Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

A Study on the Clinical Evaluation of Pre-Procedure and Post-Procedure Serum Calcium, Serum Albumin, Coagulation Parameter Along with Hematological Parameters.

Sheikh Anisul Haque[1], Sanjeela Nahreen Chowdhury[2], Fahmida Kabir[3], Md Saif Bin Mizan[4], Sumaya Afroze[5]

[1]Junior Consultant, Department of Transfusion Medicine, Impulse Hospital, Dhaka.
[2]Assistant professor, Department of Biochemistry, Green life medical college.
[3]Professor (Current Charge), Department of Biochemistry, Green Life Medical College.
[4]Assistant Professor, Department of Nephrology, Dr. Sirajul Islam Medical College, Dhaka, Bangladesh.
[5]Medical Student (MBBS Final Year), Shaheed Monsur Ali Medical College & Hospital, Dhaka.

Received: November 2018
Accepted: November 2018

Copyright: © the author(s), publisher. It is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: To evaluate the pre- and post-procedure serum calcium, serum albumin, coagulation parameter along with hematological parameters at every procedure. **Methods:** Pre-procedure and post-procedure renal functions, coagulation parameter along with hematological parameters at every procedure will also record. Procedure details will be recorded on specifically designed preforms. The statistical analysis will be carried out using the Statistical Package for Social Sciences version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Qualitative variables have been expressed as percentage. Quantitative variables are expressed as mean ± standard deviation. **Results:** The present study demonstrated that Hemoglobin (gm/dl), S. Calcium (mg/dl), serum albumin (gm/dl), platelet count (Pt. sec), activated partial thromboplastin time (APTT) and INR status before and after TPE and IvIg were almost parallel. Shrivastava et al. (2015) study showed good acceptance of TPE was in 80.3% patients. At the time of discharge 75.7% patients showed clinical improvement in their muscle strength and 99.0% patients scored higher grades of functional outcomes. **Conclusion:** Early diagnosis, intervention by TPE in the first week after the onset, at a center where facilities are available in conjunction with good ICU management and supportive care are important measures to reduce the period of the hospitalization, complications, disabilities, morbidity and mortality in patients with GBS and thereby improving the quality of life and is the key for successful outcomes in resource constraint countries.

Keywords: Renal functions, Procedureserum Calcium, Serum Albumin, Coagulation Parameter, Hematological Parameters.

INTRODUCTION

Guillain-Barre syndrome (GBS) is an inflammatory demyelinating polyradiculoneuropathy of acute or acute onset and a vital explanation for neuromuscular dysfunction, characterized by generalized weakness of progressive nature sometimes interchangeable usually ascending, paresthesia, and areflexia.[1] Sensory, brainstem, and involuntary involvement with loss of vasomotor management wide fluctuation in pressure level, hypotension and cardiac arrhythmias area unit common manifestations.[2] The very fact that GBS will progress quickly, and respiratory paralysis are often fatal, requiring mechanical ventilation in specialised medical care units makes it a possible medicine emergency.

Pathological process of GBS not however absolutely understood, is proposed to be a real case of molecular mimicry and current thinking is that GBS might not be one sickness, however a spread of acute neuropathies with variety of connected immune-mediated unhealthful mechanisms with advanced interactions involving body substance and cellular immunity, complement deposition, cytokines, and alternative inflammatory mediators.

The reported incidence rates for GBS square measure 1–2 per 100,000 populations and is common all told age teams with higher incidence in males than females.[3] Commonly known variants in several a part of the globe are those as well as severe axon loss, variants within which one specific fiber

Name & Address of Corresponding Author
Dr. Sheikh Anisul Haque,
MBBS, MD (Transfusion Medicine),
Junior Consultant,
Department of Transfusion Medicine,
Impulse Hospital,
Dhaka.

sort (sensory or autonomic is affected) that's acute inflammatory demyelinating polyneuropathy (AIDP), acute motor axonal neuropathy (AMAN), acute sensory motor axonal neuropathy (ASMAN) and Miller Fisher syndrome (MFS).[2] The diagnosing, treatment and care of patients with GBS represent challenge to health care providers. The mortality rate of GBS is 3.5% to 12%, 25% need ventilator support and nearly 20th of patients suffer severe incapacity particularly in walk (Khan et al. 2010).[4] The etiology of GBS remains unknown. Cases are related to injection of foreign protein, cat scratches, dog bites, transfusions, and immunizations, together with rabies vaccine and therefore the wide heralded association with the 1976 flu immunizing agent program.

