



## **Effect of Fresh Frozen Plasma Transfusion Inpatients with Coagulation Abnormalities**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author SN wrote protocol and draft manuscript. Author AH designed the study and performed the statistical analysis. Author IS did literature search. Author SC reviewed and corrected the draft article. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aim:** To study the efficacy of Fresh Frozen Plasma (FFP) transfusion practice in patients with coagulation abnormalities varies in clinical practice.

**Study Design:** A retrospective study.

**Place and Duration of Study:** This study was conducted in Department of Transfusion Medicine, SMCH, Chennai, between the period of 2019-2020.

**Methodology:** The medical records of each patient receiving FFP transfusions that occurred in patients with coagulation abnormalities were reviewed and the data were collected based on pre- and post transfusion PT (>12 sec), APTT (>70sec) and INR (>1.5) and then analysed statistically. Patients with normal coagulation parameters were excluded from study.

**Results:** A total of 1259 units of fresh frozen plasma were transfused to 315 patients between the

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year 2019-2020. Of the 1259 units transfused 1133 units were transfused to 283 patients with coagulation abnormalities. Apparently 32 patients were excluded from the study as they had normal coagulation profile. Among 251 patients, 37 patients PT were greater than 12 seconds before FFP transfusion out of which the PT was corrected for 14 patients (37.8%) after FFP transfusion. In 228 patients APTT was greater than 70 seconds before FFP transfusion, out of which APTT was corrected in 18 patients (8%) after transfusion. INR values for all 251 patients were greater than 1.5 before FFP transfusion, out of which INR was corrected in 84 patients (29%) after transfusion.  
**Conclusion:** We conclude that FFP transfusions in patients with coagulation abnormalities may corrects the defect only in less percentage of patient population, as in our study it corrects only an average of 31% of patient population.

**Keywords:** Fresh frozen plasma (FFP); coagulation abnormalities; PT; APTT; INR.

**ABBREVIATIONS**

FFP : Fresh Frozen Plasma;  
 PT : Prothrombin Time;  
 APTT : Activated Partial Thromboplastin Time;  
 INR : International Normalized Rat.

**1. INTRODUCTION**

Fresh frozen plasma transfusion is mainly used in correcting multiple clotting factor deficiency and many international guidelines are present that recommend its use in correcting the deficiencies and in bleeding [1,2]. The use of fresh frozen plasma has been increasing steadily and mainly used in patients in intensive care units who are critically ill and in patients with excessive active bleeding [1-3]. In recent years along with its use in active bleeding and in ICU's it is being used prophylactically even in patients with mild coagulopathy before surgeries or other invasive procedures [3,4-7].

However numerous studies on bleeding after central venous line placement, liverbiopsy, thoracentesis, paracentesis, lumbar puncture [8-11], reveal there is no correlation between bleeding and mild abnormalities in coagulation profile. In spite of such results the use of prophylactic FFP transfusion for mild abnormalities has increased [4]. FFP transfusion is associated with wide range of adverse effects like transfusion related acute lung injury, transfusion related circulatory over load and allergic reactions [2,5]. FFP is also capable of transmitting viruses like human immunodeficiency virus hepatitis B and C virus [12]. Many retrospective studies suggest that bleeding is low following an invasive procedure and the requirement of transfusion is very low [2].

At present proper guidelines for using FFP prophylactically does not exist. But commonly used in

- 1) Excessive bleeding in patients with prolonged bleeding or clotting time that cannot be corrected by other methods
- 2) Prior to a surgery or an invasive procedure in a patient with prolonged bleeding or clotting time [6].

**2. MATERIALS AND METHODS**

We studied the effects of fresh frozen plasma transfusion on the coagulation profile of patients with coagulopathy retrospectively in a tertiary health care centre between 2019-2020. The medical records of each patient were reviewed and the data were collected based on pre-and post transfusion values, pre-transfusion values of PT (>12 sec), APTT (>70sec) and INR (>1.5) were selected as inclusion criteria as it was the lowest abnormal value for which blood component was ordered and then analyzed statistically. Any person with normal coagulation profile was excluded from the study [Table 1]. PT, APTT and INR were determined using the methodology automated opto mechanical functional clotting assay - ACL ELITE PRO by Instrumentation Laboratory.

**Table 1. Normal coagulation profile**

PARAMETER*	Normal Range
PT	9 sec - 13 sec.
APTT	25 sec - 38 sec
INR	< 1.1

**3. RESULTS**

A total of 1259 units of fresh frozen plasma were transfused to 315 patients between the year 2019-2020. Of the 1259 units transfused

1133 units were transfused to 283 patients with coagulation abnormalities. 283 adults with abnormal coagulation parameters were treated with FFP in an average dose of 10-15ml/kg. FFP transfusions were most frequently utilized [Table 2] in intensive care unit followed by the department of surgery finally by the department of medicine. Age distribution, out of 283 patients 59 (21%) patients were between 20-40 years of age, 138 (49%) patients were between 40-60 years of age and 86 (30%) patients were more than 60 years of age. Based on gender, 187 (66%) patients were male and 96 (34%) patients

were female. The indications for FFP transfusion includes [Table 3] surgery, liver disease, reversal of warfarin anticoagulation, disseminated intravascular coagulation and massive hemorrhage.

