Survey on ABO blood group possible risk of covid-19

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***Abstract*: A dataset in this study gave survey data on covid -19 in various blood types and especially which gender is more susceptible to covid in the people of Maharashtra in response to the current worldwide challenge caused by covid-19. Blood type may play a role in determining disease severity in COVID-19 patients. People of blood type O appear to be protected from severe disease, according to genetic research of COVID-19 patients. Those with blood type A, on the other hand, may develop difficulties as a result of the viral infection.**

This survey includes information from roughly 300 participants and is distributed via a Google form of questionaries. Some of the data was obtained virbally by assessing the covid-19 in all blood groups and genders. According to the findings, type A blood is more susceptible to covid-19 than other blood kinds, and males are the most impacted. We received approximately 300 responses from a wide range of sources. Members of the project team looked over the survey results.

INTRODUCTION

The COVID-19 pandemic's global expansion has had an unintended negative influence on people's lives. Coronavirus illness (severe acute respiratory syndrome) is an communicable diseases disease caused by coronavirus 2. (SARS-CoV-2). In December of this year, the first known case was discovered in Wuhan, China. The disease has since spread around the world, resulting in a pandemic. In a matter of days, this disease grew into a global threat, and the World Health Organization (WHO) declared it a pandemic on March 11, 2020. Since then, the disease has impacted more than 1.5 crore people globally, with 3.04 crore persons in India as of June 29, 2021. The disease's origins have been traced back to bats, albeit the exact point of contact between the two species is unknown. Respiratory droplets and infected surfaces transmit the disease.

Fever, cough, headache, exhaustion, breathing difficulty, and loss of smell and taste are some of the common symptoms of COVID-19. Symptoms can be appear anywhere from one to fourteen days after being exposed to the virus. At least one-third of those who are afflicted do not show any signs or symptoms. The sickness behaviour of patients infected with severe acute respiratory syndrome coronavirus 2 differs significantly.

Both symptomatic and asymptomatic people can spread the virus by respiratory droplets when they come into close contact (within 6 feet). Transmission by aerosols and potentially contact with fomites is also possible, though this is not regarded to be the predominant route. COVID-19-related mortality is very varied and is linked to age, illness severity, and comorbidities. Mortality is estimated to be 0.7 percent to 2% for all patients, 10% for hospitalised patients, 30% to 50% for patients admitted to the intensive care unit, and 37 to 88 % for patients requiring invasive mechanical ventilation or extracorporeal membrane oxygenation (ECMO). We conducted this survey since the Covid-19 now has its Variants, which is a severe problem for the patients. Multiple varieties of SARS-CoV-2 are produced as a result of the virus's continual mutation, although the majority of them share the same basic characteristics. However, because of the virus's continual mutation, new variants with significant differences in the virus's spreading characteristics, fatality rates, and other features may emerge, which will be referred to as new variants below. Throughout the COVID-19 pandemic, SARS-CoV-2 genetic variations have emerged and circulated over the world. Covid-19 variant delta, which was first discovered in India, is quickly becoming the disease's most common form worldwide. The number of COVID-19 cases and deaths in India has increased dramatically, and a SARS-CoV-2 variant, B.1.617, is suspected of being responsible for many of these cases.

Although the pathophysiology of severe COVID-19 and the resulting respiratory failure is unknown, older age and male gender are consistently linked to a higher risk.

Variants of concern

WHO label	Pango lineage	Earliest documented samples
Alpha	B117	United Kingdom Sep 2020
Beta	B1351	South Africa May 2020
Gamma	P1	Brazil Nov 2020
Delta	B16172	India Oct 2020

Figure no 1: covid variants of concern.

The structure of the SARS -CoV- 2 virus Coronaviruses have a diameter of 60 to 140 nanometers and feature large linearly stranded and positive-sense RNA genomes, ranging from 26 to 32 Kb. The envelopes of these spherical or pleomorphic viruses contain a helical nucleocapsid of nucleoproteins(N) that is linked to the RNA genome. A 2 nm trimer of spike glycoprotein (S) is embedded in the envelope, which aids the virus's binding to host cell receptors. Its envelopes also contain integral membrane (M) and envelope (E) proteins. Coronaviruses in the genus Beta-coronavirus have an additional membrane glycoprotein termed hemagglutinin esterase that forms 5–7 nm long spikes on their surface, giving them a crown-like appearance under the electron microscope, thus the name coronavirus. Coronaviruses also cause the common cold, which has just a minimal impact on our respiratory system.

