A Short Study on Relationship between 'ABO' Blood Groups and Coronavirus Disease 2019

Dr. Pradip Kuma R Das, Dr. Eshita Das, Miss Chandrima Bhattacharyya & Miss Mekhola Sen

ABSTRACT

A Short study based on 204 patients with RT-PCR and Rapid Antigen Test proven SARS-CoV2 infection occurred in an urban municipality areas of total population more than 2 lakhs from March 2020 to August 2021, finding the relationship of covid -19 positive patients and their blood groups to search the link between susceptibility, severity and mortality with the blood groups. Current clinical observation suggest that gender and age of the patients are important risk factors in the susceptibility of Covid-19 infection. It is evident from the study that among the 'ABO' Blood group system, B positive groups are more affected and AB positive groups are less affected but the severity or complications leading to death is evident among more in Blood Group 'A' Positive and less in O positive cases. Among the negative groups. It has been shown that very less incidence is noted in O negative group. Why the negative groups are least affected, it is not clear to the researchers but it can be studied in details in near future.

Keywords: covid-19, coronavirus, ABO blood group system, susceptibility, severity.

Classification: NLM Code: WC506

Language: English

LJP Copyright ID: 392841

Great Britain Journals Press

London Journal of Medical & Health Research

Volume 24 | Issue 8 | Compilation 1.0

A Short Study on Relationship between 'ABO' Blood Groups and Coronavirus Disease 2019

Dr. Pradip Kuma R Das[α], Dr. Eshita Das[σ], Miss Chandrima Bhattacharyya[ρ] & Miss Mekhola Sen[Ꞷ]

ABSTRACT

A Short study based on 204 patients with RT-PCR and Rapid Antigen Test proven SARS-CoV2 infection occurred in an urban municipality areas of total population more than 2 lakhs from March 2020 to August 2021, finding the relationship of covid -19 positive patients and their blood groups to search the link between susceptibility, severity and mortality with the blood groups. Current clinical observation suggest that gender and age of the patients are important risk factors in the susceptibility of Covid-19 infection. It is evident from the study that among the 'ABO' Blood group system, B positive groups are more affected and AB positive groups are less affected but the severity or complications leading to death is evident among more in Blood Group 'A' Positive and less in O positive cases. Among the negative groups. It has been shown that very less incidence is noted in O negative group. Why the negative groups are least affected, it is not clear to the researchers but it can be studied in details in near future.

Keywords: covid-19, coronavirus, ABO blood group system, susceptibility, severity.

Author α: Mbbs, Dtm & H, Ph.D.
σ: Dr. Eshita Das, M. D, (Pediatrics).
ρ: M.SC, (Physiology).
Ꞷ: M.SC (Food & Nutrition).

I. INTRODUCTION

An outbreak of Severe Acute Respiratory Distress Syndrome diseases due to Novel Corona virus was reported on December 8, 2019 from the city of Wuhan, Hubei Province, China with a population of 11 million by the presentation of total 41 cases of pneumonia. Initially it was named as coronavirus 2019, the virus was later designated as Corona Virus Disease 2019 (COVID-19) by World Health Organization. Within a very short spell the epidemic spreads to different areas of China and later to 216 countries throughout the world as off now affecting more than thirty-two cores and death occurred more than two cores.

The patients appeared with varying clinical manifestations mainly fever with dry cough, sore throat, respiratory distress, weakness, giddiness and loss of smell in nose and loss of taste sensation, loose motions, red eyes and skin rashes. A study based on 250 patients with RT-PCR and Rapid Antigen Test proven SARS-CoV2 infection occurred in an urban municipality areas of total population more than 2 lakhs from March 2020 to August 2021, the clinical manifestations were Fever (100%), Cough (82.5%), weakness 77.5%), loss of sensation of taste in their tongue and loss of smell in their nose(35%) Body ache (35%), Throat pain and irritation (27.5 %), breathlessness (27.5%), Chest pain (20%), Dizziness and Giddiness (15%), loss of appetite (12.5%), Joint pains (7.5%), Loose motion, vomiting with pain abdomen (12.5%), red eyes (5%), allergic Skin rashes (2.5). A study of CT scan thorax reveals the most important radiological features as done by HRCT Thorax in the Covid-19 infected patients. Only 5 patients (2%) showed normal radiological pictures. But 245 patients (98%) showed various types of radiological features ranging from increased Bronco-vascular prominence (7.5%), Minimal Subsegmental Atelectasis (12.5%), Multifocal areas of Ground glass opacities (40%), Atypical Pneumonia 22.5%), Bilateral Pneumonia (7.5%), Pleural Effusion (5%) which indicate the suspicion of Covid-19 infections. The SARS Cov2 epidemic

