Association of Covid -19 cases with ABO Blood group in patients from a covid care centre (CCC) in Guwahati: A cross sectional study.

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Abstract:

Background: Coronavirus disease 2019 (COVID-19) was first reported in Wuhan, China in December 2019 and then gradually spread throughout the world. Recently spurt in the Covid cases in the world warranted caution from all. Over 761 million confirmed cases and 6.8 milion deaths worldwide. In India, over 4 crores 42 lakhs covid cases with over 5 lakh deaths occurred. In Assam, more than 5 lakhs cases with over 55 thousand fatalities occurred with Guwahati city being most affected. This study was done to find out any preponderance of ABO & Rh blood groups with covid positivity in a Covid care centre under Gauhati Medical College and Hospital**.** **Methods:** The ABO & Rh blood groups of 201 covid positive individuals were found out (N=201) by using normal saline suspension with commercially prepared antisera after ethical clearance. Data obtained were analysed for demographic profile and statistical significance using the statistical analysis of MS excel. The sample size was determined using the formula of $N=4pq/l^2$. **Results:** After evaluation of the Covid positive cases in relation with ABO & Rh blood group A Positive cases had maximum incidence followed by B Positive. **Conclusion:** The Covid positive cases with maximum number of cases were from A positive blood group.

Keywords: Covid-19, ABO blood group, Covid positive cases.

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Introduction:

Covid-19 disease was first detected in Wuhan, China in December 2019 and soon spread to the whole world to turn into an epidemic and then WHO declared Covid-19 as a global pandemic on11 March 2020.[1] Globally, there are more than 76 million confirmed Covid-19 cases in the world with more than 68 lakhs deaths.[2] More than 133 million vaccine doses has been administered worldwide. India too has been severely affected by Covid-19 disease. From an Indian perspective the scenario of Covid cases is on similar lines with the rest of the world with subsequent waves of Covid positive cases resulting in spurt of cases as well as death of the patients. As on 22nd April 2023, as per Ministry of health & family Welfare, GOI there are 67556 positive cases (active cases) with more than 4crores of cases discharged which is about 98.66% of the total cases with over 5 lacs of deaths which is about 1.18%. The number of vaccine doses administered was more than 22 billion. In our state of Assam as on 22nd April, 2023, there are 10 active cases with more than 7 lakhs of cases got cured. ABO and Rh blood groups preponderance has been an integral factor in many diseases & this novel disease of Covid-19 caused by Sars Cov-2 virus have similar type of association as reported from other studies from around the world.[3,4,5,6] This type of study was not done in Assam or for that matter in North-eastern part of India so this study was undertaken.

Method:

ABO & Rh blood groups of two hundred and one (N=201) Covid positive cases (both RTPCR and rapid test positive) which was calculated using the formula $N=4pq/l^2$ where 'p' is the prevalence of the disease, which was taken to be 50% since Covid-19 is a novel disease and prevalence of the disease in this part of India is still not elucidated so it is presumed that the prevalence is 50%. The value of 'q' being '1-p' with 'l' being allowable error or precision or variability, we have taken 7.5% standard allowable margin & after allowing another 30 for loss during follow up so the sample size was 201.

The samples whose blood group was done for the study were of both male & female gender admitted in Sarusajai Covid care centre, Guwahati. The written consent from them was taken in a language they can understand. There were no age criteria in the study. Patients who suffered from chronic diseases like hypertension, T2DM or any other chronic illness were also included in the study. Cases with symptoms of mild Covid as well asymptomatic cases who were admitted in the Covid care centre were taken up for the study. Patients who knew their blood group beforehand (14%) were also taken.

The patients who were not willing were left out. Those patients who were being referred to tertiary care centres for further treatment following complications of Covid -19 were not included in the study.

The IEC permission was obtained for the study. The study is a cross sectional study with the period of data collection and evaluation from Dec-21 to Dec-22.

