



ORIGINAL ARTICLE

## Comparison of mean hospital stay in intravenous Immunoglobulin vs Plasmapheresis in children with gullian-barre syndrome in a Tertiary Care PICU.

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**Article Citation:** Altaf MS, Khurshid A, Maqsood I. Comparison of mean hospital stay in intravenous Immunoglobulin vs Plasmapheresis in children with gullian-barre syndrome in a Tertiary Care PICU. Professional Med J 2023; 30(07):896-900. <https://doi.org/10.29309/TPMJ/2023.30.07.7541>

**ABSTRACT... Objective:** To compare the mean hospital stay between intravenous immunoglobulin (IVIg) versus plasmapheresis in the management of children with Guillain-Barré syndrome (GBS). **Study Design:** Randomized Controlled Trial. **Setting:** Emergency and Paediatric Intensive Care Unit, Children's Hospital and Institute of Child Health, Multan. **Period:** June 2021 to December 2021. **Material & Methods:** Children aged 5-12 years of either sex presenting with GBS with duration below  $\leq 2$  weeks were included. Baseline demographic data like age, gender and duration of GBS were noted. Subjects were randomly divided into 2 groups (30 in each group) by lottery method. In Group-A, IVIg was administered for five days while in Group-B, patients received a daily one-volume plasma exchange (PE) for five consecutive days. Outcome was noted in terms of hospital stay. **Results:** In a total of 60 patients, there were 35 (58.3%) were female and 25 (41.7%) male. The mean age was  $8.28 \pm 2.06$  years while 36 (60.0%) patients were aged between 9 to 12 years. The mean duration of disease was  $12.89 \pm 4.01$  days. Maternal educational status of 17 (28.3%) patients was illiterate. The mean length of hospital stay in Group-A and Group B were  $30.06 \pm 8.76$  days and  $18.71 \pm 6.43$  days respectively which was significantly less ( $p < 0.001$ ) among patients who were administered PE. **Conclusion:** When compared to IVIg, plasmapheresis reduced the duration of mean hospital stay and improved the recovery of children with GBS.

**Key words:** Guillain-Barré Syndrome, Immunoglobulin, Plasmapheresis, PICU.

### INTRODUCTION

“Guillain-Barré syndrome (GBS)” is considered a major cause of acute flaccid paralysis (AFP) while the occurrence of poliomyelitis has declined throughout the world.<sup>1</sup> Factors which cause variation in its incidence are age, geographical regions and difference in the diagnostic criteria to label it.<sup>2</sup> In the western population, GBS has varying annual incidence, reported between 1.1-1.8 per 100,000.<sup>3,4</sup> GBS is considered to be an immune-mediated polyradiculoneuropathy presenting rapid onset and inconsistent clinical course.<sup>5</sup> “Landry’s paralysis” is another term which is used to describe GBS and at most of the times it precedes an unknown infection. Progressive areflexic or hyporeflexive motor paralysis are the manifestations of this syndrome, whether sensory deficit is present or not.<sup>4</sup> Usually,

it takes hours or a few days in the progression of weakness<sup>5</sup>, moreover, GBS presents frequent occurrence of autonomic dysfunction.<sup>6</sup>

The presence of respiratory insufficiency in GBS is life threatening and can be a potential cause of death while overall mortality rates hover between 1-18% in GBS.<sup>7</sup> Diagnosis of GBS is confirmed by performing nerve conduction velocity (NCV). Although, the exact cause of GBS is still to be investigated but it has been shown in the studies that approximately 70% of the cases present with acute infectious processes, viral most of the time, and typically respiratory or gastrointestinal in nature occurring one to three weeks prior to the onset of symptoms.<sup>8,9</sup>

Owing to “intravenous immunoglobulin (IVIg)”

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**Article received on:** 02/03/2023  
**Accepted for publication:** 06/05/2023

and plasma exchange (PE), the course of the illness has significantly been changed. Both IVIG and PE have documented efficacy in GBS. It is surprising that steroids do not produce any effect when given alone. Usually, IVIG is the treatment which is preferred due to practical reasons. In an Egyptian study, Saad et al reported that in children having GBS, mean hospitalization time was  $15.7 \pm 8$  days when treated with plasmapheresis and with IVIG it was  $29.4 \pm 14.7$  days while 59.37% of the cases in plasmapheresis group had complete recovery in comparison with 23.33% in IVIG group.<sup>10</sup>

To the best of our knowledge, two local studies are on view<sup>11,12</sup> and both involved adult patients of GBS but no such study has been done in pediatric population analyzing subjects with GBS. The results of these studies done in adult population subsets cannot be generalized on our pediatric population. The results of this study are thought to assist in offering more effective treatment modality to these patients which can decrease disease morbidity and prolonged hospital stay. This study was performed to compare the mean hospital stay between IVIG versus plasmapheresis in the management of children with GBS.

