



STUDY OF CLINICAL PROFILE OF ADULT PATIENTS UNDERGOING PLASMAPHERESIS AT TERTIARY CARE CENTER

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ABSTRACT

Introduction: Plasmapheresis is therapeutic procedure that involves extracorporeal removal, return or exchange of blood or plasma products. It is an intensive care procedure that requires appropriate decision, specialized skill based training, close monitoring, and follow-up for best clinical outcomes. **Aims And Objective:** Identify clinical profiles of patient and their relation to clinical output with plasmapheresis, Review the potential complications and clinical significance of plasmapheresis. **Material And Methods:** Indoor Patients of various neurological, autoimmune diseases in Tertiary government hospital, which fulfil the criteria for study. **Result And Observations:** It was observed during study that GBS-AIDP (acute inflammatory demyelinating polyneuropathy) was the most common disease in patient undergoing plasmapheresis. Metabolic syndrome (obesity/diabetes/hypertension) were among the highest associated comorbidities. However, no statistically significant association was seen between age, sex, occupation, comorbidity such as hypertension, obesity and hypothyroidism in present study. ($p > 0.05$). **Discussion:** It was observed during study that out of 30 patient who underwent plasmapheresis, Positive correlation was found in AIDP incidence and HbA1c level $> 5.6\%$. Poor prognosis was found in patients with baseline CRP level $> 30\text{mg}\%$ compared to those with $< 30\text{mg}\%$. However, larger trials with bigger sample size should be carried out to confirm this finding from our study.

KEYWORDS :

INTRODUCTION

Plasmapheresis is a therapeutic intervention that involves extracorporeal removal, return, or exchange of blood plasma or components.^[1,2] The underlying mechanism of this procedure is accomplished by either centrifugation or filtration using semipermeable membranes.

Therapeutic plasmapheresis is used for numerous diseases. The conditions involve the presence of a toxic substance in plasma (e.g., immunoglobulin), which can be filtered. The disorders where therapeutic plasmapheresis can be done are grouped into four categories.^[2]

- Category 1 includes disorders where plasmapheresis can be done as a first-line treatment. E.g., Guillain Barre syndrome, Myasthenia gravis.
- Category 2 includes disorders where plasmapheresis can be done as a second-line treatment in addition to the existing standard of care. E.g., Multiple sclerosis, Cryoglobulinemia.
- Category 3 includes disorders in which the evidence of the benefit of plasmapheresis is minimal, and therapy must be individualized. E.g., Acute liver failure, Vasculitis.
- Category 4 includes disorders in which the evidence

suggests that plasmapheresis is either ineffective or harmful. E.g., Amyloidosis, Lupus nephritis.

AIMS & OBJECTIVES

1. Identify clinical profiles of patient and their relation to clinical output with plasmapheresis.
2. Review the potential complications and clinical significance of plasmapheresis.

MATERIAL & METHODS

Study Design: Cross Sectional Study period JULY 2020 to JULY 2022

Study Setting: Medicine department of a Tertiary government hospital.

Study Population: 30 IPD Patients of attending Tertiary government hospital, who fulfil the following criteria for study.

Sampling Method: A consecutive sampling method was used till desired sample size was achieved.

Ethical Clearance: Ethical clearance was obtained from institutional ethics committee.

Inclusion Criteria

1. Patients admitted for Neurological disorder. Eg. Guillain-barre syndrome, myasthenia gravis
2. Patients admitted for Hematological disorder. Eg. Hemolytic uremic syndrome
3. Patients admitted for Renal Pathologies Eg. Lupus nephritis
4. Patients admitted for Rheumatic pathologies Eg. SLE
5. Patients admitted for metabolic disorder Eg. Overdose, poisoning

Exclusion Criteria

1. Patients with age less than 18
2. Pt with hemodynamic instability or septicemia
3. Known allergy to fresh frozen plasma or replacement colloid/albumin

Research Methodology Specified For Data Collection

The patients fulfilling to the inclusion criteria were enrolled into the study after being explained the proceedings of the study and after they signed the consent form. Predesigned and pretested case record form was used as tool for data collection. Data was collected about sociodemographic characteristics of study subjects like age, sex, occupation, socioeconomic status and education.

Other than this, comorbidity, drug allergy, family history, marital status, addiction, BMI were obtained.

