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DEMOGRAPHIC DETAILS OF COVID-19 CONVALESCENT PLASMA DONORS - AN ANALYSIS.

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Abstract

Introduction: The recent outbreak of severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) and subsequent corona virus disease 2019 (COVID-19) has created a global health emergency with unparalleled worldwide burden. Passive immunity delivered as anti-corona virus antibodies from convalescent human plasma may offer a novel therapeutic approach for COVID-19.

Aim: The aim of this study is to understand this pandemic and its association to demographic pattern of convalescent plasma donors if any which can help us to find a possible solution to fight against this pandemic.

Materials and method: This is a retrospective study carried out at Ahmedabad Red Cross from a period of April 2020 to September 2020. The donors are scrutinized on the basis of Age-group, Blood Group, gender and Positive Antibody IgG titre index.

Result: Among 288 COVID-19 Plasma donor accepted for plasma donation; 278 were males and 10 were females. Majority of the donors belong to age group of 22-27 years of age. B positive blood group was most common encountered in the study. Most donors had SAR-COV-2 antibody titre in range of 2-4.

Conclusion: In this pandemic convalescent plasma therapy is used on compassionate basis in moderately ill patients and demographic studies help us to know the pattern of infectivity and can help us bring permanent treatment for the same.

Keywords: Convalescent plasma, blood group, IgG-antibody titre

Introduction

The World Health Organization declared COVID-19 a pandemic on 11 March 2020.[1] India, the first case was reported on 30 Jan. By 9th September, 2020, India has reported 8, 97,394 cases and 73,890 deaths.[2] Treatment strategies that have been identified thus far include medications uncommonly used in clinical practice.

Passive immunity delivered as anti-corona virus antibodies from convalescent human plasma may offer a novel therapeutic approach for COVID-19. The proposed mechanism of benefit from convalescent human plasma derived from survivors of the corona virus is the transfer of passive immunity in an effort to restore the immune system during critical illness and neutralize the virus to suppress viremia.[3]

This plasma-derived therapy involves removing plasma from COVID-19 survivors, extracting corona virus-specific antibodies to administer to infected patients to stimulate a potent immune response against SARS-CoV-2. Convalescent therapy remains in the experimental phase, but appears it may favorably influence the treatment course, and enrollment of patients into a clinical trial will aid in defining its role in therapy.

In 2014, the use of convalescent plasma collected from patients who had recovered from Ebola virus disease was recommended by WHO as an empirical treatment during outbreaks.[4]

Aim:

To understand any diseases it is important to know about the demographic pattern of the affected population. The aim of this study is to understand this pandemic and its association to demographic pattern if any which can help us to find a possible solution to fight against this pandemic.

Materials and Method:

This is a retrospective study carried out at Ahmedabad Red Cross from a period of April 2020 to September 2020. The donors are scrutinized on the basis of Age-group, Blood Group, gender and Positive Antibody IgG titre index. The details of the convalescent plasma donors are available from the donor forms and blood grouping and antibody screening of donors is performed on Qwalys fully automated blood grouping and screening machine by DIAGAST. The IgG antibody titre index for Sar-COV-2 is performed on Abbott Platform by chemiluminescence principle.

Result:

A total number of 333 COVID-19 Convalescent Plasma donors visited Ahmedabad Red Cross during the period of April to September. Among them 316 (94.90%) were males and 17 (5.11%) were females.

Amongst them 288 COVID-19 Plasma donors were eligible to donate Plasma and 45 Donors were deferred due to history or absence of SAR-COV-2 IgG antibodies. 29 donors were having no antibodies and 7 donors were deferred due to low hemoglobin rest 9 were deferred in donor deferral questionnaire criteria.

Table 1: Age-group wise distribution of Plasma Donors:

Age group (in years)	Male	Female	Total
18-22	13	03	16
22-27	69	10	79
27-32	56	02	58
32-37	51	01	52
37-42	44	00	44
42-47	40	01	41
47-52	20	00	20
52-57	22	00	22
57-60	00	00	00
>60	01	00	01
Total	**316**	**17**	**333**

According to the age group distribution, most of the COVID-19 recovered plasma donors were in the age-group of 23-27 years of age which comprises most of the youth population followed by 28-32 years of age group and least being in age-group of 58-60 years of age.(Table:1)

Table 2: Gender wise Accepted and deferred donors:

Gender	Accepted	Deferred	Total
Male	278	38	316
Female	10	7	17
Total	**288**	**45**	**333**

On comparison as expected male donors were more compared to female donors. This can be attributed to the fact that inclusion criteria include donations from males and nulliparous females only.(Table:2)
And some females at our study who were deferred from donation was due to low hemoglobin (Hb<12.5).