The blood groups were found out using conventional blood saline suspension (normal saline suspension) which was performed after pricking finger by disposable needle under proper aseptic & antiseptic precaution and then mixing it with commercially prepared monoclonal antibodies (antisera) to observe for agglutination reaction. Accordingly, the ABO & Rh blood groups of the individual were noted. Then the tabulation was done in excel sheet and then further analysis & statistical calculation was done using MS- Excel software.

Results:

The ABO & Rh blood groups of the patients admitted in Covid care centre of Guwahati with a sample size of 201 patients were found out to determine the association of or preponderance of ABO & Rh blood group with Covid positivity.

After analysis of the data it was found that 29% of patients admitted were asymptomatic whereas 23% had only fever as their presenting symptom. 39% had complaints of cough whereas 9% had complaints of both cough and fever. Amongst the asymptomatic persons 47 were males (85%) and females were 8(15%). In persons who complained of fever, 36 (80%) were males & 9 (20%) were females. Amongst the cases,38 patients were referred to higher centres for further treatment in which 28 were males (74%) were males and 10 were females (26%). Amongst the patients referred to higher centres 35 were due to Covid related complications (92%) whilst rest 3 (8%) were due to other chronic illnesses they were suffering. There was no deaths registered amongst the patients during their course in the hospital. In the admitted patients, most of them got symptom free and discharged with medical advice within 4-7 days of admission (98%) with advice to stay in home isolation for another 7days, rest 2% were discharged within 7-10 days of admission. Most of the patients admitted had mixed meals (non- vegetarians) 192 of them, whereas rest 9 were vegetarians. The highest age amongst females was 72 years whereas in males the highest age was 76 years. Lowest age amongst male patients was 10years whereas 3 years was the youngest female. The average age in females was 35.74years whereas for males the average age was 35.49years. Among the people affected, 13 of the 201 people were non vaccinated (6.4%) whereas rest 188 were vaccinated of which 133 (66%) were vaccinated with Covishield whereas 55(27%) was vaccinated with Covaxin. None received any other form like Pfizer or Sanofi or Sputnik vaccination. Amongst the Covid affected individuals in the study, 170(84%) persons were affected even after receiving second dose of the vaccine but were mostly asymptomatic or mild symptoms, on the contrary,18 persons (about 9%) were affected after first dose. This is not that one dose offered protection more than two doses – it was that most of the population in India were already 2 doses vaccinated by the time second wave of Covid was in full force thereby necessitating the protective dose.

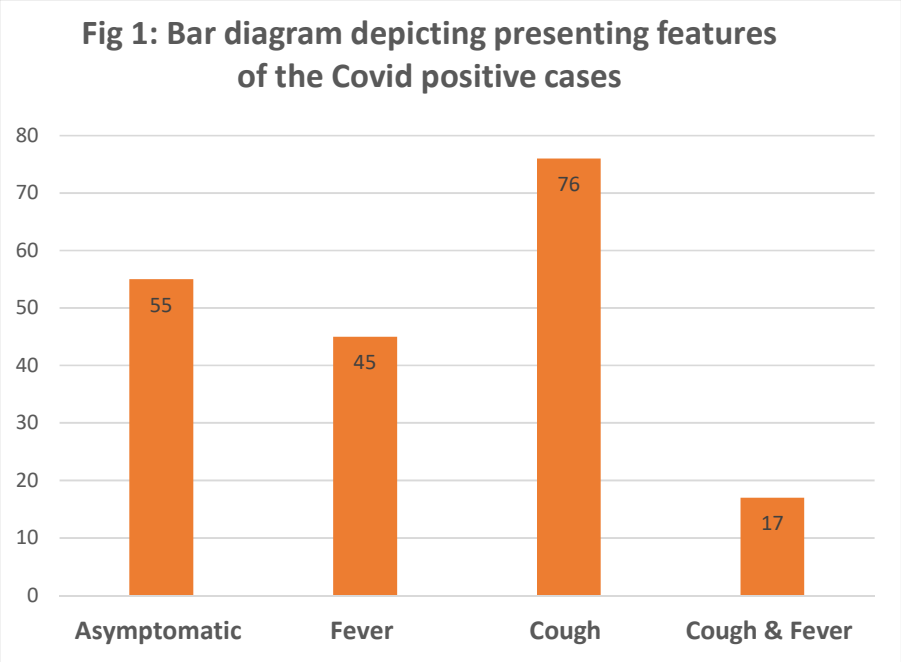


Fig 1: Bar diagram depicting presenting features of the Covid positive cases
80
70
60
50
40
30
20
10
0
55
45
76
17
Asymptomatic
Fever
Cough
Cough & Fever