Other investigations e.g. Complete Blood Count, Erythrocyte sedimentation rate, C Reactive Protein, Liver & Kidney function test, blood group, Thyroid function test, urine routine examination, ultrasound of abdomen, nerve conduction study, serum b12 level -if needed, Hba1c, MRI brain with spine, cerebrospinal fluid examination were obtained.

Statistical Analysis

The collected data was entered in Microsoft excel. The categorical variables were presents as number and percentage whereas for continuous variable were presented as mean and SD. Chi square test χ^2 and Pearson's correlation coefficient (r) were used as test of significance. p value of <0.05 was considered statistically significant.

RESULTS AND OBSERVATION

1. It was observed during study that younger and middle age group had predominance in disease occurrence (66% in age less than 45 years) while compared to older age group and geriatric population.

16/30(53.33%) male patient while 14/30(46.66%) female patient underwent plasmapheresis.

2. Diagnosis of patient undegoing plsamapheresis:^[5]

Table No. 1

DIAGNOSIS OF PATIENT UNDEGOING PLSAMAPHERESIS	NUMBER OF PATIENT	%
GBS- AIDP- ACUTE INFLAMMATORYDEMYELINATING POLYNEUROPATHY	16	52%
GBS-AMAN- ACUTE MOTOR AXONALNEUROPATHY	9	27%
GBS-AMSAN- ACUTE MOTOR ANDSENSORY AXONAL NEUROPATHY	1	3%
MYASTHENIA GRAVIS	2	6%
GOODPASTURE SYNDOME ^[3]	1	3%
THROMBOTIC THROMBOCYTOPENIC PURPURA ^[4]	1	3%

3. Out of 30 patient who underwent plasmapheresis, 7 were farmer, 8 were housewife, 5 were students, 4 were laborer, 1 barber, 1 govt job, 1 private job, 1 driver, 1 clerk.

(It is important to notice occupation to rule out other potential causes of clinical presentation e.g. patient working as painter with chronic lead poisoning may present with bilateral lower limb weakness and foot drop, which is clinically important to differentiate from GBS)

4. Comorbidity Of Patient Undergoing Plasmapheresis:

Table No.2

COMORBIDTY OF PATIENT UNDERGOING PLASMIPHERESIS	NUMBER OF PATIENT	%
DM-2	4	12%
HYPERTENSION	7	21%
TUBERCULOSIS	1	3%
CEREBROVASCULAR ACCIDENT	1	3%
CHRONIC KIDNEY DISEASE	0	0
HYPOTHYROIDISM	3	9%
OBESITY	4	12%
CORONARY ARTERY DISEASE	2	6%
HIV AIDS	1	3%
RHEUMATOID ARTHRITIS	1	3%
OSTEOARTHRITIS	1	3%

5. It was observed during study that out of 30 patient who underwent plasmapheresis, 3 had undergone cerebrospinal fluid examination and only one patient had findings suggestive of albumin-cytological dissociation.

6. Relation of blood group with clinical diagnosis of patient, 64% AIDP in O+ve vs 56.2% ADIP average incidence in rest all blood group. [pValue = 0.6540 chi squared, not significant]

Table No.3

BLOOD GROUP	NUMBER OF TOTAL PATIENT	AIDP	AMAN	AMSAN	TTP/ GOOD PASTURE SYNDROME	MYASTHENIA GRAVIS
AB+VE	6	4	1	0	1(TTP)	0
A+VE	3	2	1	0	0	0
O+VE	14	9	3	0	0	2
B+VE	5	2	2	0	1 (GPS)	0
AB-VE	1	0	0	1	0	0
O-VE	1	1	0	0	0	0

7. Out of 30 patient who underwent plasmapheresis, <20 mm/1st hr ESR values were associated with higher recovery rates(71.1%) than >20mm/1st hr(56%). [p Value=0.6857, chi squared- NOT SIGNIFICANT]

8. It was observed during study that out of 30 patient who underwent plasmapheresis, middle age group was associated with highest chances of complete recovery.(81.1% in 31-45 year age vs 52.6% average in rest) [pValue = 0.1009, chi squared, NOT SIGNIFICANT]

9. It was observed during study that out of 30 patient who underwent plasmapheresis, normal serum albumin level were associated with higher rate of complete recovery and lesser rate of residual weakness/death.