Most patients with GBS recover spontaneously. However, due to the unpredictable course and potential for death or important incapacity, all patients with the sickness ought to be hospitalized for multidisciplinary adjuvant care and disease-modifying medical aid (Lindenbaum et al. 2001). The treatment of GBS aims to accelerate recovery, decrease the sickness complications, decreases the number of future residual medical specialty deficits.

Treatment of GBS entails management of severely paralyzed patients with intensive care and ventilator support, and specific immunomodulation therapies that shorten the progressive course of GBS, presumptively by limiting nerve injury. High-dose intravenous immunoglobulin (IVIG) and plasmapheresis (PP)/plasma exchange (PE)/therapeutic apheresis aid additional fast resolution of the disease. The predominant mechanisms by that IVIG exerts its action seem to be a combined result of complement inactivation, neutralization of idiopathic antibodies, cytokine inhibition and saturation of Fc receptors on macrophages.

TPE proves to be better and cost effective modality in the treatment of GBS patient if performed in the first two weeks, especially in developing countries like Bangladesh where not many people can afford expensive treatment modalities, and where Medical Insurance is not common as in developed countries. Early diagnosis, intervention by TPE, at a center where facilities are available in conjunction with good ICU management and supportive care are important measures to reduce the period of the hospitalization, complications, disabilities, morbidity and mortality in patients with GBS and thereby improving the quality of life and is the key for successful outcomes in resource constraint countries. This type of study was conducted first time in Bangladesh, which was help us in judicious use of costly therapeutic plasma exchange as facilities with special machinery with costly special kit are only available in limited centers. It was also being helpful to cope the adverse events occurs during and after plasma exchange; which help to encourage our devoted physicians. Finally, we were enriched by our experiences to collect in future data about therapeutic plasma exchange in GBS currently in our country to reduce mortality and morbidity of GBS patients.

Outcome Variables:

1. Clinical diagnosis.
2. Age, sex, weight.
3. Antecedent events occurring during the four weeks preceding GBS onset
4. Complication during procedure of TPE
5. Investigations Before and After TPE.
6. Whole blood processed, Plasma volume removed, Replacement fluid transfused and Acid citrate dextrose used during TPE
7. Clinical improvement

MATERIALS AND METHODS

Study Mode

Open label randomised clinical management trial. The patients World Health Organization area unit candidate for IVIg are going to be listed. One cluster received TPE and alternative are going to be treated within the standard manner and conducted as management.

Location of study

Department of Transfusion Medicine of BSMMU, Dhaka.

Study population

Patient with Guillainbarre syndrome managed in Department of Neurology, BSMMU, Dhaka, from April 2017-December 2017 will be included in this study.

Period of study

12 months after approval of protocol.

Sample Size (n)

The simplest, approximate sample size formula for binary outcomes, assuming α =0•05, power=0•90, and equal sample sizes in the two groups.

n=	the sample size in each of the groups
p1=	event rate in the treatment group (when R and p2 are estimated)
p2	event rate in the control group
R	risk ratio(p1/p2)

To determine the sample size, the formula is used;

$$n = \frac{10.51[(R+1) - p_2(R^2+1)]}{p_2(1-R)^2}$$

(Schulz and Grimes, 2005)

Estimate a 30% event rate in the control group (p2=0•30) and determine that the clinically important difference to detect is a 35% improvement (R=2.523) with the treatment (Clinical improvement 75.7% in their muscle strength in Therapeutic plasma exchange Shrivastava et al. (2015) at α=0•05 and power=0•90. (Note: R=2.523 equates to an event

rate in the treatment group of p1=0•757, i.e., R=75.7%/30%)

p_1=0.757

p_2=0.30

R= 2.523

$$n = \frac{10.51[(2.523+1) - 0.30(R^2+1)]}{0.30(1-2.523)^2}$$

n=19.82

=20 in each group

Therefore 40 (20x2=40) sample will be enrolled in this study.