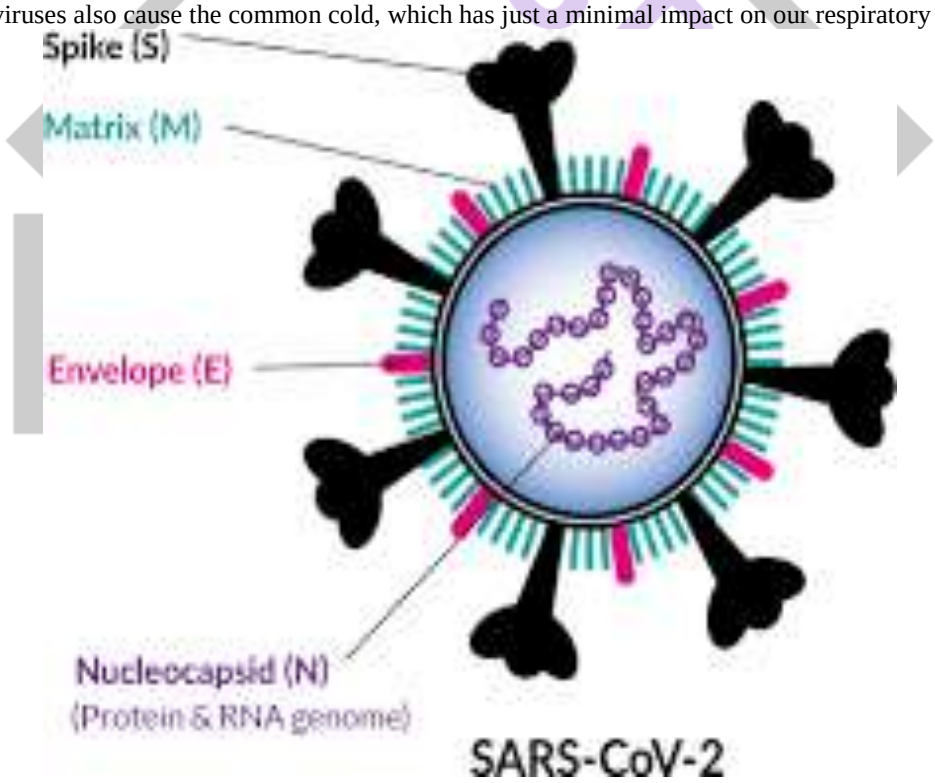


Figure no 2: Corona virus structure.

In COVID-19 patients, blood type may have a role in defining disease severity. As the first human blood group, the ABO blood group system was identified in 1901. Because the ABO blood group system is inherent in people and easily determinable, studies on the relationship between it and numerous diseases have continued since then. Many chronic diseases, such as vascular disease and coronary heart disease, are statistically or physiologically linked to ABO blood groups. Studies of the relationship between blood types and some viral diseases have gotten a lot of interest in recent years. Investigating the involvement of different blood types in viral infection could help determine a person's vulnerability to infection. Previous research has found a link between ABO blood types and infectious disease risk, including SARS-CoV 2, malignant tumours, Helicobacter pylori, Norwalk virus, and hepatitis B virus. The direct link between ABO blood types and SARS-CoV led to the idea that COVID-19 was susceptible in the

same way. Furthermore, those with underlying health issues, such as hypertension, diabetes, obesity, and cardiovascular disease, are more prone to acquire severe COVID-19.

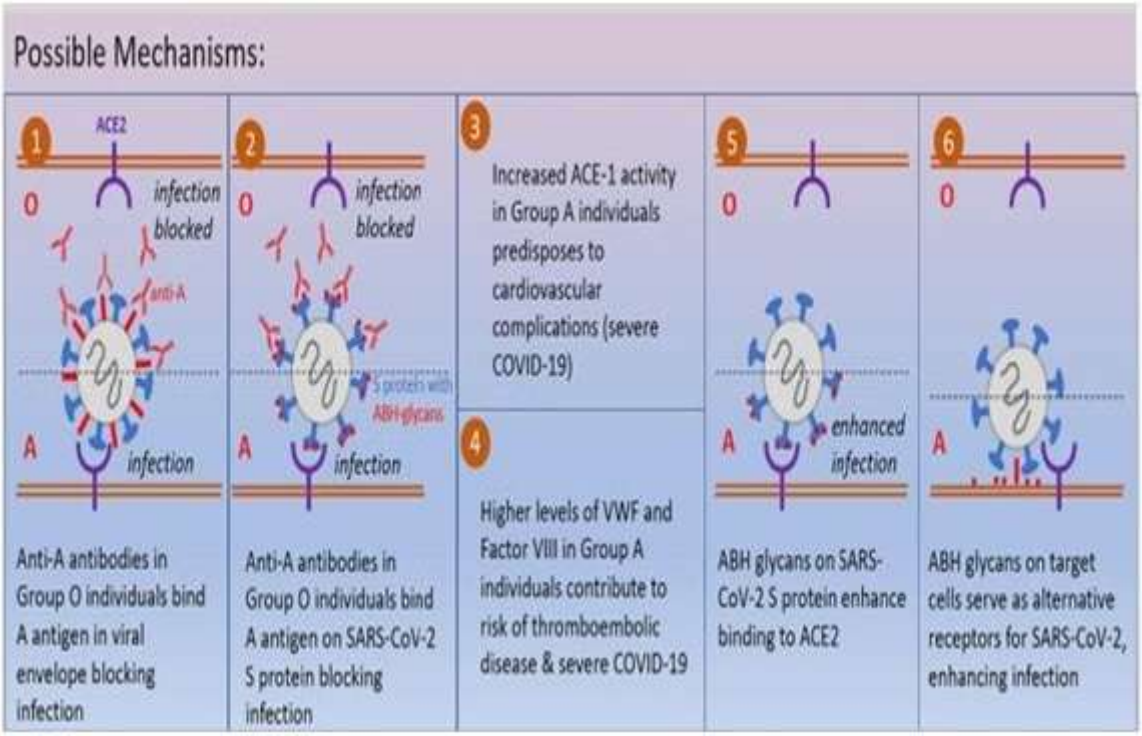


Figure 3: ABO Blood Group and its MOA

The ABO blood group system classifies human blood according to the hereditary features of red blood cells, which are determined by the presence or lack of antigens. A and B, which are carried on the red cell surface. As a result, people can have blood types A, B, O, or AB.

Antibodies against type B red cells are found in the serum (fluid) of blood containing red cells with type A antigen on their surface. When type B blood is injected into people who have type A blood, the antibodies in the recipient's blood kill the red cells in the injected blood. Anti-A antibodies in type B blood will damage type A red cells in the same way. Unless there is incompatibility with another blood group system, type O blood can be injected into people who have type A, B, or O blood. Type AB blood recipients can receive type A, B, or O blood.

Long before birth, ABO antigens are created and remain in the body for the rest of one's life. Children passively obtain ABO antibodies from their mothers before birth, but by three months of age, they are able to produce their own; the impetus for such antibody generation is thought to be contact with ABO-like antigenic compounds in nature. ABO incompatibility occurs in a limited proportion of pregnancies when the antigens of the mother and her foetus are sufficiently different to elicit an immunological reaction. In rare cases, ABO incompatibility can result in hemolytic illness of the newborn, a kind of anaemia in which the maternal immune system destroys the foetus' red blood cells. When a mother is type O and her foetus is either type A or type B, this is the most common scenario.

