM. Treatment guidelines for Guillain–Barré syndrome. Annals of Indian Academy of Neurology. 2011 Jul;14(Suppl1): S73.
6. Winer JB, Hughes RA, Anderson MJ, Jones DM, Kangro H, Watkins RP. A prospective study of acute idiopathic neuropathy. II. Antecedent events. Journal of Neurology, Neurosurgery & Psychiatry. 1988 May 1;51(5):613-8.
7. Saad K, Mohamad IL, Abd El-Hamed MA, Tawfeek MS, Ahmed AE, Abdel Baseer KA, El-Shemy AS, El-Houfey AA, Tamer DM. A comparison between plasmapheresis and intravenous immunoglobulin in children with Guillain–Barré syndrome in Upper Egypt. Therapeutic Advances in Neurological Disorders. 2016 Jan;9(1):3-8.
8. Charra B, Hachimi A, Benslama A, Motaouakkil S. Intravenous immunoglobulin vs plasma exchange in the treatment of mechanically ventilated adults with Guillain-Barré syndrome. Pan African Medical Journal. 2014;18(1).
9. Kishore CK, Vijayabhaskar J, Vishnu Vardhan R, Sainaresh VV, Sriramnaveen P, Sridhar AV, Varalaxmi B, Sandeep P, Ram R, Vengamma B, Siva Kumar V. Management of Guillain–Barré syndrome with plasmapheresis or immunoglobulin: our experience from a tertiary care institute in South India. Renal failure. 2014 Jun 1;36(5):732-6.
10. Willison HJP, Jacobs BCP, van Doorn PAP. Guillain-Barré syndrome. Lancet, The 2016;388:717–727.CrossRefPubMedGoogle Scholar
11. S. B. Buzzigoli, M. Genovesi, P. Lambelet, C. Logi, S. Raffaelli, D. Cattano, Plasmapheresis Treatment in Guillain-Barré Syndrome: Potential Benefit over Intravenous Immunoglobulin, Anaesthesia and Intensive Care, 10.1177/0310057X1003800225, 38, 2, (387-389), (2010).
12. Ramesh Venkatraman, Rema Menon, Pratheema Ramachandran, Therapeutic Plasma Exchange Practices in Intensive Care Unit, Indian Journal of Critical Care Medicine, 10.5005/jp-journals-10071-23209, 23, 7, (336-338), (2019).
13. Zbigniew M. Szczepiorkowski, Nicholas Bandarenko, Haewon C. Kim, Michael L. Linenberger, Marisa B. Marques, Ravindra Sarode, Joseph Schwartz, Beth H. Shaz, Robert Weinstein, Ashka Wirk, Jeffrey L. Winters, Guidelines on the use of therapeutic apheresis in clinical practice—Evidence-based approach from the apheresis applications committee of the American society for apheresis, Journal of Clinical Apheresis, 10.1002/jca.20129, 22, 3, (106-175), (2007).
14. Joseph Schwartz, Anand Padmanabhan, Nicole Aqui, Rasheed A. Balogun, Laura Connelly-Smith, Meghan Delaney, Nancy M. Dunbar, Volker Witt, Yanyun Wu, Beth H. Shaz, Guidelines on the Use of Therapeutic Apheresis in Clinical Practice–Evidence-Based Approach from the Writing Committee of the American Society for Apheresis: The Seventh Special Issue, Journal of Clinical Apheresis, 10.1002/jca.21470, 31, 3, (149-338), (2016).

15. Saad K, Mohamad IL, Abd El-Hamed MA, Tawfeek MS, Ahmed AE, Abdel Baseer KA, El-Shemy AS, El-Houfey AA, Tamer DM. A comparison between plasmapheresis and intravenous immunoglobulin in children with Guillain-Barré syndrome in Upper Egypt. Ther Adv Neurol Disord. 2016 Jan;9(1):3-8.

16. Van der Meché F., Schmitz P. and the Dutch Guillain-Barré Study Group (1992) A randomized trial comparing intravenous immune globulin and plasma exchange in Guillain–Barré syndrome. N Engl J Med 326: 1123–1129. [PubMed] [Google Scholar]

17. Diener H., Haupt W., Kloss T., Rosenow F., Philipp T., Koeppen S., et al. (2001) A preliminary, randomized, multicenter study comparing intravenous immunoglobulin, plasma exchange, and immune absorption in Guillain–Barré syndrome. Eur Neurol 46: 107–109. [PubMed] [Google Scholar

18. Hughes RA, Swan AV, Van Doorn PA. Intravenous immunoglobulin for Guillain-Barré syndrome. Cochrane Database of Systematic Reviews. 2014(9).

19. Van Doorn PA, Kuitwaard K, Walgaard C, van Koningsveld R, Ruts L and Jacobs BC: IVIG treatment and prognosis in guillain-barré syndrome. J Clin Immunol. 30 (Suppl):S74–S78. 2010.

20. Van Doorn PA, Kuitwaard K, Walgaard C, van Koningsveld R, Ruts L and Jacobs BC: IVIG treatment and prognosis in guillain-barré syndrome. J Clin Immunol. 30 (Suppl):S74–S78. 2010.

21. Buzzigoli SB, Genovesi M, Lambelet P, Logi C, Raffaelli S and Cattano D: Plasmapheresis treatment in guillain-barré syndrome: Potential benefit over intravenous immunoglobulin. Anaesth Intensive Care. 38:387–389. 2010.

22. A Retrospective Study on Patients with Guillain-Barré Syndrome Treated with Therapeutic Plasma Exchange and Other Treatment Options – A Centre's Experience; European Neurological Review, 2015;10(1):81–4

23. Chakraborty, T., Kramer, C. L., Wijdicks, E. F. M., and Rabinstein, A. A. (2020). Dysautonomia in Guillain-Barre syndrome: prevalence, clinical spectrum, and outcomes. Neurocrit. Care 32, 113–120. doi:10.1007/s12028-019-00781-w

24. Raphaël JC, Chevret S, Hughes RA and Annane D: Plasma exchange for guillain-barré syndrome. Cochrane Database Syst Rev. 7(CD001798)2012.

25. Comparison of ICU outcomes between intravenous immunoglobulin and plasma exchange in treatment of mechanically ventilated patients with GuillainBarré syndrome in a neuro-intensive care unit in a Govt. Hospital of Bangladesh: a observational cohort studyJ. Nat. Instit. Neurosci. Bangladesh, 5 (2019), pp. 118-122, 10.3329/jninb.v5i2.43015

26. Cea G, Jara P, Quevedo F. Características epidemi-ológicas del síndrome de Guillain-Barré en población chilena: estudio hospitalario en un período de 7 años. Rev Med Chil. 2015; 143 (2), 183-9.

27. Dhar R, Stitt L, Hahn AF. The morbidity and out-come of patients with Guillain- Barré syndrome admit-ted to the intensive care unit. J Neurol Sci. 2008; 264 (1-2), 121-8.