has been announced as Public Health Emergency of International concern (PHEIC) by the World Health Organization on 30.01.2020 due to prolonged disease transmission and human-to-human transmission has been reported to different countries like Italy, Germany, Spain, America, Japan, Australia, India and others. People coming from abroad are forced to remain in quarantine period of 14 days for preventing the spread of transmission of entry of virus into the developing countries like India which is also a thick population density country, may have not their health infrastructure so developed to cope up with this divesting infection, is facing such type of global concern.

II. REVIEW OF LITERATURE

According to Chen N et al. SARS COV-2 reveals with respiratory distress symptom at its previous stage at local seafood market at Wuhan, China. Females were less susceptible than male for the reason of having female X chromosome and sex hormone that build innate and adaptive immunity. [1]

Cheng Y et al. states that, among 45 participant staffs 35 were affected by SARS-CoV and show the symptoms. Among them 'O' Blood group are found less that Non 'O' Blood group are found with SARS-CoV affected.[2]

According to Po XU et al. by examining with immunohematology analyzer among 3694 Han people who are disease free individual distribution od ABO blood group is found as O> A>B>AB, i.e., distribution of B blood group is found more that AB blood group. [3]

American College of Emergency Physicians (ACEP) says that, Covid-19 assessment tools like D-Dimer, CT- scan od chest, ferritin level, CRP (C-Reactive Protein) can clearly investigate Covid-19 circumstances within patients and can create positive disease management.[4]

III. METHODOLOGY

Clinical diagnosis of Covid-19 infected patients confirmed by RTPCR testing, other blood examination, D-Dimer test, St X-ray, HRCT Thorax etc. and local control population study.

Table 1: Survey of Covid-19 Positive Patients in Relation to Blood Groups

S L. No	Blood Group	Male	Female	Total No. of PTS
1	A POSITIVE	14	19	33
2	A NEGATIVE	0	0	0
3	B POSITIVE	40	42	82
4	B NEGATIVE	01	0	01
5	AB POSITIVE	12	15	27
6	AB NEGATIVE	0	01	01
7	O POSITIVE	35	23	58
8	O NEGATIVE	01	01	02
9	TOTAL	103	101	204