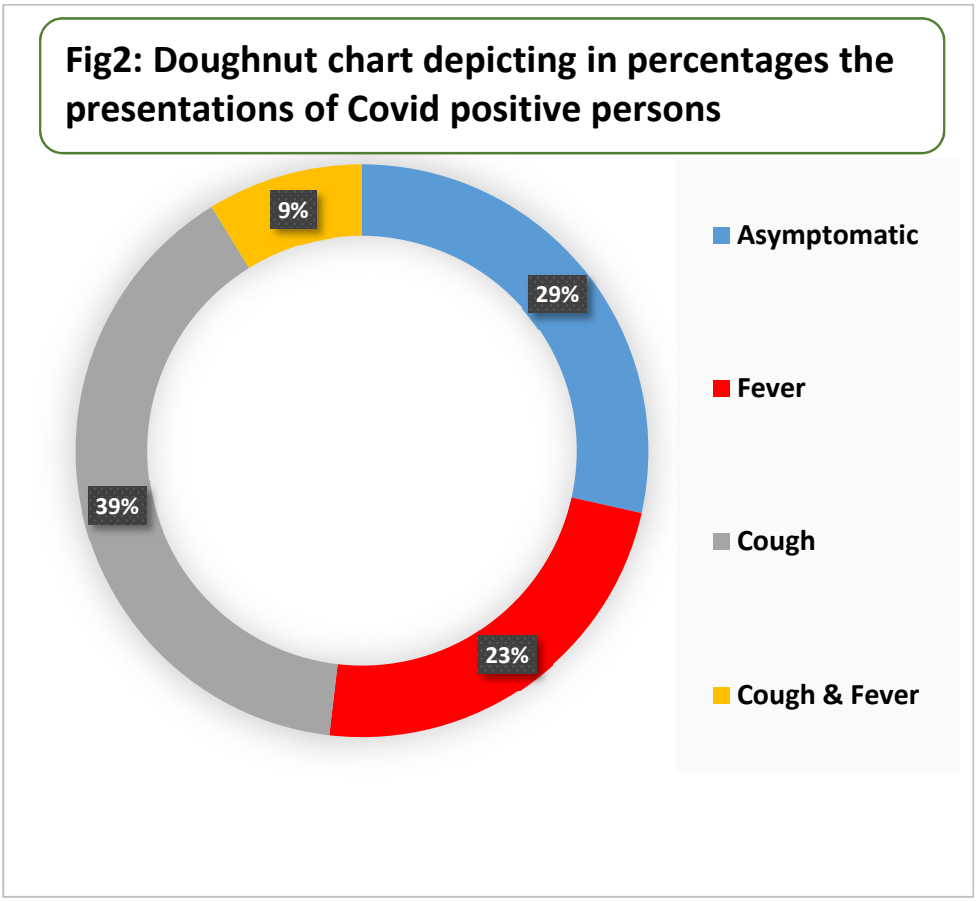


Fig2: Doughnut chart depicting in percentages the presentations of Covid positive persons
9%
29%
39%
23%
Asymptomatic
Fever
Cough
Cough & Fever

The ABO blood group analysis reveals A positive blood group people has maximum propensity to get affected from Covid-19 (48% of the subjects studied belonged to A positive blood group) followed by B positive (27% of the subjects) then O positive (18% of the cases). After that AB positive were found to be having more chance of getting Covid (5%) with A negative and B negative persons were (1%) both and AB negative and A negative are 0% or to be specific there were no cases having A negative or AB negative blood group. The mean of the total positive cases studied was 25.23 with the standard deviation being 34.86 with the standard error of mean for the positive cases of all blood groups being 11.53. p value was calculated using single factor ANOVA in MS Excel and it was 1 which is greater than 0.05, thereby implicating p is insignificant. The coefficient of correlation between the different blood groups and positive cases also came out to be 1 which is a positive correlation which suggests that the number of Covid positive cases and also they will be having any of the ABO & Rh blood groups.