## MATERIAL & METHODS

This randomized controlled trial was done at the emergency and "paediatric intensive care unit (PICU)", Children Hospital and Institute of Child Health, Multan from June 2021 to December 2021. Approval from "Institutional Ethical Committee" was acquired (1250/Admin.CH&ICH/Multan). Informed and written consents were acquired from parents/guardians. Sample size of 60 (30 in each group) was calculated considering mean hospital stay in plasmaphoresis group as  $15.7 \pm 8$  days and  $29.4 \pm 14.78$  days in IVIG group with 80% power and 95% confidence interval.<sup>10</sup> Children aged 5-12 years of either sex presenting with GBS with duration below  $\leq 2$  weeks were included. Patients already taking present study treatment approaches in last 2 months or those whose parents did not give consent participate were excluded. GBS was diagnosed as "an acute progressive symmetric weakness of the extremities with areflexia or

hyporeflexia", electrophysiological studies showing demyelinating (acute inflammatory demyelinating poly – neuropathy) / axonal (motor and sensory) neuropathy, the cerebral spinal fluid (CSF) showing albuminocytological dissociation (protein > 30 mg/dl and total cell count of  $\leq 10$  per  $\text{mm}^3$ ).

Hospitalized children fulfilling inclusion criteria were registered from the emergency and paediatric intensive care unit. Baseline demographic data like age, gender and duration of GBS were noted. Subjects were randomly divided into 2 groups (30 in each group) by lottery method. In Group-A, IVIG (0.4 g/kg/day) was given for 5 days while once daily one volume PE (200 to 500 ml per kg) was given in Group-B for 5 days. Outcome was noted in terms of hospital stay.

Data analysis was performed using "Statistical Package for Social Sciences (SPSS)", version 26.0. Categorical data were shown as frequencies and percentages. Numeric data were represented as mean and standard deviation. Effect modifiers like age, BMI and gender were controlled by making stratified tables. Chi-square test and independent sample t-test were employed for the comparisons taking  $p < 0.05$  as significant.

## RESULTS

Out of a total of 60 patients, 35 (58.3%) were female. The mean age was  $8.28 \pm 2.06$  years while 36 (60.0%) patients were aged between 9 to 12 years. The mean duration of disease was  $12.89 \pm 4.01$  days. Maternal educational status of 17 (28.3%) patients was illiterate. Table-I is showing comparison of study variables in both study groups.

The mean duration of hospital stay in Group-A and Group B were  $30.06 \pm 8.76$  days and  $18.71 \pm 6.43$  days respectively which was significantly less ( $p < 0.001$ ) among patients who were administered PE (Figure-1).

In Group-B, age and gender were significantly linked ( $p < 0.001$ ) with reduced duration of hospitalization as showed in Table-II.

Study Variables		Group-A (n=30)	Group-B (n=30)	P- Value
Age (years)	5-8	19 (63.3%)	17 (56.7%)	0.598
	9-12	11 (36.7%)	13 (43.3%)	
	Mean±Sd	8.07±2.11	8.53±2.05	0.389
Gender	Male	14 (46.7%)	11 (36.7%)	0.432
	Female	16 (53.3%)	19 (63.3%)	
Duration of disease	≤7	14 (46.7%)	20 (66.7%)	0.118
	>7	16 (53.3%)	10 (33.3%)	
	Mean±SD	12.56±3.19	13.33±4.18	0.426
Maternal Education Status	Illiterate	10 (33.3%)	7 (23.3%)	0.390
	Literate	20 (66.7%)	23 (66.7%)	