(75% rate of residual weakness/death vs 25% in normal serum protein level) [pValue = 0.0576, chi squared, NOT SIGNIFICANT]

10. NCV study:

Table No.4

NERVE CONDUCTION STUDY FINDINGS IN PATIENT UNDEGOING PLASMIPHERESIS	NUMBER
NOT DONE(10%)	3
NORMAL (10%)	3

Bilateral lower limb demyelinating polyneuropathy (50%)	15
Bilateral lower limb motor axonal neuropathy (27%)	8
Bilateral lower limb and upper limb motor and sensory axonal neuropathy (3%)	1

11. It was observed during study that out of 30 patient who underwent plasmapheresis, pt with higher S.CRP level >30mg/dl were associated with lower recovery rate compared to those with <30mg/dl serum crp level.

[pValue= 0.0164, chi sqared, statistically SIGNIFICANT]

Table No.5

CRP LEVELS (mg/l)	Number of patient undergoing plasmapheresis	NUMBER PF PATIENT WITH COMPLETE RECOVERY	%
< 5	13	7	53
6 TO 20	13	11	84
21 TO 30	1	1	100
>30	3	0	0

12. Highest association of ACUTE INFLAMMATORY DEMYELINATING POLYNEUROPATHY(GBS- AIDP), was with HbA1C level >5.6 % (22.2% IN hbA1c <5.6 vs 66.66% in hbA1c > 5.6) [pValue 0.0253, chi sqared, STATISTICALLY SIGNIFICANT]

Table No.6

HbA1C	Number Of Patient Undergoing Plasmapheresis	AIDP Diagnosis	Percentage
<5.6	9	2	22.2
5.7-6.5	15	11	73
>6.5	6	3	50

13. 63.3% patient were discharged with complete recovery, while 26.7% were discharged with residual weakness.

Table No.7

Outcome In Patient Undergoing Plasmapheresis	Number	%
Discharged with complete recovery	19	63.3
Discharged with residual weakness	8	26.7
Discharged without improvement	0	0
Referred to higher center	1	3.3
Expired	2	6.7

DISCUSSION AND CONCLUSION

- A study was conducted at University Of Glasglow, "Therapeutic application of plasmapheresis".
- Another study was done comparing effect of fasting glucose level in prognosis of plasmapheresis.
- (Data demonstrates that FPG in the acute phase of GBS correlates with the severity of GBS and may predict the short-term prognosis of GBS.)^[6]
- 3rd study was done in 2021: Plasmapheresis: A Retrospective Audit of Procedures from a Tertiary Care Center in Southern India^[7]
- In given study done at tertiary center observed in 30 patients,

1. Positive correlation was found in AIDP incidence and HbA1c level >5.6%
2. Poor prognosis was found in patients with baseline CRP level >30mg% compared to those with <30mg.
3. GBS-AIDP(acute inflammatory demyelinating polyneuropathy) was the most common disease in patient undergoing plasmapheresis
4. 2/3rd of patients had 100% recovery for 30 undergoing plasmapheresis.
5. 2/3rd of patient were under 45 years of age, condition needing plasmapheresis was more common in younger- adult population.

6. Highest rate of recovery was found in adult age group followed by young group.
7. No gender predominance noted during study in need of plasmapheresis.
8. Patient belonging to Lower socioeconomic class was more than 90% in given study.
9. Metabolic syndrome (obesity/diabetes/hypertension) were among the highest associated comorbidities.
10. Smoking and tobacco chewing were the commonest habit among patient.
11. Low baseline ESR level were associated with higher rate of recovery.
12. O+ve was the commonest blood group found during study.
13. Baseline lower serum total calcium level and lower serum albumin level were associated with higher rate of residual weakness.

However, larger trials with bigger sample size should be carried out to confirm this finding from our study.

Limitation Of Study:

- Diseases/Clinical conditions with need of plasmapheresis are rare to present at tertiary center, e.g. Patient with G.B.S. and Myasthenia gravis with need of plasmapheresis are 2-3 in number per month.
- Fulminant presentation/ Patients with need of ventilatory assistance needed to be treated with Intravenous Immunoglobulin due to non- availability of bedside plasmapheresis at institute.
- Patient with hemodynamic un-stability, autonomic dysfunction with blood-pressure fluctuation, needed to be treated with Intravenous Immunoglobulin, as high risk of blood pressure fluctuation and hemodynamic collapse while doing plasmapheresis.
- Negative consent by Patient and/or relatives for insertion of central venous access needing to treat patient with Intravenous Immunoglobulin.

As a cross-sectional single center study and small sample size may not be able to generalize the entire population.

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