ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 01 | January - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

AGE AND SEX DISTRIBUTION OF CONVALESCENT COVID19 PLASMA RECEPIENT

Immunohaematology

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ABSTRACT

Introduction: Corona virus disease- 2019 is caused by severe acute respiratory syndrome- 2 (SARS-CoV-2), also known as Novel corona virus (2019-nCoV).The disease presentation ranges from asymptomatic to severe acute respiratory failure requiring intensive care support. There are multiple drugs, therapies, and vaccine trials underway. One such therapy is convalescent plasma. Passive immunity delivered as anti-corona virus antibodies from convalescent human plasma has promise of emerging as a therapeutic option in the treatment of SARS-CoV-2. **Objective:** The objective of the study is to determine the age and sex distribution of the recipients of the convalescent Covid 19 plasma among patients admitted at different hospitals in Ranchi, Jharkhand. **Materials and Methods:** A retrospective study was conducted at Department of blood bank, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand from July 28, 2020 to October 28, 2020 who received at least one convalescent plasma transfusion for hospitalized patients aged 18 years or older with moderately as well as severely ill or life-threatening COVID-19 disease within 21 days from the onset of their illness. **Results:** This study recorded greater number of male recipients with B Positive blood group. The convalescent plasma recipients were mostly old patients above 50 years of age.

KEYWORDS

INTRODUCTION:

Corona virus disease- 2019 is caused by severe acute respiratory syndrome- 2 (SARS-CoV-2), also known as Novel corona virus (2019-nCoV). The disease emerged in Wuhan, Hubei province, China. World Health Organization (WHO) declared the Corona virus disease2019 caused by Novel corona virus (2019-nCoV) as a pandemic on March 11th 2020. As on 21 October 2020, in the worldwide, there have been 41,121,174 confirmed cases of COVID-19, including 1,131,009 deaths, as reported by WHO. Risk factors for severe COVID-19 are smoking, chronic obstructive pulmonary disease, diabetes, hypertension, cardiovascular diseases.[1]

The disease presentation ranges from asymptomatic to severe acute respiratory failure requiring intensive care support. There are multiple therapies, and vaccine trials underway[2]. One such therapy is convalescent plasma. In March 2020, the US Food and Drug Administration (FDA) issued guidance to study the safety and efficacy of COVID-19 convalescent plasma in the treatment of serious and critically ill patients [3].

Previously research based on the use of convalescent plasma for the treatment of viral infections such as SARS-CoV, Middle Eastern Respiratory Syndrome (MERS), H5N1 avian influenza, and H1N1 influenza have suggested that transfusion of convalescent plasma was effective, if given early in the course of the infection [4–9]. Following infection, virus antigens stimulate the immune system to produce antibodies is detected in the blood. IgM antibodies are detected after 3–5 days of onset of symptom and IgG antibodies within 10–18 days. IgM titers then decline, while IgG antibody levels may increase four times or more as compared to the early phases of infection. Information on immune response to SARS-CoV-2 and duration is rather limited. Studies suggest that IgM expression is concurrent with IgG expression and both antibodies are associated with a high degree of variability in patients who test Positive for the virus [10]. Li et al. [10] concluded that in 49 potential donors, IgG antibodies increased after 4 weeks from the onset of SARS-CoC-2 symptoms, while in another study these antibodies decreased in 2–3 months after the infection [11].

Passive immunity delivered as anti-corona virus antibodies from convalescent human plasma has promise of emerging as a therapeutic option in the treatment of SARS-CoV-2 however, the selection of potential donors and the timing of the donations are very important in order to ensure therapeutic potency [10]. Shen et al. first presented a case series of 5 critically ill patients with SARS-CoV-2 and Acute Respiratory Distress Syndrome (ARDS) who showed improvement in their clinical status when treated with convalescent plasma containing neutralizing antibodies [12].

Convalescent plasma donation and preparation

Screening of convalescent plasma donors was done for SARSCoV-2 antibody titers by a chemiluminescence immunoassay method. Plasma recipients were transfused with either one or two units of ABO-compatible convalescent plasma. Each unit of about 200 milliliters in volume was infused over 1 to 2 hours. Monitoring of recipients was done every 15 minutes for signs of transfusion-related reactions.

Aim and Objective of the Study

The objective of the study is to determine the age and sex distribution of the recipients of the convalescent Covid 19 plasma among patients admitted at different hospitals in Ranchi, Jharkhand.

Material and Method

Study setting: This study was conducted in the Department of blood bank, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand which is the only tertiary institution in the state.

Study design: A retrospective study was conducted at Department of blood bank, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand from July 28, 2020 to October 28, 2020 which received at least one convalescent plasma transfusion for hospitalized patients aged 18 years or older with severe or life-threatening COVID-19 disease within 21 days from the onset of their illness.

Plasma recipients

Patients eligible to receive convalescent plasma were between 18 and 100 years who had confirmed moderate, severe or life-threatening COVID-19 disease. Severe disease is defined as presence of at least one of the following: dyspnea, respiratory frequency ≥30/min, blood oxygen saturation ≤ 93 %, partial pressure of arterial oxygen to fraction of inspired oxygen ratio 50 % within 24–48 hours. Life-threatening disease is defined as respiratory failure, septic shock, or multiple organ dysfunctions [13]. Once subjects or legally authorized representatives gave informed consent, they received either one or two convalescent plasma infusions of 200 ml each.