ABO blood group frequency in the population

Migration and the selective advantage of certain blood groups may be linked to infection exposure, may have led to these variances in ABO blood group frequencies among human cultures (Table 1). Group O, for example, is the most frequent worldwide, followed by A, B, and finally AB. Because it gave a selection advantage against malaria, Group O may have arisen in Africa before early human migration. Individuals in group O, on the other hand, are at a higher risk of having severe cholera, which may explain the lower incidence of group O and higher frequency of group B in Bangladesh's Ganges Delta region.

The ABO blood group distributions among indigenous tribes are extremely diverse. Those in Australia, North and South America, and Asia, for example, nearly entirely lack group B, whereas those in Asia have the greatest rates of group B. Furthermore, group A is essentially non-existent in indigenous populations of South and Central America, but is more common (>30 percent) in Canada, Scandinavia, and Central Europe, possibly due to smallpox's selective pressure. In contrast, present ABO distributions in these same areas show the impact of migration; for example, whereas group A is essentially absent in indigenous groups in Central and South America, its general population frequency is as high as 30%.

		Native population			Current population		
Region		Type A %	Type O %	Type B %	Type A %	Type O %	Type B %
North America	Canada	Up to 40	80–100	0–5	40+	40+	9
	United States	0–15*	80–100	0–5	40+	40+	~10
Central and South America		Absent	90–100	0–5	10–30	50–80	~10
Greenland		Up to 40+					
Australia		Up to 40+†	60–80 (North)	0–5	38	49	~10
Africa		15–20	60–80	10–20	~20–25¥	Up to 60	West > 20
Middle East		15–20	60–80	5–15	~25	>40	>20
Europe	Scandinavia	25–40‡	50–70	0–10	40+	~40	10
	Western Europe	25–30	60–70	5–10	30–40	30–40	~10
	Eastern Europe	25–30	50–60	10–20	30–40	30–40	~10
Russia		15–20	50–60	15–30	~35	~35	~10
Asia	China	20–25	60–70	15–25	~30	~50	~20
	Japan	15–25	50–70	10–15	40	30	20
	Pacific	15–20	60–70	15–25	25–30	>40	~30
India		15–20	56–60	Up to 30	22	29	38

Table 1: Table of Geographic Distributions of ABO for Native and Modern Populations

The first mass vaccination campaign began in early December 2020, and the number of immunisation doses given out is recorded daily here. At least 13 different vaccines (distributed across four platforms) have been given out. In 206 economies, campaigns have already begun. As of April 13, 2021, there are 16 vaccine candidates in Phase III studies, having promising efficacy results from nonhuman primate testing and Phase I and II trials. Currently, the bulk of Phase III vaccines are administered intramuscularly (few are administered using different routes such as skin, e.g., AG0302-COVID19). Intramuscular vaccination stimulates robust IgG responses that protect the lower respiratory tract, but not enough secretory IgA to protect the upper respiratory tract, as in spontaneous infection. These Phase III vaccination candidates were created on a variety of platforms (Table 2). Several of these platforms, such as the mRNA platform [6], have previously produced licenced vaccines, while others, such as the mRNA platform, have not. The primary vaccination platforms that have gone through Phase III studies are listed below.

The UK government, India, Brazil, and the European Union have all given their approval to this vaccination (recent). B Pfizer/mRNA BioNTech's vaccine candidate received full approval in Canada, Bahrain, and Saudi Arabia, and was approved for limited or emergency use in the United States, the United Kingdom, Panama, Ecuador, Chile, Costa Rica, Singapore, Mexico, Kuwait, the United Arab Emirates, and the European Union (recent). c Moderna's mRNA vaccine received FDA EUA and was recently licenced in the United Kingdom. d N/A stands for "not applicable." The FDA recently licenced this vaccination EUA, however it has been put on hold in the United States due to safety concerns. The presence or absence of the antigens A and B, which are carried on the surface of red blood cells, determines the ABO blood group system, which classifies human blood based on the inherited features of red blood cells (erythrocytes).

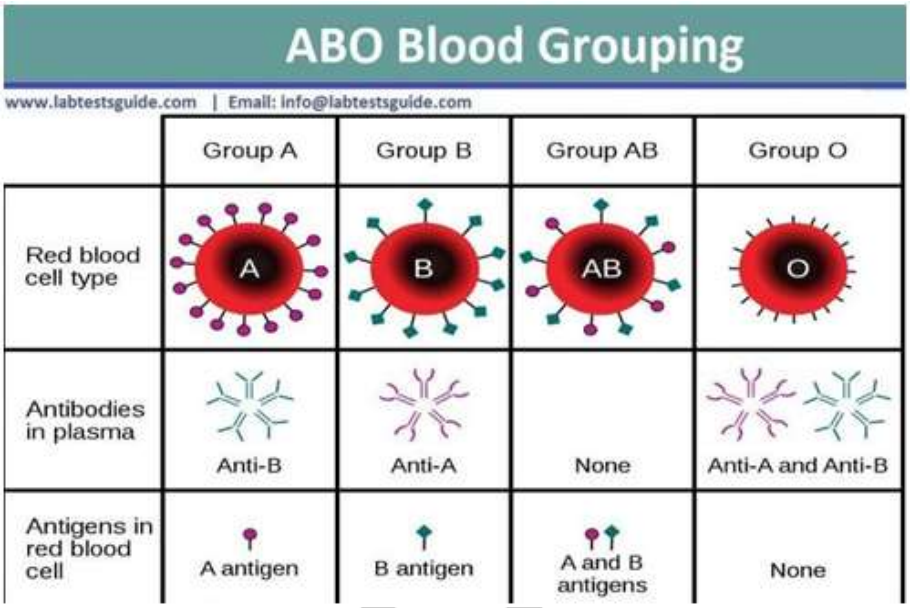


Figure 4 : ABO blood grouping.