Inclusion Criteria

1. 15 to 60 years of male and female GBS
2. Progressive weakness of variable degree from mild paresis to complete paralysis.
3. Generalized hypo- or a reflexia,
4. Demonstration of relative limb asymmetry regarding paresis.
5. Mild to moderate sensory signs.
6. Patients who will not develop respiratory muscle paralysis.
7. Patients who will be selected for IVIg (Ropper, 2005)
    a. Adult (age 15-60)
    b. Acute onset
    c. Progressive
8. Autonomic dysfunction includes tachycardia, other arrhythmias, postural hypotension, hypertension, and other vasomotor symptoms.
9. Gastrointestinal illness (e.g., diarrhea),
10. PT, APTT, INR, serum albumin, serum calcium – within normal physiological limit.
11. Cerebrospinal fluid (CSF) showing elevated CSF protein, CSF cell counts <10 mononuclear cell/mm3.

Exclusion criteria

1. Severely deteriorated patients
2. Severe Anemia

Sampling method: Consecutive

Screening method: The preliminary screening panel for each patient will be included the complete history, physical examination and the necessary laboratory tests.

Research instruments:

- A pre-tested data collection sheet – diagnosed case of GBS refer from neurology dept. of BSMMU.
- Pre-tested physical examination (MRC and MMT) and lab investigation (CBC, Serum albumin, Serum calcium, INR).

Methodology of data collection

In this randomized clinical trial, 40 patients with the age range of 15 to 60 years admitted to Intensive care unit of BSMMU and referred to neurology Department of this hospital for performing TPE and its evaluation, from May 2016 to December 2017. Among them 20 patients will receive therapeutic plasma exchange and 20 patients will receive conventional medical treatment (IVIG) by the lottery method. All patients had clinical findings of Guillain-Barre syndrome (GBS) and/or GBS variants. TPE procedures will performed on haemonatics apheresis machine (Manufacturer) on an alternate day using a double lumen femoral catheter depending on the clinical condition of the patient. A minimum of 1 and maximum of 10 cycles of plasma exchange will performed depending upon the clinical outcome in the patient. Calcium gluconate infusion (10 ml of calcium gluconate in 500 ml normal saline [NS]) will given during the procedure to prevent citrate toxicity. Acid citrate dextrose: Whole blood ratio used was 1:10, blood flow rate was kept between 25 and 40 ml/min depending on the weight of the patient and blood volume of the patient will calculate. Depending on the amount of plasma exchange, the duration of procedure varied from 1 to 1.5 h. The TPE kit was primed first with NS and then with group specific, screened, and cross-matched packed red blood cells for patients who had weight <25 kg to avoid hypoxia and hypovolemia. Patient's total blood volume was calculated as per Nadler's formula and processed through central double lumen catheter. 1-1.5 times plasma volume was exchanged with NS and fresh frozen plasma (FFP) to prevent hypotension. The ratio of NS and FFP for replacement fluid was 1:1. Continuous monitoring of vitals, e.g., pulse, blood pressure and respiratory rate wascarried out during the procedure to prevent any adverse events related to the procedure. Details of the procedural complications, if any, were noted and analyzed. Pre- and post-procedure coagulation parameter along with hematological parameters were done at every procedure. Clinical improvement was assessed by measuring the grading of muscle power and functional grading scales as per Medical Research Council Scales before and after completion of TPE schedule. Intravenous immunoglobulin (IVIG) is preferable in children weighing <15 kg. Steroids are not used as a treatment protocol.

Data Analysis Plan

Statistical analysis will be carried out by using the Statistical Package for Social Sciences version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). It will be a randomized clinical control trial. Here two group will be taken, one will be case group and another will be control. The analysis will be done MRC and MMT examination and some lab investigations. The mean values will be calculated for continuous variables. The quantitative observations will be indicated by frequencies and percentages. Chi-Square test with Yates correction will be used to analyze the categorical variables, shown with cross tabulation. Student t-test will be used for continuous variables. P values <0.05 will be considered as statistically significant.

