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REVIEW ARTICLE ON PLASMA THERAPY

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ABSTRACT

Humanity has witnessd a pandemic in late December or early January. Novel coronavirus nCov-19 is responsible for causing Covid-19. The first case was reported in Wuhan city, China in month of December 2019. No specific drugshas been approved yet for it's treatment through Convalescent Plasma (CP) Therapy is expected to increase the survivable rate. The history of Convalescent Plasma Therapy dates back to the early 20th century. A plethora of studies suggest that CP can be used to treat the immerging infectious disease we had a systematic search in PubMed and found numerous Chinese and Korean clinical trials of Convalescent Plasma Transfusion. As on date, no specific treatment is available for devastating COVID-19 (SARS-CoV-2) infection. This pandemic viral infection has affected over 200 countries within a very short time and created a calamitous situation across the globe. As per WHO guidelines, the treatment is mainly symptomatic and supportive. This clinical protocol has not proven sufficient to save the lives of COVID-19 patients suffering from diabetes or having underlying liver diseases; hence there is utmost need to tackle this situation by other means such as Convalescent Plasma (CP) therapy. The present review gives an insight into the same.

KEYWORDS: plasma therapy, prophylaxis, treatment, covid-19.

1. INTRODUCTION

A novel Coronavirus disease 2019 (COVID-19) is the infection of the respiratory tract caused by Severe acute respiratory syndrome coronavirus −2 (SARS-CoV-2) which has created a disastrous situation in most of the countries.

The first case of COVID-19 was reported in China's Wuhan State (capital of Hubei province) in December 2019.

It is a highly infectious disease and almost reached every country across the globe (Over 200 counties) within a very short span. By April 20, 2020 over 24 lakh people were infected with COVID-19 and caused over 1.7 lakh deaths worldwide The mortality rate based on the cases which had an outcome is on higher side, i.e. 20%.[2] Most of COVID-19 patients were asymptomatic (or with very mild symptoms) and recovered themselves, which were very difficult to be detected; otherwise the total number of COVID-19 cases reported so far would be on the higher. plasma is classic adaptive immuno therapy has been applied to the prevention and treatment of the many infectious diseases for more than one century unfortunately there are several potentially pandemic viruses, such as flaviviruses (eg.West Nile Virus(WNV), Dengue virus and Zika virus, Influenza virus, Ebola virus and Respiratory betacoronavirus which could put us in situations with the current pandemic and which requires the development of specific intervention protocols. While vaccination strategy is undoubtedly a viable goal, development of vaccine requires a time frame not compatible with an emergency situation.it is also prophylactic approch that has no use in the therapeutic setting.on the other hand the use of antivirals is valuable for therapeutic setting.in situation in which the new pathogen is able to induce an immune system response with the production of neutralizing antibodies, passive transfusion of convalescent blood products (CBPs), in particular Convalescent plasma (CP) has proven to be winning and logistically feasible therapeutic strategy. CBPs can be manufactured by collecting whole blood or apheresis plasma from a Convalescent donor. The main accepted mechanism of action of CBP therapy is clearance of viremia, which typically happens 10to 14days after infection. so CBP has typically administered after the appearance of early symptoms to maximize efficacy.

2. METHODS AND MATERIALS

1.1 Patients:

1.2 Disease severity

1.3 Collection of Convalescent plasma

1.4 Statistical Analysis

1.1 Patients: As of 22may 2020, there have been 154,500 laboratory confirmed Covid-19Patients in Turkey. from the republic of turkey Ministry Of Health Database, severe or critically ill Covid-19 patients who received anti-SARS- Cov-2 antibody containing CP along with the Antiviral treatment(n=888)were selected and includedin the study.

1.2 Disease severity: Presence of dyspnea, hypoxemia (SaO2<93%), PaO2/FiO2<300 and >50% progression in lung infiltrates within 24-48hours was defined as severe Covid-

19.presence of respiratory failure, septic shock an/or multiple organ dysfunctions was defined as criticalCovid-19.

1.3 Collection of convalescent plasma: Therapeutic apheresis centered licenced by the Republicbof Turkey, Ministry of Health and Turkish Red Crescent carried out activities for obtaining CP from donors.Donor assessment were performed according to the Republic of Turkey, Ministry of Health and Donor Eligibility criteria for Covid-19 Convalescent plasma.