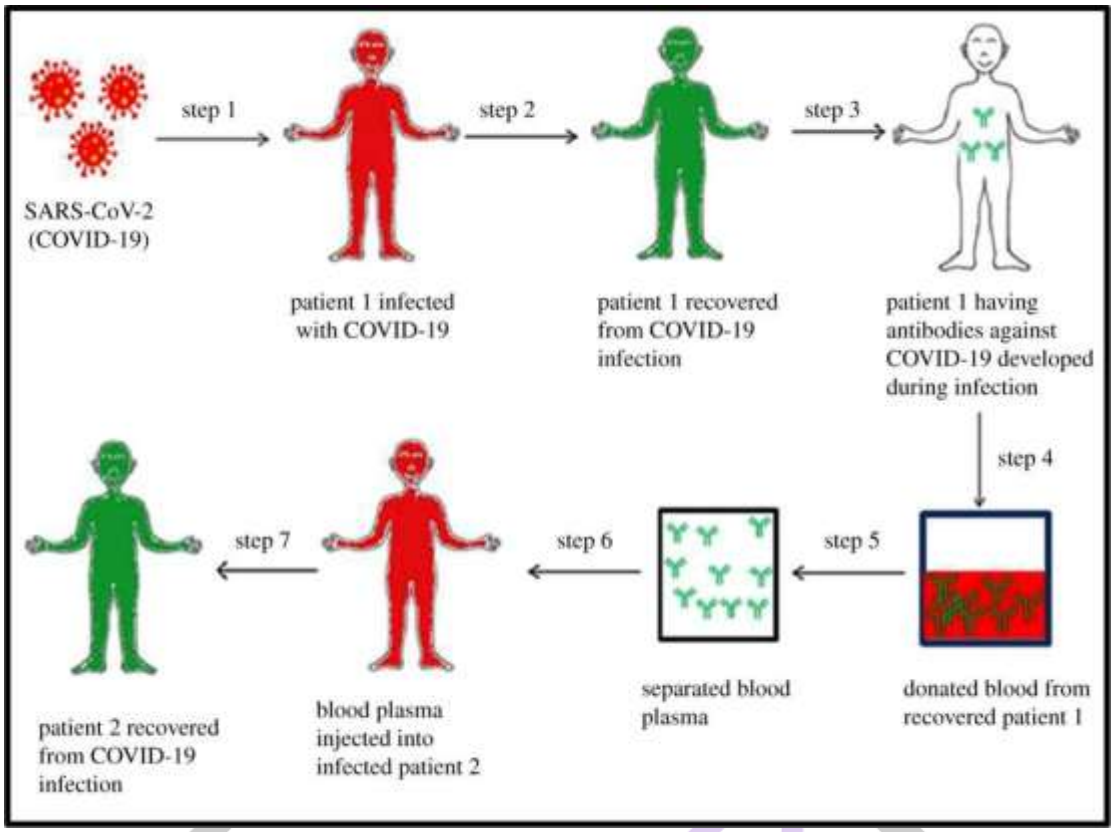
Vaccine/ Commercial Name	Developer	Platform	Seroprevalence of Vector Used	Needs Freezing	Need for Booster	Immunogenicity in Humans	Licensed Vaccines From Platform	Phase III Registration	Emergency Use Authorization (EUA)
Weakened adenovirus (ChAdOx1-S; AZD1222)[a]	University of Oxford/ AstraZeneca	Deficient chimpanzeeadenovirus	Very low	Stable for at least 6 months at 2–8 °C	Yes	High (90%)	No	NCTa04516746	Yes
Inactivated + alum (CoronaVac; formerly PiCoVacc)	Sinovac	Inactivated whole virus	Very low	No, needs refrigeration	Yes	Unknown	Yes	NCT04456595	Yes, in UAE and China
Inactivated SARS-CoV-2	Inactivated Wuhan Institute of Biological Products/ Sinopharm	Inactivated whole virus	Very low	No, needs refrigeration	Yes	Unknown	Yes	ChiCTR-2000034780	Limited use China and UAE
Inactivated (BBIBP-CorV)	Beijing Institute of Biological Products/ Sinopharm	Inactivated whole virus	Very low	No, needs refrigeration	Yes	Very high (86%)	Yes	ChiCTR-2000034780	Limited use in China, approved in UAE and Bahrain
Adenovirus Type 5 Vector (Ad5-nCoV)	CanSino Biological Inc./ Beijing Institute of Biotechnology	Deficient adenovirus-5	High	No, needs refrigeration	Single dose	High	No	NCT04526990NCT04540419	Limited use in China
Bharat Biotech, India(**BBV152**)	Covaxin	Inactivated whole virus	Very low	No, needs refrigeration	Yes	Unknown	Yes	CTRI/2020/11/028976	Yes, in India
Adenovirus-based (Gam-COVID-Vac)	Gamaleya Research InstituteSputnik V	Deficient adenovirus-5	High	No, needs refrigeration	Yes	Very High (91.4%)	No	NCT04530396	Early use in Russia
Ad26.COV2.S [e]	Janssen Pharmaceutical CompaniesAd26. COV2.S	Deficient adenovirus-26	Very Low but high in sub-Saharan African populations	Stable for 2 years at − 20 °C and 3 months at 2–8 °C	No	Unknown	Yes, Ad26 prime MVA boost-based ebolavirusvaccine was licensed in Europe	NCT04505722	Yes
Recombinant glycoprotein nanoparticle (NVX-CoV2373)	Novavax	Recombinant protein	N/A[d]	Stableat 2–8 °C	Yes	High (89.3%)	Yes, such as FluBlok	2020–004123–16	No
3 LNP-mRNAs (BNT162) Comirnaty	BioNTech/ Fosun Pharma/ Pfizer[b]	RNA-based vaccine	N/A	Yes (−70 °C)	Yes	Very high (95%)	No	NCT04537949	Yes
LNP-encapsulated mRNA (mRNA-1273)	Moderna/ NIAID[c]	RNA-based vaccine	N/A	Yes (−20 °C)	Yes	Very high (94.5%)	No	NCT04470427	Yes

Table 2: results of Covid vaccination in clinical studies.