Fig 3: Doughnut figure showing the percentage scale of different ABO & Rh blood groups in Covid positive cases

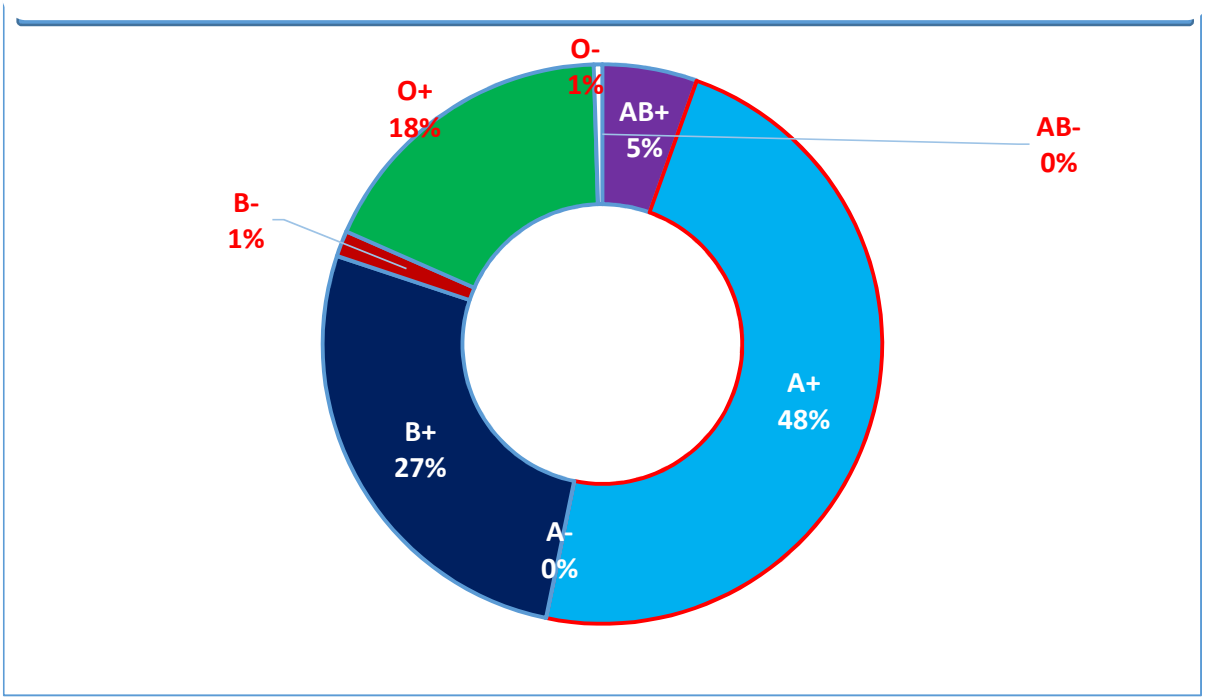


Table 1 : ABO & Rh blood group and the number of Covid positive cases

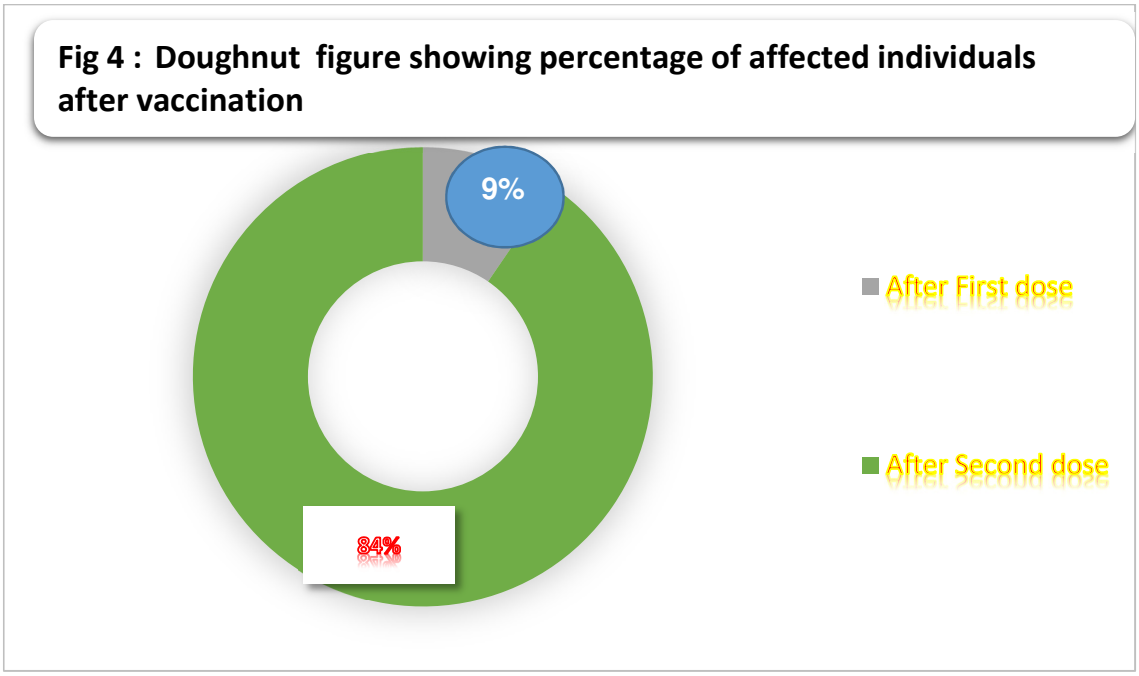
ABO & Rh Blood Groups	No. of Covid positive cases