RESULTS

[Table 1], shows before and after TPE, it was observed that mean hemoglobin was 11.7±1.2gm/dl in before TPE and 11.05±0.8 gm/dl in after TPE. Mean S. calcium was 8.6±0.4mg/dl in before TPE and 8.4±0.31mg/dl in after TPE. Mean serum albumin was 35.60±2.39gm/dl in before TPE and 34.55±1.5gm/dl in after TPE. Mean platelet count was 211.50±42.9 sec in before TPE and 185±40.45 sec in after TPE. Mean activated partial thromboplastin time (APTT) was 33.70±1.8 in before TPE and 33.30±1.4 in after TPE. Mean INR was 1.01±0.11 in before TPE and 1.02±0.14in after TPE. The difference was statistically not significant (p>0.05) between two groups.

Table 1: Distribution of the study patients by before and after TPE (n=40)

Parameter	Before TPE Mean±SD	After TPE Mean±SD	p value
Hemoglobin (gm/dl)	11.7±1.2	11.05±0.8	0.051ns
S. Calcium (mg/dl)	8.6±0.4	8.4±0.31	0.085ns
Serum albumin (gm/dl)	35.60±2.39	34.55±1.5	0.104ns
Platelet count (Pt. sec)	211.50±42.9	185±40.45	0.052ns
Activated partial thromboplastin time (APTT)	33.70±1.8	33.30±1.4	0.438ns
INR	1.01±0.11	1.02±0.14	0.803ns

ns= not significant; p value reached from unpaired 't' test

Table 2: Distribution of the study patients by before and after IvIg (n=40)

Parameter	Before IvIg Mean±SD	After IvIg Mean±SD	p value
Hemoglobin (gm/dl)	11.6±0.9	11.80±0.8	0.4622ns
S. Calcium (mg/dl)	8.5±0.5	8.72±0.2	0.076ns
Serum albumin (gm/dl)	35.5±2.6	34.0±2.3	0.061ns
Platelet count (Pt. sec)	211.5±42.9	214.45±43.01	0.004s
Activated partial thromboplastin time (APTT)	33.70±1.7	30.6±1.2	0.829ns
INR	1.01±0.3	0.9±0.08	0.121ns

ns= not significant; p value reached from unpaired 't' test

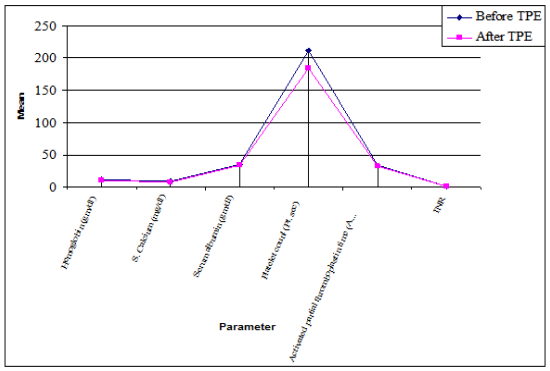

Figure 1: Line chart Showing Parameter of the study patients

Table-2, shows before and after IvIg, it was observed that mean hemoglobin was 11.6±0.9gm/dl in before IvIg and 11.05±0.8 gm/dl in after IvIg. Mean S. calcium was 8.5±0.5mg/dl in before IvIg and 8.72±0.21mg/dl in after IvIg. Mean serum albumin was 35.50±2.6gm/dl in before IvIg and 34.0±2.3gm/dl in after IvIg. Mean platelet count was 211.50±42.9 sec in before IvIg and 214±43.01 sec in after IvIg. Mean activated partial thromboplastin time (APTT) was 33.70±1.7 in before IvIg and 30.6±1.2 in after IvIg. Mean INR was 1.01±0.3 in before IvIg and 0.9±0.08in after IvIg. The difference was statistically not significant (p>0.05) between two groups.