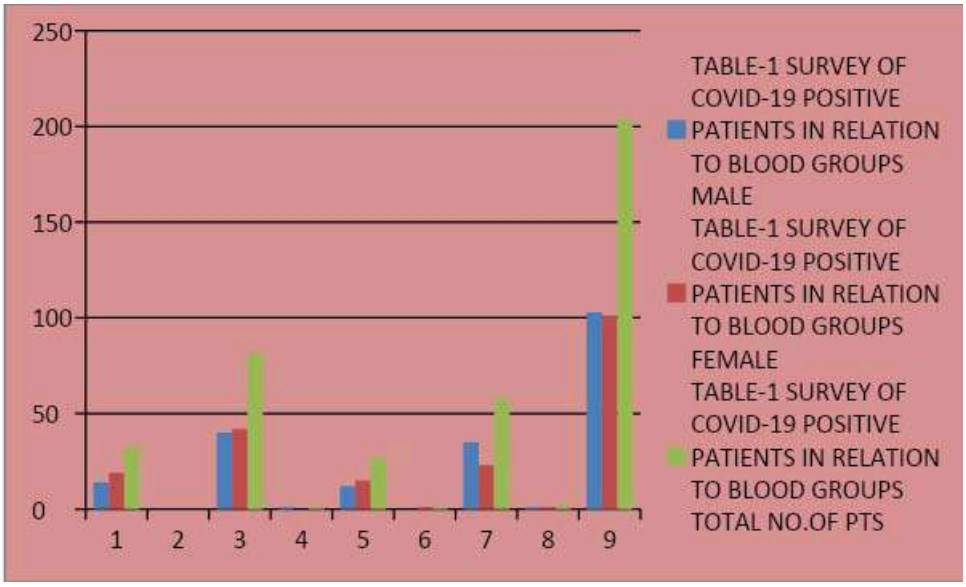

Chart-I

Table-1 & Chart-I shows that out of 204 numbers of positive Covid-19 patients examined so far it is evident that 33 patients (14-male,19-female) having A+ Blood Group, 82 Patients (40-male, 42-female) have B+ Blood Group, 27 (12 male,15 female) possess AB+ Blood Group, 58 (35 male, 23 female) possess O+ Blood group and 1male B-, 1 female AB- and 1 male with 1 female O- blood group.

Table 2: Age & Sexwise Blood Grouping

Blood Group	Agewise (Male)				Agewise (Female)				Total
	20-30 yrs	31-40 yrs	41 -50 yrs	51 yrs Above	20-30 Yrs	31-40 yrs	41 -50 yrs	51 yrs Above	204
A+	01	02	04	07	04	02	06	07	33
A-	0	0	0	0	0	0	0	0	0
B+	13	07	04	16	12	07	09	14	82
B-	0	0	0	01	0	0	0	0	01
AB+	04	02	01	05	06	01	03	05	27
AB-	0	0	0	0	0	01	0	0	01
O+	06	10	11	08	07	04	08	04	58
O-	0	01	0	0	0	0	0	01	02

Table-2 shows the age and sex-wise relationship of ABO Blood Group system with the covid-19 infected patients. It is evident from the Table that highest number of male patients belonging B+ group (40) and female patients belonging to B+ group (42) are characteristically divided into the age groups between 20-30 years (13) in male patients and in the same age group (14) in female patients, whereas in the age group between 5i years and above the number goes to 16 in males and 14 in females. In case of O+ group the figure is different in the age groups. In that case the age group between 31-40 yrs (10) and 41 -50 yrs (11) in male patients and in female patients the figure is 4 & 8 respectively. Different picture is also noted in male and female patients possessing A + group in their variant age groups.

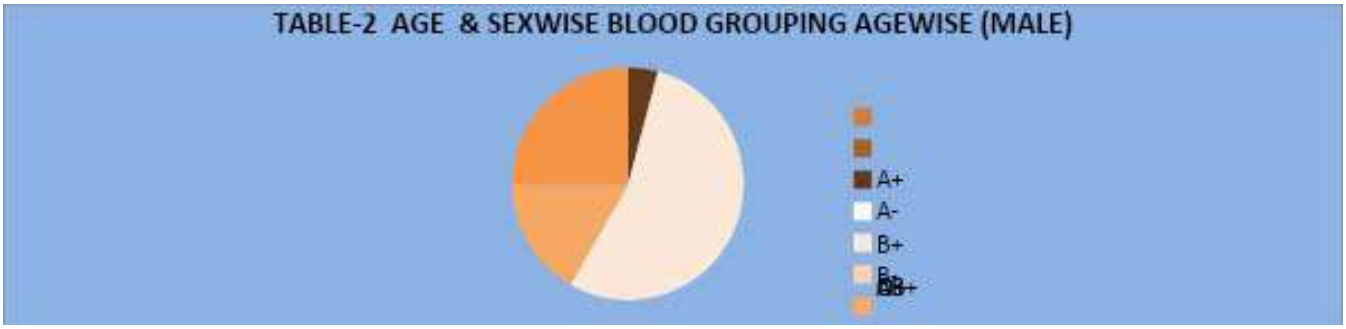

Chart-2

Table-2 & Chart-2 shows age-wise and sex-wise reflection of covid-19 positive patients.

Having different Blood groups but B positives are more affected than other groups.

Table-I: Sex Wise Categorization of Covid-19 Infected Patients

Male	Female
103	101

Table –I shows out of total patients diagnosed as COVID-19 under study it is evident that 103 patients (50.49%) are male and 101 patients (49.50%) are female.