1.4 Statistical analysis: Data analysis was performed using IBM SPSS v-26software.descriptive statistics were used to summarize data. Variable assessed for normal distribution with the kolmogorov, Smimov test differences between categorical variables were analysed with the Che-square test and post hoc Bonferroni correction was used when the group comparison were higher than 2;and numeric variables were compared with the Mann-whitney U test.

3. DISCUSSION

SARS-CoV-2 is the third CoV that caused infection in humans. therefore, experience in the use of CP against a human CoV was first obtained during SARS-CoV-1 and MERS Cov-2 outbreaks. Covalncent plasma therapy includes administration of immunoglobulins containing plasma of recently recovered individual from specific infection (SARS-2)to any individual who is susceptible,or infected for specific disease(such as Covid-19) for the purpose of prophylaxis and treatment. immunized plasma acts by binding to a given pathogen including virus (SARS-2) directly and causing denaturation, eventually, eradicating the latter from the peripheral blood streams while other antibody mediated pathways including compliment system, antibody cell mediated dependent cytotoxic med mediated cytotoxic mediated cytotoxicity and phagocytosis might,also contribute towards the therapeutic effect achieved.

Table 1 COVID-19- Recent trials and locations with key findings.

Table 1 COVID-19.	No. of Patients in Trial/ Location	Dose of CP	Titres	Key Findings
COVID-19	5, Shenzhen, China	400ml in two consecutive doses of 200 ml each	•ELISA anti-SARS CoV-2 antibody titre less than 1:1000 •Neutralising antibody titres > 40	Clinical status improved, SOFA score decreased, ARDS resolved, viral antibodies not detectable, increase in PAO2/FIO2 (range 172-276 before and 284-366 after), all were on other medications including steroids and antiviral, no significant adverse effects reported.
COVID-19	10, Wuhan, China	200ml	• Neutralising anti-SARS CoV-2 antibody titres > 1:640	Clinical status improved, increased oxyhemoglobin saturation, absorption of lung lesions in radiographic examination noted, no significant adverse effects, other therapy included steroids, antimicrobials and antiviral.
COVID-19	2, Korea	500 ml in total; infused 250ml twice in 24 hrs	Not stated	-
COVID-19	245	Not stated	Not stated	91 patients benefitted, plasma therapy said to be safe and effective.
COVID-19	4	Different amount of plasma were infused in each patients (900ml, 200ml, 2400ml, 300ml)	Not stated	See Table 2.

Table 2 COVID-19- Case files.

Case	Drugs	Past Medical History	Secondary Infection	Amount of plasma diffused	Key Findings
1) Age 69/ Female	Arbidol (200mg/TDS), Lopinavir/Ritonavir (400mg/BD), Interferon alpha inhalation (50ug/ BD); Additional drugs: Human albumin, Zadixin, Immunoglobulins (Dose not stated)	Hypertension (HT)	Co-infection with bacteria and aspergillus (For this, patient was treated with Caspofungin and Voriconazole)	900ml in three consecutive doses	•Radiographic examination revealed absorption of consolidation. •RT-PCR test results negative.
2) Age 55/Male	Arbidol (200mg/TDS), Lopinavir/Ritonavir(500mg/ BD), Interferon alpha 2b (5milion units/BD)	Chronic Obstructive Pulmonary Disease (COPD)	-	200ml	•Chest images showed absorption of interstitial pneumonia. •RT-PCR test results negative.
3) Age 73/Male	Arbidol (200mg/TDS), Lopinavir/Ritonavir (400mg/BD), Interferon alpha 2b (5milion units/BD), Oseltamivir (75mg/BD), Ribavirin (500mg/BD)	Hypertension (HT) with Chronic Renal Failure (CRF)	Septic Shock, Co-infection with bacteria and aspergillus (For this, patient was treated with Caspofungin and Voriconazole)	2400ml in 8 consecutive doses	•Reduced viral load. •Radiographic examination showed absorbed infiltrative lesions. •RT-PCR test results negative.
4) Age 31/ Female	Lopinavir/Ritonavir (400mg/BD), Ribavirin (500mg/BD)	Pregnancy	Multiple Organ Failure Syndrome, Septic Shock	300ml	•RT-PCR test results negative.

In the absence of any Proven drug Or therapy covalnscent plasma has been used previously outbreaks in Machupo virus, Junin virus, Lessa fever and few others to name. in recent times covalnscent plasma therapy has been used effectively in treating SARS, MERS and Ebola virus outbreaks.