AB-	**0**
AB+	**11**
A+	**96**
A-	**0**
B+	**54**
B-	**3**
O+	**36**
O-	**1**

Table 2: Depicting the status of vaccination in the Covid positive patients

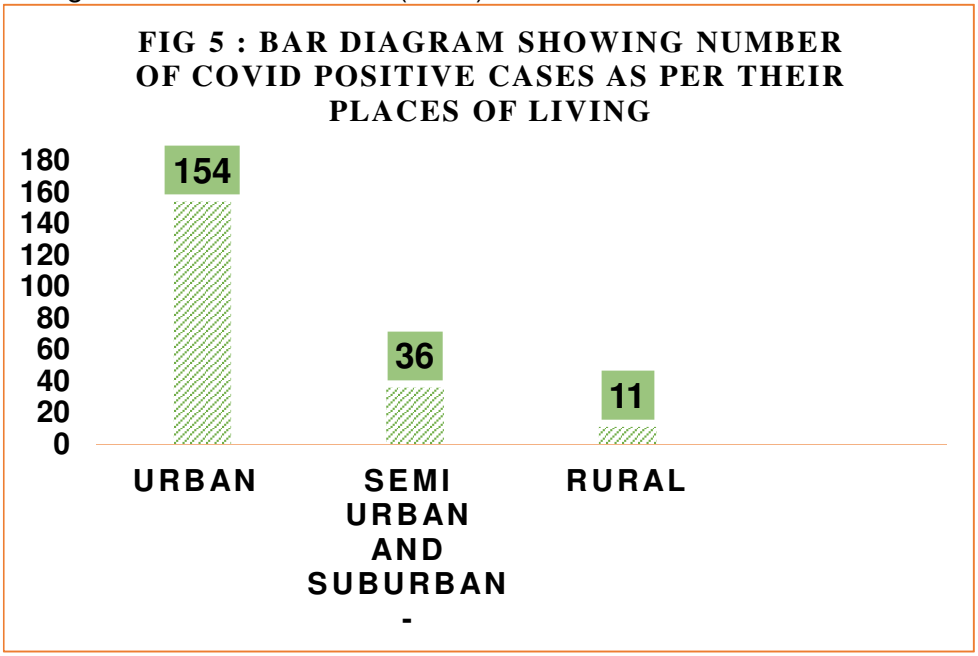
Vaccines	Numbers vaccinated
Covishield	133
Covaxin	55
Non vaccinated	13
Others	Nil