Table-II: Age Wise Categorization of Covid-19 Infected Patients

20-30 Yrs (Male)	31-40 Yrs (Male)	41- 50 Yrs (Male)	51 Yrs and Above (Male)	Total (Male)
24	22	20	37	103
20-30yrs (Female)	31-40yrs (Female)	41-50 Yrs (Female)	51 Yrs & Above (Female)	Total (Female)
29	15	26	31	101

Table-II reveals that the patients under study are categorized as per their ages into three groups. Among them 53 patients (24 male & 29 female) belong to the age group between 20-30 years, 37 patients (22 male and 15 female) belong to 31 to 40 years, 46 patients (20 male & 26 female) belong to the age group of 41 to 50 yrs and 68 patients (37 male and 31 female) fall into the group of 51 yrs and above. From the Table-II, it has been shown that in the younger age group (20 to 30 Years) the affection is 25.98%, next to the age group (31-40) is 18.13%, in the age group between 41 to 50 years the percentage of affection is 22.5, whereas in the older age group (51 years and above) the affection is 33.33%. In our country the older age group is affected (33.33%) in compare to the western countries where the affection is more than 72% above the age group of 60 years. As age advances, immunity power of our body diminishes as well as co-morbidities increases. For that reason, their mortality rate increases (3%) in compare to our country where mortality rate is 1.8 %, although infectivity rate is high in our country.

Table-III: Presentation of Symptoms

Fever	Weak ness	Body ache	Joint Pain	Throat Pain	Cough Dry or product ive	Breath lessness	Loss of Taste sensation And loss of smell	Chest Pain	Tingling or Numbness	Giddiness or Dizziness	Loss of App etite	Nasal al stuf finess
204	155	70	15	55	165	55	43	40	5	30	25	10

Younger patients presented with loss of smell and taste sensation but aged patients came with breathlessness.

Table –III shows the various presentation of symptoms came to the doctors' chamber. In our study, it is noted that out of infected with Covid-19 204 patients, 100 per cent presented with fever of short or long duration, then presented with marked weakness (155) by 75.98 % along with dry cough or productive cough (165) by 80.89%. Most interesting finding is that younger patients (43) presented with loss of sensation of taste in their tongue and loss of smell in their nose by 21 per cent. Moreover, Body ache (70) by 34.31%, Throat pain and irritation in the throat during deglutition (55) by 26.96 %, breathlessness (55) mostly by the aged patients by 26.9%, Chest pain (40) by 19.6%, Dizziness and Giddiness (30) by 14.7%, loss of appetite (25) by 12.25%, Joint pains (15) by 7.35%. Astonishingly 10 (4.90%) presented with nasal stuffiness and five cases (2.45%) presented with allergic skin rashes in the abdomen, hands and legs without taking any drugs previously, excluding any drug rash and she had no food allergy recorded from her personal history.

Table-IV: Oropharyngeal and Nasopharyngeal Swab Testing Procedure

Rt Pcr Test	Rapid Antigen Test
194	10

Table-IV reveals that most of the testing procedures were done in Serampore Walsh Hospital from where Oropharyngeal and nasopharyngeal swabs were taken as per Standard Protocol and sent to NICED center, Kolkata for RT-PCR testing. out of 204 patients studied, 194 patients (95.09%) were tested RT-PCR and 10 patients (4.90%) were tested Rapid Antigenic mode as day goes number of infections increases to cope up with that situation Rapid Test were performed.

Table V: Abnormal Biochemical Testing of PTS

Liver Function Testing		D-Dimer Testing		C-Reactive Protein Testing	
Normal Finding in PTS	Abnormal Finding in PTS (Sgpt & Sgot U/Llevel)	Normal Finding in PTS	Abnormal Finding in PTS (Above 500 Ng/Ml)	Normal Finding in PTS	Abnormal Finding in PTS (More Than 6 Ng/Ml)
35	05	36	04	30	10

Table V shows that apart from Covid-19 testing other tests like Liver Function Tests- SGOT, SGPT, D-DIMER, C-Reactive Proteins were done to correlate any other organ affection by Covid-19

It has been shown that out of 40 patients, 35 patients (87/5%), showed no abnormal liver function but 5 Patients (12.5%) revealed abnormal liver function as evidenced by raised SGPT & SGOT levels.

Similarly, by estimating D-Dimer level it has been found that 4 (10%) patients showed raised D-Dimer level and 10 Patients (25%) revealed raised level of C-Reactive Proteins which indicates that Covid-19 infections in some cases can rise to Cytokine storms.