Apparently 32 patients were excluded from the study as they had normal coagulation profile. Among 251 patients [Fig. 1], 37 patients PT were greater than 12 seconds before FFP transfusion out of which the PT was corrected for 14 patients (37.8%) after FFP transfusion. In 228 patients APTT was greater than 70 seconds before FFP

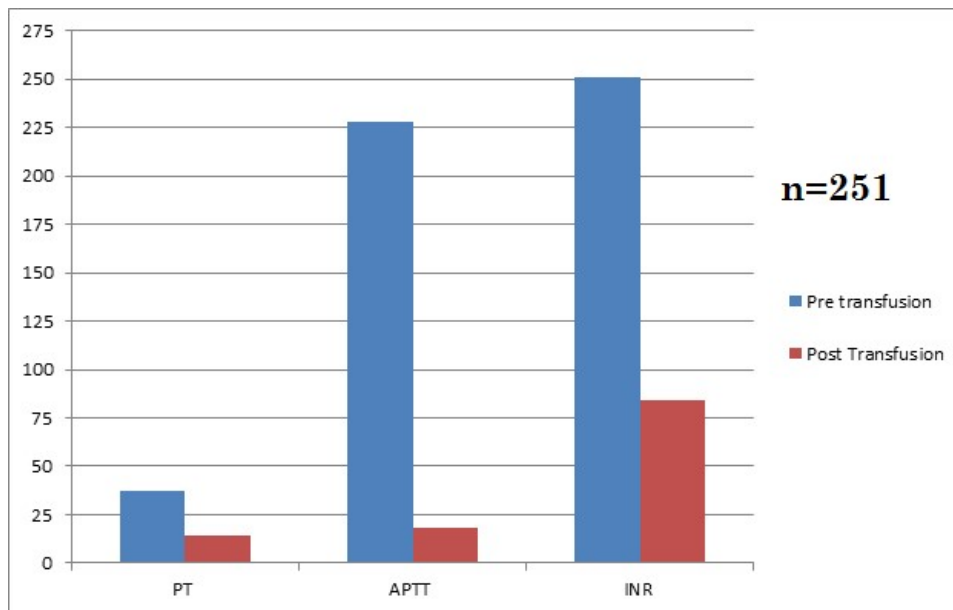
**Table 2. Utilisation of FFP based on departments**

Department	No of patients (n=283)	Percentage
Intensive Care Unit	145	51%
Department of surgery	73	25.7%
Department of medicine	65	22.9%

**Table 3. FFP transfusion based on clinical indications**

Clinical Indication	No of patients (n=283)	Percentage
Reversal of warfarin anticoagulation	45	16%
DIC*	8	3%
Massive haemorrhage	40	14%
Liver disease	57	20%
Surgery or invasive procedures	99	35%
Others	34	12%

\* Disseminated intravascular coagulation



**Fig. 1. Effect of FFP transfusion in coagulation**

transfusion, out of which APTT was corrected in 18 patients (8%) after transfusion. INR values for all 251 patients were greater than 1.5 before FFP transfusion, out of which INR was corrected in 84 patients (29%) after transfusion of FFP. From the above values it can be seen that after FFP transfusion coagulation profile was corrected only at average of 31 percent of the patients.

#### 4. DISCUSSION

Despite the adverse effects of FFP transfusion and not enough guidelines for its prophylactic use, the use of FFP transfusion prophylactically has been increasing in recent times. In this study we examined the effect of FFP transfusion on the PT, APTT and INR and evidence of bleeding in patients with mild elevations of the PT (>12sec). We found that regardless of the number of units of FFP transfused or the number of hours after FFP transfusion, FFP resulted in only trivial decrements of the PT. Out of the 251 patients who had undergone transfusion PT was corrected in 37% is comparable with the study done by Abdel-Wahab et al. [4] that showed an average 15% correction of PT value. APTT was corrected in 28% and INR was corrected in 29% of the patients which is comparable to 36% correction of INR with the study done by Dara SI et al. [5] and 32% correction according to study conducted by Biu E et al. [3]. Regarding APTT following FFP transfusion showed negligible correction which is similar to Pybus et al. [13].

#### 5. CONCLUSION

The study sample included were adults with coagulation abnormalities who had undergone Fresh frozen plasma transfusion. The types and severity of the clotting factors was not fully evaluated and characterized. From the data collected it has been shown that there is very little or negligible correction of coagulation profile after Frozen Plasma Transfusion and inappropriateness of FFP utilization is also noticed based on the indications. FFP transfusions, as a prophylactic measure, especially in patients with mildly deranged conventional coagulation screening test results (INR <1.5) without any empirical evidence of clinical bleeding, needs further scrutiny with control group. With this study, we would like to rationalize the use of FFP by implementing new transfusion policy with the approval of hospital transfusion committee.

#### CONSENT

It is not applicable.

#### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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