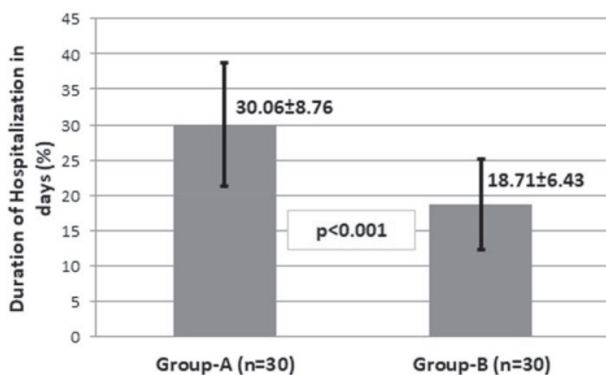
**Table-I. Comparison of study variables in both study groups (N=30)**

Group-A: Intravenous Immunoglobulin; Group-B: Plasma exchange.

Study Variables		Duration of Hospitalization (Mean±SD)		P-Value
		Group-A (n=30)	Group-B (n=30)	
Age (years)	5-8	32.13±7.01	17.66±5.62	<0.001
	9-12	31.92±5.58	16.44±5.94	<0.001
Gender	Male	32.69±6.19	16.11±6.28	<0.001
	Female	29.85±6.49	18.61±4.29	<0.001
Duration of disease	≤7	9.25±6.72	8.14±6.62	0.522
	>7	12.27±5.97	13.05±4.43	0.568

**Table-II. Stratification of study variables with respect to mean duration of hospitalization (N=60)**

Group-A: Intravenous Immunoglobulin; Group-B: Plasma exchange



**Figure-1. Comparison of mean duration of hospitalization in study groups**

Group-A: Intravenous Immunoglobulin;  
Group-B: Plasma exchange

## DISCUSSION

GBS is known to be the commonest cause behind acute flaccid paralysis in the paediatric age groups.<sup>13</sup> The present researcher showed that there was a female predominance in GBS which is different to what has been reported previously and the literature describes a slight male predominance with a male to female ratio ranging between 1.2-1.5 in 1.<sup>14</sup>

It has been documented that respiratory infections are the commonest antecedent infection exhibiting in 40–70% patients whereas 7–20% patients demonstrate gastrointestinal infections.<sup>15</sup> Majority of the cases report occurrence of infections within a month before the onset of GBS. The mean duration of disease was 12.89±4.01 days in this study. Although, lots of improvements have been made handling GBS in the last few decades but it is reported that many of the subjects with moderate to severe GBS are still spending 1-2 months at healthcare facilities.<sup>16</sup> During hospitalization, patients are at risk for several well-recognized complications. The mean length of hospital stay in Group-A and Group B were 30.06±8.76 days and 18.71±6.43 days respectively ( $p<0.001$ ). Our results are consistent to what has been reported by a study done by Saad K et al from Egypt analyzing children with GBS and revealed that duration of hospitalization was 29.4±14.7 days in IVIG group vs. 15.7±8 days among children treated with plasmapheresis ( $p<001$ ).<sup>10</sup> Another study by El-Bayoumi MA and colleagues analyzing children with GBS reported that PE treated patients had a shorter duration of mechanical ventilation

(median 11 days) in comparison to IVIG group (median 13 days),  $p=0.04$ .<sup>17</sup> Among children who were treated by PE, PICU stay was somewhat less than those treated with IVIg ( $p=0.094$ ). The same study reported that short-term neurological outcomes were found to be statistically similar.<sup>17</sup> A local study by Anwer J et al demonstrated that PE had 100% cure rate in children treated with GBS while IVIg and steroids treatment were found to have 64% and 43% cure rates depicting significantly better treatment outcomes with PE treatment approach.<sup>18</sup> Some other treatment options like Chinese medicine and supportive care have also been studied for treating GBS but there seems to be a consensus in the literature that PE or IVIG seems to be the best possible choice of treatment.<sup>19</sup>

We noted outcome in terms of duration of hospitalization in the current set of patients while occurrence of in-hospital morbidity and long-term outcomes were beyond the scope of this research.

## CONCLUSION

When compared to IVIG, plasmapheresis reduced the duration of mean hospital stay and improved the recovery of children with GBS.



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### AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Muhammad Shahzaib Altaf	Data collection, Data analysis, Literature Review.	
2	Asim Khurshid	Study concept, Proof reading.	
3	Imran Maqsood	Drafting, Critical Revisions.	