TABLE 3: Depicting the number of people affected after vaccination in the present study

	Affected (Covid Positive individuals) after vaccination
After First dose	18
After Second dose	170
Not vaccinated at all	13



On further analysis about their places of living it was found that 154 (76.6%) were living in urban locality whereas 36 of those affected (18%) were from semi urban background and 11(5.4%) were from rural background



In our study mostly males were affected. In all 201 persons were Covid positive out of which 141(70%) were males whereas 60 (30%) patients were females.

There were 141 male patients more of which 65 (46%) cases were blood group A positive. There was no significant relationship between blood groups and severity of Covid -19 as most of the patients were discharged after primary treatment and did not develop severe Covid; still patients with minimal or no symptoms were highest numbered 168(83%) of whom 65(39%) were blood group A positive.

Table 4: Frequency distribution of blood groups in the Covid positive patients as per demographic information

Blood Type		A+	A-	B+	B-	AB+	AB-	O+	O-	Total
Gender	Male	65	0	39	3	8	0	26	0	141
	Female	31	0	15	0	3	0	10	1	60
	Total	96	0	54	3	11	0	36	1	201
Age distribution	Under 30 years	19	0	13	1	3	0	9	0	45
	30-60 years	68	0	34	2	7	0	22	1	134
	Above 60 years	9	0	7	0	1	0	5	0	22
	Total	96	0	54	3	11	0	36	1	201

In our study O blood group had only 37 cases (18%) whereas rest of the cases of 164 were of Non O blood group (82%).

There was no significant relationship between ABO blood groups & age ($p<0.18$). Patients who were classified in the age group of 30-60 years were134 (67%) were the highest numbered out of which 68 (51%) were of blood group A positive.

Discussion:

Soares D.M.B et al[7] in 2021 mentioned in their study that blood group A was associated with increased risk of Sars-Cov -2 infection with a decreased risk with blood group O. In our study also, we found out almost similar result that blood group A positive was the predominant blood group among those infected with blood group O persons affected being very meagre. As explained in the study mentioned one cause that might be a factor that blood group A & B are affected more could be that, in the Abo blood group system – represented by ABH oligosaccharide antigens A & B and the antibodies subsequently produced against these antigens which is designated as Anti A and Anti B respectively. The antigens are coded by autosomal dominant genes which correspond to the alleles A & B. The H antigen acts as a template on which A & B antigens attach to form the blood group A & B attached by α -1,3 glyosidic linkage. The presence of galactosmine on the N- terminal moiety of the H antigen renders the person as A group. On the other hand presence or rather attachment of D- galactose to the N terminal moiety imparts the person to havr blood group B. These antigens are mainly expressed on the surface of red blood cells & on the surface of endothelial & epithelial cells & in mucins secreted by exocrine glands.[8]

Padhi S et al[9] in 2020 in India stated that blood group O protects whereas subjects having blood group B have more risk of dying a fact which could not be established in our study as almost all of the patients 98% of patients got discharged after preliminary treatment and only a handful of patients (total 38 -of which 35 were due to Covid related complications [92%] and rest 3 persons were due to causes other than Covid [8%]) who were also discharged after follow up of the patients were done. There was no death registered due to Covid in our study. So, it is evident that Covid -19 infection rate may be variable amongst different countries or amongst regions of the country. The reason behind theses is not clear yet, still age, gender, comorbidities, socioeconomic condition, doctor density as well as genotype and phenotype of the subject could contribute to this difference which was evaluated in our study.