4. Recommendations

A. Pathways for use of investigational convalescent plasma

Because convalescent plasma for the treatment of COVID-19 has not yet been approved for use by FDA, it is regulated as an investigational product. As such, its administration must be under the EUA or an IND. The emergency use of COVID-19 convalescent plasma is not authorized under the EUA unless it is consistent with, and does not exceed, the terms of the Letter of Authorization, including the Scope of Authorization and Conditions of Authorization.

Alternatively, investigational convalescent plasma may be administered under the traditional IND regulatory pathway, a single-patient IND for emergency use, or an intermediate-size population expanded access IND (section 351(a)(3) of the PHS Act (42 U.S.C. 262(a)(3)); section 505(i) of the FD&C Act (21 U.S.C. 355(i)); 21 CFR 601.21; and 21 CFR Part 312).

FDA does not collect convalescent plasma or provide convalescent plasma. Health care providers or acute care facilities should obtain convalescent plasma from an FDAregistered or licensed blood establishment.

The following pathways are available for administering or studying the use of convalescent plasma

a) Emergency use authorization

On August 23, 2020, FDA issued an EUA for COVID-19 Convalescent Plasma for the treatment of hospitalized patients with COVID-19.

Health care providers intending to administer COVID-19 convalescent plasma under the EUA are not required to report its use to FDA. Providers should refer to the Fact Contains Nonbinding Recommendations

Sheet for Health Care Providers for information on the intended use and known and potential risks and benefits of COVID-19 convalescent plasma. The Fact Sheet also provides a description of the product, information on the dosage, administration and storage of COVID-19 convalescent plasma, use in specific populations, and instructions for communicating with recipients.

As described in the Fact Sheet, health care providers must maintain records and conduct a thorough investigation of adverse reactions after transfusion of COVID- 19 convalescent

plasma, and must report fatalities to FDA as required in 21 CFR 606.170. Refer to FDA's guidance entitled "Notifying FDA of Fatalities Related to Blood Collection or Transfusion" for recommendations on reporting fatalities related to blood transfusion to FDA (Ref. 8).

FDA does not collect convalescent plasma or provide convalescent plasma. Health care providers or acute care facilities should obtain convalescent plasma from an FDAregistered or licensed blood establishment.

The following pathways are available for administering or studying the use of convalescent plasma

b) Clinical trials

The EUA is not intended to replace clinical trials that are critically important for the definitive demonstration of safety and efficacy of investigational convalescent plasma. Ongoing clinical trials of investigational convalescent plasma should not be amended based on the issuance of the EUA. Health care providers are encouraged to enroll patients in those trials and complete clinical trials to fully answer the questions about the effectiveness of convalescent plasma for the treatment of COVID-19.

Investigators wishing to study the use of convalescent plasma in a clinical trial should submit requests to FDA for investigational use under the traditional IND regulatory pathway (21 CFR Part 312). The Center for Biologics Evaluation and Research (CBER) Office of Blood Research and Review (OBRR) is committed to engaging with sponsors and reviewing such requests expeditiously. During the COVID-19 pandemic, INDs may be submitted via email to CBERDCC_eMailSub@fda.hhs.gov.

c) Expanded access

An IND application for expanded access is an alternative for use of investigational convalescent plasma for patients with serious or immediately life-threatening COVID-19 disease who are not eligible or who are unable to participate in randomized clinical trials (21 CFR 312.305). During the COVID-19 pandemic, INDs for expanded access, that are not single patient INDs, may be submitted via email to CBERDCC_eMailSub@fda.hhs.gov.

- Single Patient IND for Emergency Use

For various reasons, COVID-19 convalescent plasma under the EUA or investigational convalescent plasma through participation in clinical trials may not be readily available to all

patients in potential need. Therefore, given the public health emergency that the COVID-19 pandemic presents, FDA is continuing to facilitate access to investigational convalescent plasma through Contains Nonbinding Recommendations the process of a physician requesting a single patient IND for an individual patient with serious or life-threatening COVID-19 under 21 CFR 312.310. This process allows the use of an investigational drug for the treatment of an individual patient by a licensed physician upon FDA authorization, if the applicable regulatory criteria are met. Note, in such cases, a licensed physician seeking to administer investigational convalescent plasma to an individual patient must request the IND (see 21 CFR 312.310(b)). Given that the intended use of COVID-19 convalescent plasma under the EUA is for treatment of hospitalized COVID-19 patients, FDA expects few requests for single patient INDs.