IgG antibody titers

IgG antibody titers were measured in the Department of blood bank, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand using chemiluminescence immunoassay method. Person with serum IgG antibody value ≥1 RLU is considered as positive result whereas positive values for IgG antibody assays were serum values ≥ 4.0 RLU which is directly proportional to 1:80 or 1:160 is considered for convalescent plasma therapy.

RESULT

A total of 400 units of convalescent plasma were requested within the study period. Most transfusion recipients were male (321, 80.25%) of whom 125 (31.25%) were in the 51-60 age group. Approximately 1% of the transfusion recipients were under the age of 20 while 4.5% were at least 81-90 years (Table 1). The most common blood group type of the recipients was B Positive (163, 40.75%) while the least was AB Negative (00, 0%) (Table 2)

According to table No 1 in the age group distribution between 18-20 years total of 4 recipients were there, out of which only 4 males and no females. Between 21-30 years, 7 recipients were there in which 6 males and 1 female. Between 31-40 years, 15 recipients out of which 12 males and 03 females. Between 41-50 years, 88 recipients were there out of which 74 males and 14 females were there. Between age group 51-60 years, 125 recipients were there out of which 101 males and 24 females. Between age group 61-70 years, 89 recipients were there, out of which 67 males and 22 females were there. Between age group 71-80 years, 54 recipients were there, out of which 48 males and 6 female were there. And between age group 81-90 years, 18 recipients were there, out of which 9 males and 9 female were there. Thus in the age group distribution most of the recipients were male where least number of recipients were below 20 years of age.

According to Table no 2 out of total 400 recipients, 75 was A Positive and 02 A Negative, 163 B Positive, 03 B Negative, 121 O Positive, 03 O Negative, 33 AB Positive and zero AB Negative. So maximum recipient were O Positive and no recipient of AB Negative.

In Table 3 a comparative study of the blood group of the RH Positive recipients in different age and sex was done. In between 18-20 years maximum recipients were B Positive males. In between 21-30 years, the recipients were A Positive male, B Positive male & female and O Positive male. In between 31-40 years, the recipients were A Positive male, B Positive male & female and O Positive male. In between 41-70 years, the recipients were A Positive male & female, B Positive male & female and O Positive male & female, AB Positive male & female with maximum no of B Positive male recipients. In between 71-80 years, the recipients were A Positive male & female, B Positive male & female and O Positive male & female & AB Positive male with maximum no of B Positive male recipients. In between 81-90 years, the recipients were A Positive male & female, B Positive male & female and O Positive male & female and AB Positive male & female recipient present. So among all maximum B Positive male recipient and minimum AB Positive female recipient were there.

According to the table No 4 a comparative study of age, sex and blood group distribution of RH Negative of the recipients was done. In age group of 31-40 years, one B Negative female were there. In age group of 41-50 years, one B Negative male and two O Negative female recipients were there. In 51-60 years, 02 A Negative male and one O Negative male recipients were there recipients and in age group of 61-70 years only one B Negative recipient was there.

Table No: 1 Showing age and sex distribution of the recipients

Age group (years)	Recipients, n (%)	Sex of recipient	
		Male, n (%)	Female, n (%)
18-20	4, 1%	4, 1.25%	0, 0%
21-30	7, 1.75%	6, 1.87%	1, 1.26%
31-40	15, 3.75%	12, 3.74%	3, 3.80%
41-50	88, 22%	74, 23.05%	14, 17.72%
51-60	125, 31.25%	101, 31.46%	24, 30.40%
61-70	89, 22.25%	67, 20.87%	22, 27.85%
71-80	54, 13.5%	48, 14.95%	6, 7.59%
81-90	18, 4.5%	9, 2.80%	9, 11.39%
Total	400	321, 80.25%	79, 19.75%

Table No: 2 Showing blood group distribution of the recipients

ABO/Rh Blood Group	Recipients, no. (%)
A +ve	75, 18.75%
A -ve	02, 0.5%
B +ve	163, 40.75%
B -ve	03, 0.75%
O +ve	121, 30.25%
O -ve	03, 0.75%
AB +ve	33, 8.25%
AB -ve	00, 0%
Total	400

Table No: 3 Showing age, sex and blood group distribution of RH Positive recipients

AGE	A POSITIVE		B POSITIVE		O POSITIVE		AB POSITIVE		TOTAL		
	M	F	M	F	M	F	M	F	M	F	TOTAL
18-20	0	0	4	0	0	0	0	0	4	0	4
21-30	2	0	2	1	2	0	0	0	6	1	7
31-40	3	0	5	2	4	0	0	0	12	2	14
41-50	13	2	26	5	27	5	7	0	73	12	85
51-60	14	7	42	9	32	6	10	2	98	24	122
61-70	15	3	30	10	16	9	5	0	66	22	88
71-80	10	2	20	2	11	2	7	0	48	6	54
81-90	2	2	1	4	5	2	1	1	9	9	18
TOTAL	59	16	130	33	97	24	30	3			392