Blood Related Therapy

Because infection with the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is so common, developing a novel ameliorative and curative method as soon as possible is critical. Convalescent plasma (CP) therapy is a sort of adaptive immunity that has been shown to be beneficial in the last two decades in combating a variety of infectious infections. For instance, CP therapy was utilised to treat viral-induced disorders such as the SARS-CoV epidemics. Plasma treatment is depicted in this diagram.

Figure No. 5: Plasma Therapy for COVID 19



When COVID-19-infected people recover, their blood plasma contains antibodies against the SARS-CoV-2 virus that causes COVID-19. Individuals who have been rehabilitated contribute blood, from which plasma with the needed antibodies is collected. Transfusions of this plasma are later given to the affected person(s).

PRECAUTIONS

- Avoid touching your eyes, nose, or mouth
- Limit social assembly or meet and time spent in crowded places
- Avoid direct contact with unwell people
- Touched objects and surfaces should be cleaned and disinfected on a regular basis

People from India should avoid going to places where the virus is prevalent, exercise good cleanliness, and avoid eating food that has not been prepared at home. Wearing a mask, washing hands regularly and avoiding direct contact with infected people are all recommended precautions to take. While India is still dealing with the second wave of Coronavirus, some countries have already won or are on the approach of winning the war against the unique pandemic. Isarel, USA, New Zealand, and Brazil are the countries that have effectively fought the new pandemic and are currently mask-free. In April, Israel became the first country to declare itself COVID-free, removing the requirement for wearing a face mask. Vaccination has been administered to 70% of Israel's population. Since April 24, no new COVID-19 cases have been reported throughout the country, indicating that the illness has been contained as a result of the lockdown measures. COVID-19 cases totaled 8,39,000 in Israel, with 6,392 deaths.

The covid-19 is represented in this survey report in various blood types and genders. We chose this issue since the pandemic has made it critical to determine which blood group or gender is most susceptible to covid-19. We gathered over 300 responses from Maharashtra residents and reviewed them using Google Forms and Virbally. As a health care professional, pharmacy students conducted and collected this data survey. It has anything to do with health sciences. We can all relate to it because it may assist people avoid covid-19 in the future. This evaluation method can be used to investigate the epidemiology of a variety of other diseases in order to prevent and control them.

Figure no 6 : Covid 19 precautions.

OBJECTIVES

- We aimed to compare the blood groups distribution in the infected people by Covid

- To examine the association between the ABO blood group and COVID-19 susceptibility and try to comprehend the relationship between ABO groups and COVID-19 (susceptibility and severity).

PLAN OF WORK

Between June and July, the present study collected data from 300 persons largely from Maharashtra, India. We used Google forms to conduct the survey and also collected information verbally from friends, family, relatives, and others. Gender, blood group, Corona test results, medication use, and so on are all included in the Google form. This will allow us to determine the number of people with various blood kinds who have been affected by Covid.