DISCUSSION

A total of 40 patient clinical findings of Guillain-Barre syndrome (GBS) and/or GBS variants managed in Department of Transfusion Medicine of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, from April 2017-December

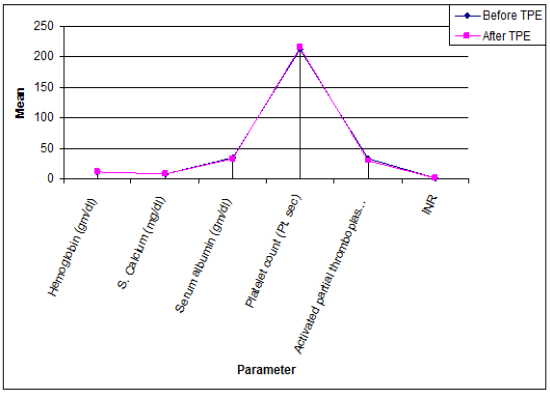

Figure 2: Line chart Showing Parameter of the study patients

2017 were included in this study. Among them 20 patients received Therapeutic plasma exchange (TPE) and 20 patients treated in the conventional manner(IvIg) and conducted as control. Patients with GBS age belonged to 15 to 60 years of male and female, progressive weakness of variable degree from mild paresis to complete paralysis, generalized hypo- or a reflexia, demonstration of relative limb asymmetry regarding paresis, mild to moderate sensory signs, patients who didn't develop respiratory muscle paralysis, patients selected for IVIg, Acute onset, progressive, autonomic dysfunction include tachycardia, other arrhythmias, postural hypotension, hypertension, and other vasomotor symptoms, gastrointestinal illness (e.g.,

diarrhea), PT, APTT, INR, serum albumin, serum calcium – within normal physiological limit, cerebrospinal fluid (CSF) showing elevated CSF protein, CSF cell counts <10 mononuclear cell/mm3 were enrolled in this study. Severely deteriorated patients and severe Anemia were excluded from the study.

CONCLUSION

Therapeutic plasma exchange (TPE) has been used to remove immunoglobulins and other immunologically active substances, such as complements or cytokines, from the blood for the treatment of neurologic diseases in which autoimmunity plays a major role. It is a standard treatment regimen for some neurologic diseases, such as GBS, MC and CIDP. This study was undertaken to assess the clinical outcomes and recovery in patients with GBS treated with TPE as an interventional treatment modality in intensive care unit. Most of the patients were in 5th and 6th decade and all patients had confined to bed or chair bound. Nearly half of the patients had improvement grade belonged to grade 3 to grade 5. ASMAN, AMAN and AIDP were more common Variants in both groups. Diarrhea and Flu like illness were more frequent in both groups. Hemoglobin, S. Calcium, serum albumin, platelet count, activated partial thromboplastin time and INR status before and after TPE and IvIg were similar findings. Early diagnosis, intervention by TPE in the first week after the onset, at a center where facilities are available in conjunction with good ICU management and supportive care are important measures to reduce the period of the hospitalization, complications, disabilities, morbidity and mortality in patients with GBS and thereby improving the quality of life and is the key for successful outcomes in resource constraint countries.

REFERENCES

1. Hughes, R.A., Swan, A.V., Raphael, J.C., Annane, D., van Koningsveld, R. and van Doorn, P.A., 2007. Immunotherapy for Guillain-Barré syndrome: a systematic review. Brain, 130(9), pp.2245-2257.
2. Burns, T.M., 2008. Guillain-Barre Syndrome. SeminNeurol, 28, pp.152-167.
3. Chio, A., Cocito, D., Leone, M., Giordana, M.T., Mora, G. and Mutani, R., et al. 2003. Guillain-Barre syndrome A prospective, population-based incidence and outcome survey. Neurology, 60, pp.1146-50.
4. Hughes, R.A., Swan, A.V. and van Doorn, P.A., 2010. Intravenous immunoglobulin for Guillain-Barré syndrome. Cochrane Database Syst Rev, p.2063.

How to cite this article: Haque SA, Chowdhury SN, Kabir F, Mizan MSB, Afroze S. A Study on the Clinical Evaluation of Pre-Procedure and Post-Procedureserum Calcium, Serum Albumin, Coagulation Parameter Along with Hematological Parameters. Ann. Int. Med. Den. Res. 2019; 5(1):MC04-MC08.

Source of Support: Nil, **Conflict of Interest:** None declared