- To Obtain a Single Patient IND for Emergency Use

The requesting physician may contact FDA by completing Form FDA 3926 (https://www.fda.gov/media/98616/download) and submitting the form by email to CBER_eIND_Covid-19@FDA.HHS.gov.

NOTE: To enable electronic completion of the form, download it from your internet browser, save locally, close, and re-open. Do NOT ATTEMPT to fill out this form after opening it from your internet browser; the form will not be fillable until downloaded, saved, and opened locally. Check either box 3a or 3b to enable form logic and the appropriate fields. For more detailed instructions see the Form FDA 3926 Instructions (https://www.fda.gov/media/98627/download).

CBER requests that all forms be filled out electronically to facilitate rapid review. Hand written forms are often hard to read and may delay the processing of the request. Please pay special attention to the following:

- The completed form should include a brief clinical history of the patient, including: age, gender, diagnosis, current therapy, and rationale for requesting the proposed investigational treatment in order to meet the expanded access use requirements in 21 CFR 312.305 and 312.310.
- The form should include the name of the blood establishment collecting the investigational convalescent plasma.

- Providers should complete the form to the extent possible, and FDA will work with the provider if additional information is required.

For requests between 8am ET and 8pm ET (Mon-Sun): FDA will respond within four hours. For requests between 8am ET and 8pm ET when the provider is unable to complete and submit Form FDA 3926 due to extenuating circumstances, the provider may contact FDA's Office of Emergency Operations at 1-866-300-4374 to be routed to the appropriate clinical review staff for assistance with submitting the request.

Contains nonbinding recommendations

For requests that are made overnight between 8pm ET and 8am ET (Mon-Sun)

- In case of a medical emergency, i.e., when authorization and issuance of an IND number is needed before 8 am ET the next morning, the provider should contact FDA's Office of Emergency Operations at 1-866-300-4374 to be routed to the appropriate clinical review staff for assistance with submitting the request and issuance of an IND number.
- In case of a non-critical overnight request, the Form FDA 3926 should be submitted by email to CBER_eIND_Covid-19@FDA.HHS.gov for review, and the IND number will be issued by 8 am ET the next morning.

In situations when the provider is unable to complete and submit Form FDA 3926 due to extenuating circumstances, the requestor must agree to submit an expanded access application (i.e., Form FDA 3926) within 15 working days of FDA's authorization of the use (21 CFR 312.310(d)(2)). When submitting the expanded access application form, the requestor is advised to indicate that the application is a follow-up to a previously granted IND for emergency use, and to provide the IND number.

B) Collection of COVID-19 Convalescent Plasma under the EUA

Blood establishments collecting authorized COVID-19 convalescent plasma must comply with the Conditions for Authorization in the EUA. Please refer to the Letter of Authorization for the Conditions of Authorization for registered and licensed blood establishments convalescent plasma must be collected by registered or licensed blood establishments from donors in the U.S. or its territories in accordance with applicable regulations, policies, and procedures. Testing for relevant transfusion- transmitted infections (21 CFR 610.40) must be performed and the donation must be found suitable (21 CFR 630.30).

COVID-19 convalescent plasma is collected from individuals who meet the following qualifications

a) Evidence of COVID-19 documented by laboratory testing in either

1. Individuals who had symptoms of COVID-19 and a positive test result from a diagnostic test approved, cleared, or authorized by FDA. OR
2. Individuals who did not have a prior positive diagnostic test and/or never had symptoms of COVID-19 may be qualified to donate if they have had reactive (positive) results in two different tests approved, cleared, or authorized by FDA to detect SARS-CoV-2 antibodies.

A list of all current EUA COVID-19 in vitro diagnostics is available at: https://www.fda.gov/emergency-preparedness-and-response/mcm-legalregulatory- and-policy-framework/emergency-useauthorization#covidinvitrodev.

b) Complete resolution of symptoms at least 14 days before the donation. A negative result for COVID-19 by a diagnostic test is not necessary to qualify the donor.

c) Male donors, female donors who have never been pregnant, or female donors who have been tested since their most recent pregnancy and results interpreted as negative for HLA antibodies

2. Testing for anti-SARS-CoV2 Antibodies

a) Under the EUA, all plasma donations must be tested by registered or licensed blood establishments for anti-SARS-CoV-2 antibodies as a manufacturing step to determine suitability before release.

b) Pursuant to the EUA, blood establishments must test units using the Ortho VITROS SARS-CoV-2 IgG. Units tested using Ortho VITROS SARS-CoV-2

IgG and found to have a signal-to-cutoff (S/C) value of 12 or greater qualify as high titer COVID-19 convalescent plasma. Units containing anti-SARS-

CoV-2 antibodies but not qualified as high titer by the Ortho VITROS SARS- Contains Nonbinding Recommendations.