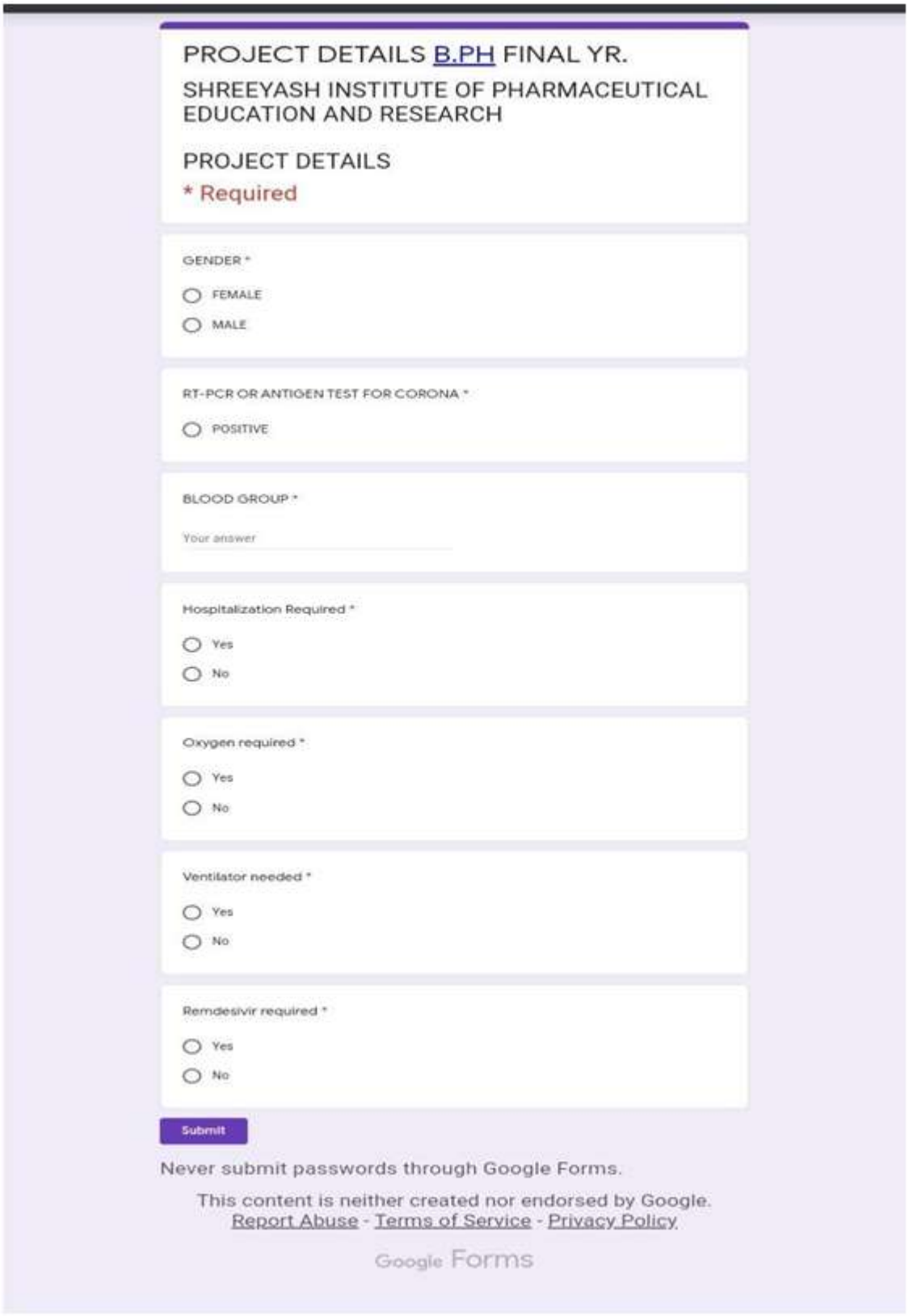


Figure no 7: Google form

RESULTS

There were 300 participants in the study (168 men and 132 women), with 122 having blood type A, 69 having blood group B, 53 having blood group O, and 56 having blood group AB; Table 6 shows the distribution of blood groups in our region. Types A+, A, B+, AB, O+, and O were used to split the study population into ABO blood groups. Blood group A was linked to increased infection susceptibility: group A, which was less common in group O, group B had 53, and group AB had 56. COVID-19 infection was frequent in non-blood group O, with 101, 21, 63, and 56 cases in types A+, A, B+, and AB, respectively, while type O had 53 cases. Almost all of the patients were in hospitals. As a result, whereas the A, B, and AB blood groups were observed more frequently in COVID-19 cases than in healthy blood donors, the O blood group had a lower COVID-19 frequency than healthy blood donors across the board.

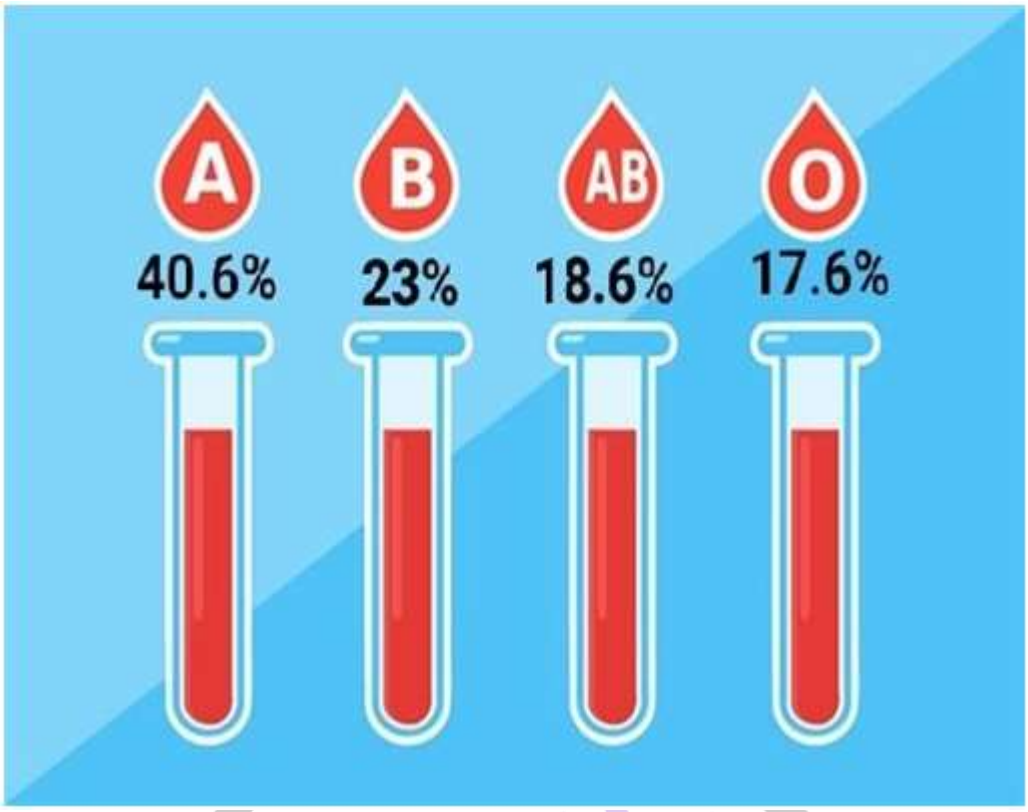


Figure no 8: Covid 19 in severity in blood groups

GENDER	NUMBER OF PATIENTS
MALE	168
FEMALE	132
TOTAL	**300**

Table 5: gender and number of patients

SR. NO.	BLOOD GROUP	NO. OF PATIEN
1	**A+**	**101**
2	**A-**	**21**
3	**B+**	**63**
4	**B-**	**6**
5	**AB+**	**52**
6	**AB-**	**4**
7	**O+**	**41**
8	**O-**	**12**