Table VI: Hematological Testing

Hemoglobin In Gm/Dl			Leucocyte Count Per Cubic Millilitre		
Below 10 Gm%	10+ To 12 Gm%	12+ To 14 Gm%	Below 4000	4000+ To6000	6000+ To 9000
25	125	54	16	136	52

Table-VI reveals that the all-infected patients under study have low level of hemoglobin. Out of them 25 patients (12.25%) have hemoglobin below 10 gm%, 125 Patients (61.27%) possess hemoglobin 10 to 12 gm % and 54 patients (26.47%) showed their hemoglobin range between 12 to 14 gm%. 16 patients (7.84%) showed leukopenia (leucocyte count below 4000) but the other patients showed leucocyte count within normal range. (4,000 to 9000).

Normal Picture	Increased Bronco Vascular Prominence	Minimal Subsegmental Atelectasis	Multifocal Areas of Ground Glass Opacities	Atypical Viral Pneumonia	Bilateral Pneumonia	Pleural Effusion
10	15	25	80	40	10	05

Table-VII reveals the most important radiological features as done by HRCT Thorax in the Covid-19 infected patients. Only 2 patients (5%) showed normal radiological pictures. But 38 patients (95%) showed various types of radiological features ranging from increased Bronco-vascular prominence (7.5%), Minimal Subsegmental Atelectasis (12.5%), Multifocal areas of Ground glass opacities (40%), Atypical Pneumonia 22.5%), Bilateral Pneumonia (7.5%), Pleural Effusion (5%) which indicate the suspicion of Covid-19 infections. In our study it has been found that 15 patients (37.5%) showed Atypical Pneumonia, Bilateral Pneumonia and Pleural Effusion which needs to be treated urgently otherwise patient can go to life saving measures. But in our study, 16 patients (40%) revealed the radiological features of Multifocal areas of Ground Glass opacities which also gave us a clue for suspicion of Covid-19 infections particularly in the background of Pandemic infection.

IV. RESULTS

Table –I shows out of total patients diagnosed as COVID-19 under study it is evident that 22 patients are male and 18 patients are female. Table-II reveals that the patients under study are categorized as per their ages into three groups. Among them 14 patients belong to the age group between 20-40 years, 15 patients belong to 41 to 60 years and 9 patients fall into the group of 61 to 80 years and only 2 patients belong to 81 to 100 years. From the Table-II, it has been shown that in the younger age group (20 to 40 Years) the affection is 35%, next to the age group (41-60) is 37.5%, whereas in the older age group (above 60) the affection is 27.5%. In our country the younger group is affected more (72.5%) in compare to the western countries where the affection is more than 72% above the age group of 60 years. As age advances, immunity power of our body diminishes as well as co-morbidities increases. For that reason, their mortality rate increases