CoV-2 IgG are considered low titer units. (See section III.B.3 of this guidance for labeling requirements.)

c) Blood establishments considering the use of a test other than the Ortho VITROS SARS-CoV-2 IgG to qualify COVID-19 convalescent plasma should contact the CBER OBRR to determine acceptability of the proposed test, which if accepted, would require an amendment to the EUA. FDA will consider data submitted to support such use in assessing the acceptability of other tests.

Requests should be submitted to CBER-EUA-CCP-Assays@fda.hhs.gov.

3. Labeling

COVID-19 convalescent plasma must be appropriately labeled.

a. The requirements in 21 CFR 606.121 for the container label apply, including the requirement to include a reference to the circular of information.

FDA recognizes that the current circular of information does not contain specific information about COVID-19 convalescent plasma regarding indications for use, dosage information, contraindications or cautions, but it provides information on the use of plasma.

b. COVID-19 convalescent plasma is not an approved product. The container label must not indicate a license number.

c. COVID-19 convalescent plasma units must be clearly labeled, based on the test results that are used as part of manufacturing, as being high titer COVID19 convalescent plasma or low titer COVID-19 convalescent plasma based on the level of anti-SARS-CoV-2 antibodies. This information may be placed on the container label or on a tie tag.

d. We recommend the use of a uniform container label for COVID-19 convalescent plasma. In particular, we recommend the use of the International Society of Blood Transfusion (ISBT) format specified in the U.S. Industry Consensus Standard for the Uniform Labeling of Blood and Blood Components Using ISBT 128.

e. The manufacturing process used and the expiration date on the label for COVID-19 convalescent plasma should be the same as for other plasma products that are of the same type. For example, COVID-19 Convalescent Plasma, Fresh Frozen, should be frozen within 8 hours after collection, stored at -18ºC or colder and have an expiration date one year from the date of collection.

C) Collection of convalescent plasma under an IND

Under FDA's IND regulations, an IND (including an intermediate-size population expanded access or single patient IND) must provide information with respect to the investigational drug, chemistry, manufacturing, and controls adequate to ensure the proper identification, quality, purity, and strength of the investigational drug (21 CFR 312.23(a) (7) and 21 CFR 312.305(b)(2)(vi)). For INDs for use of investigational convalescent plasma, the IND should contain, among other things, adequate information to demonstrate that the plasma will contain SARS-CoV-2 neutralizing antibody titers, if available. Accordingly, health care providers or acute care facilities should include information in the IND submission that the investigational convalescent plasma will be obtained from an FDA-registered blood establishment that follows the donor eligibility criteria and donor qualifications described in section III.C.1 of this guidance in collecting plasma from donors.

1. Donor eligibility

a. Investigational convalescent plasma must only be collected from individuals who meet all donor eligibility requirements (21 CFR 630.10 and 21 CFR 630.15). Donation testing for relevant transfusion-transmitted infections must be performed (21 CFR 610.40) and the donation must be found suitable (21 CFR 630.30).

b. We recommend investigational convalescent plasma is collected from individuals who meet the following qualifications:

i. Evidence of COVID-19 documented by laboratory testing in either:

1. Individuals who had symptoms of COVID-19 and a positive test result from a diagnostic test approved, cleared, or authorized by FDA.
2. Testing for anti-SARS-CoV2 Antibodies

Plasma donations should be tested for anti-SARS-CoV-2 antibodies to determine suitability before release in accordance with an applicable IND.

Note: Plasma units that do not qualify as COVID-19 convalescent plasma under the EUA may qualify for investigational use under an applicable IND. The units should be labeled as described in section III.C.3 below.

Registered and licensed blood establishments that collect plasma intended for transfusion do not need to contact FDA or request a supplement to their license, respectively, or obtain their own IND to collect and manufacture convalescent plasma for investigational use provided

they 1) follow their standard operating procedures for plasma collection and all applicable regulations, and 2) collect plasma from individuals who meet the donor qualifications specified above, which would be included in the applicable IND(s) held by a health care provider or other sponsor.

Once manufactured, the convalescent plasma may be distributed for investigational use.