Table 6: blood group and number of patients

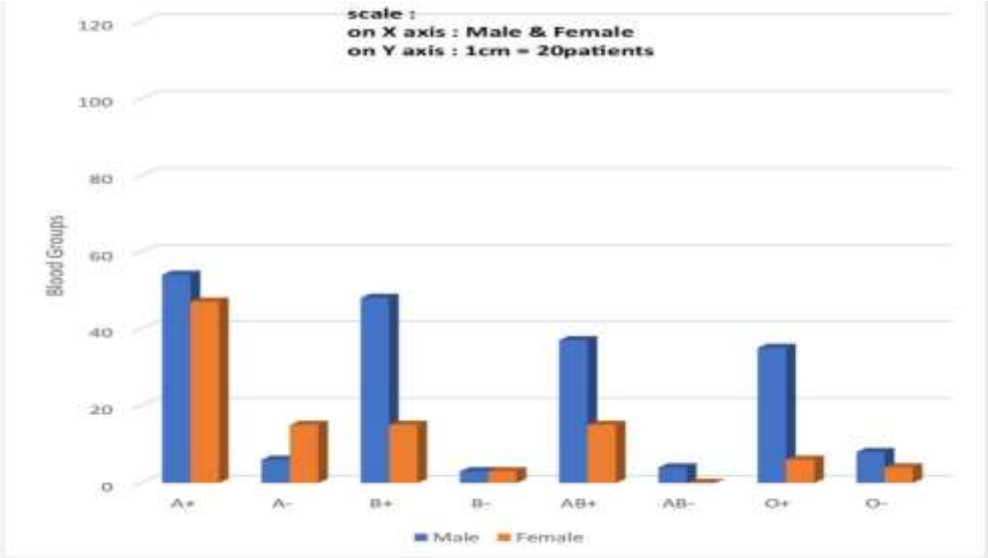


Figure no 9: blood group vs patients

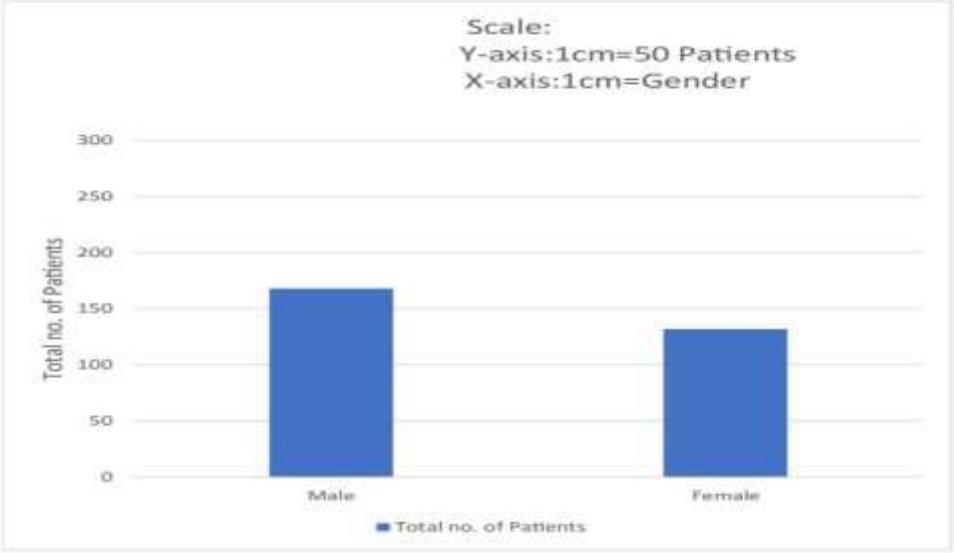


Figure no 10: gender vs number of patients

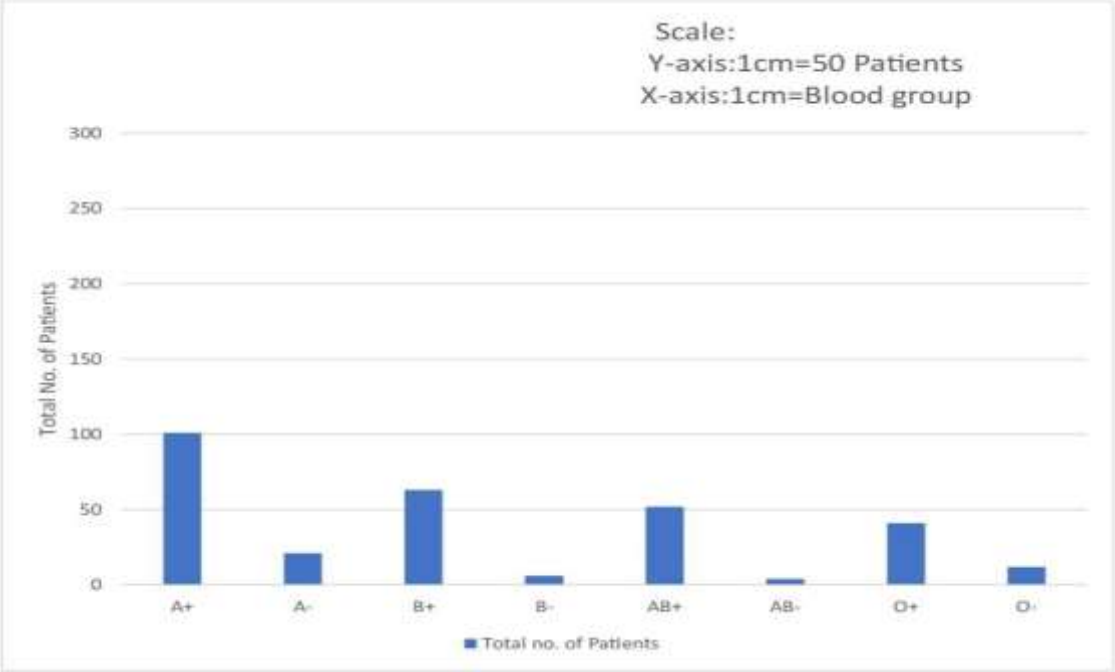


Figure 11: Blood groups vs number of patients

DISCUSSION

In this work, we discovered that ABO blood groups had varying chances of infection with SARS-CoV-2, which resulted in COVID-19. Specifically, blood group A was linked to a higher risk, whereas blood group O was linked to a lower risk, so it is observed that the ABO blood type is a more susceptible for COVID-19. These findings are consistent with prior research that identified comparable risk patterns of ABO blood groups for different coronavirus infections.

Clinical research on the link between SARS-CoV-2 and blood types has also been undertaken. However, given the frequency of blood groups varies throughout populations, more studies will be important for comparing results and determining whether findings differ in other communities.