Table 3: Blood Group wise distribution of accepted plasma donors:

Blood Group		Data	%
ABO	**RH**		
A	Positive	69	23.96
A	Negative	02	0.69
B	Positive	111	38.56
B	Negative	02	0.69
O	Positive	74	25.69
O	Negative	00	00
AB	Positive	28	9.72
AB	Negative	02	0.69
total		**288**	**100**

In blood group distribution it is observed that most of the donors belong to B positive blood group (38.56%) followed by O Positive blood group (25.69%) and least being O negative. (Table:3)

Table 4: Antibody titre based distribution:

IgG antibody titre Index	Data
2-4	111
4-7	89
>7	88
Total	**288**

SAR-COV- 2 IgG Titre index of 1.4 cut-off value is regarded as positive IgG antibody which suggests that the person was infected with corona virus and thus the immune system has made antibody against the viral antigen.

In our study we accepted donations from the donors having antibody index value more than 2.

Maximum number of donors was having IgG antibody titre Index in between range of 2-4. (Table:4)

Discussion:

The recent outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and subsequent coronavirus disease 2019 (COVID-19) has created a global health emergency with unparalleled worldwide burden. The full epidemiological impact of this virus remains to be seen, but an understanding of the approximate denominator will be important when considering the clinical characteristics of these cases and the percentage of cases with more severe disease or resultant mortality. [5]

One of the hopeful treatments that have emerged is convalescent plasma (CP), or immune plasma. CP, which is plasma that is collected from an infected individual, such as by COVID-19 (i.e., human anti–SARS-CoV-2 plasma), is then transfused into infected patients as a post exposure prophylaxis. Unlike immunoglobulin (IgG)-derived antibodies such as plasma-derived monoclonal antibodies, CP is a passive antibody therapy that showed some success as a neutralizing antibody against other corona virus epidemics, SARS-1 and Middle East respiratory syndrome (MERS), in the first two decades of the 2000s. CP-derived antibodies can neutralize a virus by preventing replication (e.g., by complement activation or phagocytosis) or by binding without interfering with replication. [6]

To fight against the pandemic of COVID-19 ; there are many clinical trial therapies going on amongst which one of them is Convalescent Plasma therapy. Convalescent plasma or immunoglobulin's have been used as a last resort to improve the survival rate of patients with SARS whose condition continued to deteriorate despite treatment with pulsed methylprednisolone. Moreover, several studies showed a shorter hospital stay and lower mortality in patients treated with convalescent plasma

than those who were not treated with convalescent plasma. [3]

In our study we studied the demographic pattern of the donors. Most of the donors belong to the youth population that is 23-27 years of age group; this can be attributed to the fact that the youth population is enthusiastic. This also shows the maturity of the youth towards reducing global burden.

Most of the donors in our study have B positive blood group and this association may be because B positive being most common blood group in the population.

In our study 96.53% donors were male and 3.47% donors were females who were accepted for plasma donation and fulfilled all the criteria for convalescent plasma donation by Apheresis method.

The donors at our centre showed the presence of IgG antibody titre index in range of 2-4. This might represent that the COVID-19 recovered patients developed antibodies in significantly average index required for donation. In one of the study by Knudson .M. [8] it was found that the average antibody titre index was 5 and they found that 5 molecularly confirmed COVID-19 positive patients were negative for IgG antibody titre index out of 31.In comparison to our study we had COVID-19 rt-PCR positive 29 donors with absence of IgG antibodies from total of 333 donors. Any conclusion to this cannot be made at present as there is lack of evidence and studies at present.

Conclusion:

To understand any diseases it is important to know about the demographic details of the affected population. At our centre it was noted that maximum people who recovered were having blood group B positive and maximum donors had antibody titre index in range of 2-4.

In this pandemic convalescent plasma therapy is used on compassionate basis in moderately ill patients and hopefully demographic studies help us to know the pattern of infectivity and can help us bring permanent treatment for the same.

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