Blood establishments do not need to request an alternative procedure or exception under 21 CFR 640.120(a) to collect and distribute investigational convalescent plasma.

3. Labeling

Investigational convalescent plasma must be appropriately labeled.

A. The container label of investigational convalescent plasma units must include the following statement, "Caution: New Drug—Limited by Federal (or United States) law to investigational use" (21 CFR 312.6(a)).

a) In addition, the requirements in 21 CFR 606.121 for the container label apply, including the requirement to include a reference to the circular of information.

FDA recognizes that the current circular of information does not contain specific information about investigational convalescent plasma regarding indications for use, dosage information, contraindications or cautions, but it provides information on the use of plasma.

a) The investigational convalescent plasma container label must not indicate a license number.

b) We recommend the use of a uniform container label for investigational convalescent plasma. In particular, we recommend the use of the ISBT format specified in the U.S. Industry Consensus Standard for the Uniform Labeling of Blood and Blood Components Using ISBT 128.

c) The manufacturing process used and the expiration date on the label for investigational convalescent plasma should be the same as for other plasma products that are of the same type. For example, Convalescent Plasma, Fresh Frozen, should be frozen within 8 hours after collection, stored at -18ºC or colder and have an expiration date one year from the date of collection.

Investigational convalescent plasma units may be labeled for anti-SARSCoV2 antibodies based on the test results as specified under the applicable IND. This information may be

placed on the container label or on a tie tag.

d) Recordkeeping

A health care provider who is participating in an IND, including an expanded access IND or single patient IND for emergency use, must maintain records for the investigational convalescent plasma unit(s) administered to the COVID-19 patient (21 CFR 312.62). Such records should include the unique identification number(s) (e.g., the ISBT donation identification number(s) of the unit(s)).

Side benefits from cp in covid-19

Obviously, patients with humoral immune deficiencies can benefit from polyclonal antibodies contained in CP, and patients with hemorrhagic diathesis can benefit from clotting factors. Plasma is also likely to contain antibodies againstother common betacoronaviruses associated with the common cold, which have been shown to cross-react with SARSCoV-2 antigens in intravenous immunoglobulin (IVIg) preparations (135), likely stemming from recent infection with another human betacoronavirus (128). Accordingly, IVIg led to clinical and radiological recovery in 3 Chinese patients with severe COVID-19 (136), and the same team is now leading a randomized controlled trial (NCT04261426).After demonstration that blood group O health care workers were less likely to become infected with SARS-CoV (137), a research group proved that anti-A blood group natural isoagglutinins (which can also be found in CP plasma from blood group O and B donors) inhibit SARS-CoV entry into competent cells (138). Such binding could opsonize virions and induce complement-mediated neutralization (139).

Since SARSCoV-2 uses the same receptor as SARS-CoV, anti-A isoagglutinins are expected to have similar effects against SARS-CoV-2 (140); accordingly, clusters of glycosylation sites exist proximal to the receptor-binding motif of the S protein from both SARS-CoV (141) and SARS-CoV-2 (142). Several publications showed that the odds ratio for acquiring COVID-19 is higher in blood group A than in blood group O (143–147), and one showed the ABO gene polymorphism to be the most significant at predicting severity of COVID-19 (147). COVID-19 has more severe clinical presentations and outcomes in the elderly and in males; intriguingly, elderly males are known to experience reductions in isoagglutinin titers (148, 149). Although alternative explanations exist (150, 151), studies are hence ongoing to evaluate correlations between isoagglutinin titers and outcomes in blood group O and B patients (152). If the correlations are confirmed, while preserving ABO match compatibility,

blood group O and B donors for CP in COVID- 19 could be preferred, and their anti-A isoagglutinin titers should be tested.

RESULTS

The patients suffering from diabetes or liver dysfunction or any other underlying diseases are at greatest risk of SARS-CoV-2 infection. From the study, it is proved that plasma collected from the recovered patients of viral infection has considerable potential to treat the viral disease without the occurrence of adverse effects.

CONCLUSION

The CP therapy can be a possible life saving alternative to treat critical COVID-19 patients having diabetes or underlying liver dysfunction. Hence, randomised clinical trials are recommended at the earliest to save the lives of infected individuals of COVID-19.

In case of critically ill patients, plasma transfusions improve clinical condition and decrease mortality rates, though, further studies and controlled clinical trials are always mandated to determine its efficiency and exact role in treatment of Novel corona virus (2019-nCoV) Table 1 and 2.

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