COVID-19 prevalence was higher in blood types A, B, and AB and lower in blood group O in our study, which looked at the blood group distribution of healthy blood donors in the area. People with blood group O are seen more resistant clinically to infection with SARS-CoV-2 than people with other blood groups, according to previous studies. According to them, one of the reasons why blood type O was detected less frequently in the patient group could be because blood donors were picked especially from people with blood group O. This is a fantastic reinterpretation. Blood type A was more common than blood group O in the blood group distribution of our donors, despite the fact that this was not statistically significant. Nonetheless, blood donors in this location cannot precisely reflect the true blood type. In the blood group population that denotes the entire society, there are both healthy and sick persons. In addition to the greater O blood group, the male gender is more prevalent in the donor population. The distribution of blood types in the region may alter over time as a result of the region's population migration. As a result, blood group distribution should be based on a society-wide screening and kept up to date. Individuals infected with SARS-CoV-2 who are asymptomatic should also be found by screening the entire community. This blood group analysis approach will provide us the most accurate findings. To do this work, you'll need good organisation, a lot of time, a lot of work, and a lot of money. As a result, it is an excellent but challenging manner of functioning.

Anti-A antibodies reduced the invasion of the S protein into tissues during the SARS-CoV-1 epidemic, and the same process is likely to result in less infection in individuals with blood group O during the SARS-CoV-2 pandemic. Despite the presence of anti-A antibodies in blood group B, no studies have indicated that it is less susceptible to SARS-CoV-2. Patients with anti-A antibodies in blood group O have IgG antibodies, whereas patients with anti-A antibodies in blood group B have IgM antibodies.

Anti-A antibody titre has also been underlined in the context of SARS-CoV-1 infection. Individuals with blood group AB who did not have any blood group antibodies, on the other hand, showed no increased sensitivity to COVID-19 infection. In this situation, other mechanisms must be involved in blood group A's increased sensitivity to infection and blood group O's decreased vulnerability to infection. One of these variables could be that people with blood group A are more likely to develop thromboembolic illnesses, resulting in higher disease symptoms. Knowing the blood groups of SARS-CoV-2-infected asymptomatic patients in the population could assist objectively define the link between SARS-CoV-2 and the blood types of infected people. However, there has yet to be a publication of such a study.

A symbiotic link exists between the expansion of the gut microbiota and the expression of blood types. Antibodies against blood type antigens, such as ABO, can be produced by bacteria. Because the gut flora supports them, blood group antibody titres are lower in hyper-hygienic cultures and those who eat a Western diet. This showed that human anti-A antibodies and monoclonal anti-A antibodies can both inhibit SARS-CoV-1; it is important to have a high anti-A antibody titre, but a lesser anti-A antibody titre is ineffective. This research suggests that SARS-CoV-2 infection will spread more quickly in wealthy countries where people eat Western food and live in sanitary conditions.

According to other investigations it is found that people with blood group O are slightly more resistant to clinically overt infection with SARS-CoV-2 than people with other blood groups. This propensity, however, is not well-established enough to warrant specific prophylactic recommendations for non-O people. Of course, contagiousness is determined by more than just blood group. A range of factors, in addition to blood types, determine the contagiousness and severity of SARS-CoV-2 infection. Many of these remain unsolved puzzles. To better understand the link between SARS-CoV-2 infection and blood types, more research is needed. Following a review of covid positive patients' blood groups, we discovered that the majority of persons with the A+ve glood are covid positive, and that people with the A+ve& B+ve glood have the highest likelihood of being covid positive.

As a result, A, B, and AB+ve positive blood people are more likely to become covid positive if they come into touch with a covid positive patient.

CONCLUSION

In conclusion, we found a relationship between COVID-19 susceptibility and the ABO blood group, suggesting that the latter can be used to distinguish the former. SARS-Cov-2 infection and COVID-19 severity are more likely in people with blood type A, while COVID-19 severity is less likely in people with blood group O. This research could have clinical ramifications. Given the current COVID-19 problem.

(1) People with blood group A may require enhanced personal protection to limit the risk of infection;

(2) SARS-CoV-2-infected patients with blood group A may require increased surveillance and monitoring. All intellectual property rights are reserved.

(3) It would be beneficial to establish ABO blood typing as a standard aspect of the management of SARS-CoV-2 and other coronavirus infections in both patients and medical personnel, to help define therapeutic options and estimate risk exposure levels of persons. It should be noted that, due to the above-mentioned imitations, this study should not be used to guide clinical practise at this time. This research paves the way for more research.

(4) COVID-19 was prominent in non-blood group O, as was its frequency, severity, and fatality. COVID-19 was not transmitted to people with blood group O. There was no link found between ABO blood group and the severity or fatality of COVID-19.

(5) The purpose of this study is to help individuals understand the link between ABO blood group and COVID-19 infection, severity, and death. Furthermore, more research and studies are needed to clarify the current conclusion and have a better understanding of COVId 19.

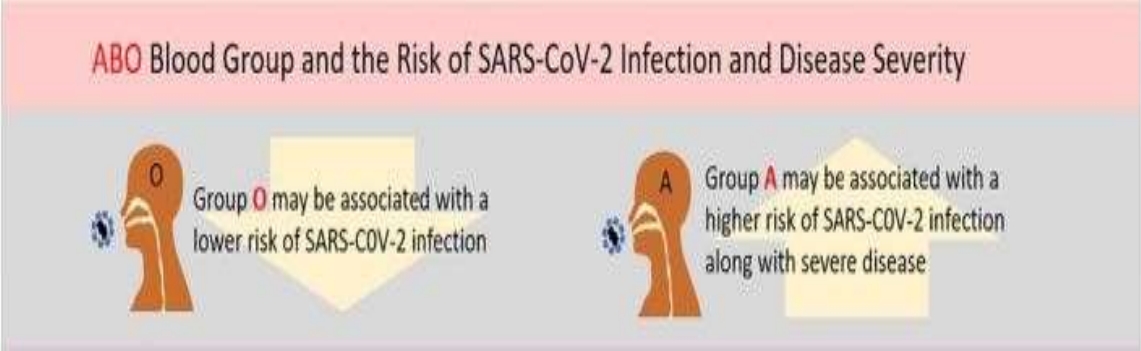


Figure no 12 : ABO blood group severity in covid

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