(3%) in compare to our country where mortality rate is 1.8 %, although infectivity rate is high in our country. In our study it is noted that the lowest age of infectivity to Covid-19 is 23 years and highest age is 92 years old, both of them are quite well after treatment. Table –III shows the various presentation of symptoms came to the doctors' chamber. In our study, it is revealed that out of infected with Covid-19, 250 patients (100 %) presented with fever of short or long duration, then presented with marked weakness by 19 (77.6 %) along with dry cough or productive cough by33 (82.5%). Most interesting finding is that younger patients by number 14 (35%) presented with loss of sensation of taste in their tongue and loss of smell in their nose. Moreover 14 patients (35%) are presented by body ache, Throat pain and irritation in the throat during deglutition is manifested by 11 (27.5 %) patients, only breathlessness mostly by the 11 (27.5%) aged patients, Chest pain by 8 patients (20%), Dizziness and Giddiness by 6 patients (15%), loss of appetite by 5 patients (12.5%), Joint pains (03) by 7.5%. Astonishingly only 2 (5%) presented with nasal stuffiness and only one case presented with allergic skin rashes in the abdomen, hands and legs without taking any previously, excluding any drug rash and she had no food allergy recorded from her personal history. Table-IV reveals that most of the testing procedures were done in Serampore Walsh Hospital from where Oropharyngeal and nasopharyngeal swabs were taken as per Standard Protocol and sent to NICED center, Kolkata for RT-PCR testing. out of 40 patients studied, 32 patients (80%) were tested RT-PCR and 8 patients (20%) were tested Rapid Antigenic mode as day goes number of infections increases to cope up with that situation Rapid Test were performed. Table V shows that apart from Covid-19 testing other tests like Liver Function Tests- SGOT, SGPT, D-DIMER, C-Reactive Proteins were done to correlate any other organ affection by Covid-19 It has been shown that out of 40 patients, 35 patients (87/5%), showed no abnormal liver function but 5 Patients (12.5%) revealed abnormal liver function as evidenced by raised SGPT & SGOT levels. Similarly, by estimating D-Dimer level it has been found that 4 (10%) patients showed raised D-Dimer level and 10 Patients (25%) revealed raised level of C-Reactive Proteins which indicates that Covid-19 infections in some cases can rise to Cytokinetic storms. Table-VI reveals that the all-infected patients under study have low level of hemoglobin. Out of them 5 patients (12.5%) have hemoglobin below 10 gm%, 25 Patients (62.5%) possess hemoglobin 10 to 12 gm % and 10 patients (25%) showed their hemoglobin range between 12 to 14 gm%. Only 3 patients (7.5%) showed leukopenia (leucocyte count below 4000) but the other patients showed leucocyte count within normal range. (4,000 to 9000). Table VII reveals the most important radiological features as done by HRCT Thorax in the Covid-19 infected patients. Only 2 patients (5%) showed normal radiological pictures. But 38 patients (95%) showed various types of radiological features ranging from increased Bronco-vascular prominence (7.5%), Minimal Subsegmental Atelectasis (12.5%), Multifocal areas of Ground glass opacities (40%), Atypical Pneumonia 22.5%), Bilateral Pneumonia (7.5%), Pleural Effusion (5%) which indicate the suspicion of Covid-19 infections. In our study it has been found that 15 patients (37.5%) showed Atypical Pneumonia, Bilateral Pneumonia and Pleural Effusion which needs to be treated urgently otherwise patient can go to life saving measures. But in our study, 16 patients (40%) revealed the radiological features of Multifocal areas of Ground Glass opacities which also gave us a clue for suspicion of Covid-19 infections particularly in the background of Pandemic infections.

Objectives:

To find out the relationship of ABO blood groups and Covid-19 infected patients.

V. DISCUSSIONS

It is revealed that out of 204 number of positive Covid-19 patients (Table-1) examined so far it is evident that 33 patients (14-male,19-female) having A+ Blood Group, 82 Patients (40-male, 42-female) have B+ Blood Group, 27 (12 male,15 female) possess AB+ Blood Group, 58 (35 male, 23 female) possess O+ Blood group and 1 male B-, 1 female AB- and 1 male with 1 female O- blood group. Table-2 shows the age and sex-wise

relationship of ABO Blood Group system with the covid-19 infected patients. It is evident from the Table that highest number of male patients belonging B+ group (40) and female patients belonging to B+ group (42) are characteristically divided into the age groups between 20-30 years (13) in male patients and in the same age group (14) in female patients, whereas in the age group between 5i years and above the number goes to 16 in males and 14 in females. In case of O+ group the figure is different in the age groups. In that case the age group between 31-40 yrs (10) and 41 -50 yrs (11) in male patients and in female patients the figure is 4 & 8 respectively. Different picture is also noted in male and female patients possessing A + group in their variant age groups.

VI. CONCLUSION

Very younger and older patients are very much susceptibility to Covid-19 so far. Susceptibility of Covid-19 infection has got certain relationship with the ABO Blood Group system. Here we have tried to find the link between them in our clinical and laboratory research works. It has been shown that O+ Blood group patients are less affected that other groups and B+ groups are more affected and severity of infections goes to A+ groups.

REFERENCES

1. Chen N Zhou M Dong X et al, Epidemiological and clinical characteristics of 99 of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study, Lancet,2020: (Published in Jan 29, https://doi.org/10.1016/SO140-6736 (20)30211-7.
2. Cheng Y, Cheng G et al. ABO Blood Group and susceptibility to severe acute respiratory syndrome, JAMA 2005 March 21: 293 (12); 1450-1.
3. Yu P Xiong Y et al. Distribution of ABO and RhD blood group among Healthy Han population in Wuhan, J Clin Hemato/(China), 2015 (28):837.
4. American College of Emergency Physician (ACEP), (2020): Covid-19 severity classification.