Table No: 4 Showing age, sex and blood group distribution of RH Negative recipients

AGE	A NEGATIVE		B NEGATIVE		O NEGATIVE		AB NEGATIVE		TOTAL		
	M	F	M	F	M	F	M	F	M	F	TOTAL
31-40				01					00	01	01
41-50			01			02			01	02	03
51-60	02				01				03	00	03
61-70			01						01	00	01
Total											08

DISCUSSION:

Studies reported from above observations is that the majority of the transfusion recipients were above the age of 50 years. The study recorded greater number of male transfusion recipients and also provide information on the pattern of convalescent plasma utilization and demographic characteristics of plasma transfusion recipients in the Department of blood bank, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand.

CONCLUSION:

This study recorded greater number of male recipients receiving convalescent plasma transfusion for conditions which ranges from moderate to severe acute respiratory failure. The blood recipients were mostly of old patients above 50 years of age.

REFERENCES

1. Guan WJ, Liang WH, Zhao Y, et al. Comorbidity and its impact on 1590 patients with Covid-19 in China: a nationwide analysis. Eur Respir J. 2020;55:2000547. https://doi.org/10.1183/ 13993003.00547-2020.
2. Barlow A, Landolf KM, Barlow B, Yeung SYA, Heavner JJ, Claassen CW, et al. Review of Emerging Pharmacotherapy for the Treatment of Coronavirus Disease 2019. Pharmacotherapy 2020;40(5):416–37. https://doi.org/10.1002/phar.2398.

3. US Food and Drug Administration. Investigational COVID-19 convalescent plasma: emergency INDs. 2020 (accessed 2020 March 30; guidance updated 2020 May 1), https://www.fda.gov/vaccines-blood-biologics/investigational-new-drug-ind-ordevice-exemption-ide-process-cber/investigational-covid-19-convalescent-plasmaemergency-inds.
4. Zhou B, Zhong N, Guan Y. Treatment with convalescent plasma for influenza A (H5N1) infection. N Engl J Med 2007;357(14):1450–1. https://doi.org/10.1056/NEJMc070359.
5. Hung IF, To KK, Lee CK, Lee KL, Chan K, Yan WW, et al. Convalescent plasma treatment reduced mortality in patients with severe pandemic influenza A (H1N1) 2009 virus infection. Clin Infect Dis 2011;52(4):447–56. https://doi.org/10.1093/ cid/ciq106.
6. Burnouf T, Radosevich M. Treatment of severe acute respiratory syndrome with convalescent plasma. Hong Kong Med J 2003;9(4):309. ; author reply 10.
7. Cheng Y, Wong R, Soo YO, Wong WS, Lee CK, Ng MH, et al. Use of convalescent plasma therapy in SARS patients in Hong Kong. Eur J Clin Microbiol Infect Dis 2005;24(1):44–6. https://doi.org/10.1007/s10096-004-1271-9.
8. Mair-Jenkins J, Saavedra-Campos M, Baillie JK, Cleary P, Khaw FM, Lim WS, et al. The effectiveness of convalescent plasma and hyperimmune immunoglobulin for the treatment of severe acute respiratory infections of viral etiology: a systematic review and exploratory meta-analysis. J Infect Dis 2015;211(1):80–90. https://doi.org/10.1093/infdis/jiu396.
9. Sun M, Xu Y, He H, Zhang L, Wang X, Qiu Q, et al. Potential effective treatment for COVID-19: systematic review and meta-analysis of the severe infectious disease with convalescent plasma therapy. Int J Infect Dis 2020. https://doi.org/10.1016/j.ijid.2020.06.107 (cited 2020 July 30). Epub 2020 July4.
10. Li L, Tong X, Chen H, He R, Lv Q, Yang R, et al. Characteristics and serological patterns of COVID-19 convalescent plasma donors: optimal donors and timing of donation. Transfusion 2020;(July (6)). 10.1111/trf.15918. doi: 10.1111/trf.15918. Epub ahead of print. (cited 2020 July 30).
11. Long QX, Tang XJ, Shi QL, et al. Clinical and immunological assessment of asymptomatic SARS-CoV-2 infections. Nat Med 2020;26(August (8)):1200–4. https://doi.org/10.1038/s41591-020-0965-6. Epub 2020 Jun 18.
12. Shen C, Wang Z, Zhao F, et al. Treatment of 5 critically ill patients with COVID-19 with convalescent plasma [published online ahead of print, 2020 Mar 27] JAMA 2020;323(16):1582–9. https://doi.org/10.1001/jama.2020.4783.
13. US Food and Drug Administration. Investigational COVID-19 convalescent plasma: emergency INDs. 2020 (accessed 2020 March 30; guidance updated 2020 May 1), https://www.fda.gov/vaccines-blood-biologics/investigational-new-drug-ind-ordevice-exemption-ide-process-cber/investigational-covid-19-convalescent-plasmaemergency-inds.