Liu Y, Haussinger L, Juergan M[10] in 2021 came to the conclusion with a similar type of study as ours calculated the infection rate, doubling time of infection, number of deaths in relation to blood groups found that blood type A has positive correlation with negative correlation with blood group B. In the study mentioned, as blood group A in most of them was more than 30% the populations of all countries which were taken in the study was divided into higher (≥30%) & lower (<30%) for advanced analysis. In our study also we got the persons with blood group A positive 48% of the cases which as per the above mentioned study falls into high A group.

In the study done on pregnant women by Ibrahim A.S[11].et al in 2020 found most common blood group to be O (52%) and Rh positive (87.4%) which had maximum number of Covid positive cases whereas in our study O blood group had only 18% positivity whereas rest of the cases were of Non O blood group (82%) which did not support the finding of the study done by Ibrahim A.S.et al.

Gheslagh R.G, Ansari M[12] et al in 2022 in their metaanalysis reported that individuals infected with Covid 19 have higher odds of having blood group A and lower odds of having blood group O like our present study.

Rabiul M et al [13] in 2020 in a tertiary care hospital ICU setup found similar results that blood group A patients were Covid positive most followed by group B and blood group O was the least affected. Our study also found similar result. They also found out that patients with blood group O had more need for supplemental oxygen and more likely to die compared to other patients. Also, patients with blood group had higher WBC counts and peak serum ferritin levels. But in the present study these parameters were not taken into account as it was only a Covid care centre and facilities to carry out such tests require a tertiary level setup.

Conclusion:

The present study arrives at the conclusion that amongst ABO & Rh blood groups the persons having blood group A positive maybe at an increased risk of getting affected from Covid -19 infection and blood group O may have a lower incidence of infection. These conclusion was arrived at only after qualitative assessment of the available information and based on heterogeneous evidence & do not reflect the predominance of omicron variants. Because of the severity of Covid 19 & its unpredictable nature &

severity, identifying risk factors associated with this infection, such as blood group points towards those people who maybe at increased risk of infection and thus can protect themselves by maintaining strictly the Covid protocols of frequent hand wash, use of sanitizers and face masks as well as maintain proper physical distancing in social gatherings.

Limitations of the study: As the study was done on Covid positive patients in Covid ward it was not possible to follow the exact procedure of ABO blood group determination.

Future scope of the study: In future bigger sample maybe used to find out the true severity in each and every region of our country to establish a true linkage of ABO & Rh Blood group with Covid positivity and also further studies are needed to further assess Covid positivity in relation to Omicron variants and also vaccinated individuals which will characterize the present moment of the pandemic.

Funding: This study was not funded by any private or public sector.

Conflict of Interest: All authors declare that they have no conflict of interest with any person or organisation.

References:

1. Gowd K.K, Veerababu D, Reddy V.R, Covid-19 and the legislative response in India. The need for a comprehensive health care law. Journal public Aff,2021 Nov;21(4) e 2669.
2. WHO Corona virus (Covid-19) dashboard as on 12 Apr 2023.
3. Pereira E, Felipe S, Freitus de R, Araujo V et al. ABO blood groupand link to Covid 19: A comprehensive review of the reported associations and their possible underlying mechanisms. Microb Pathog, 2022 Aug,25 (published online) doi: 10.1016/j.micpath.2022.105658.
4. Solmaz I, Arac S. ABO blood groups in Covid -19patients : Cross- sectional study. Int J Clin Pract.2021Apr, 75(4); e13927. (published online) doi:10.1111/ijcp.13927.
5. Zhao J, Yang Y, Li D et al. Relationship between ABO blood group and the Covid -19 susceptibility. Clinical infectious diseases. Doi:10.1093/cid/ciaa1150.
6. Ishaq I, Malik A, Malik J, Mehmood A, Quereshi A, LaiqueT, Rana A S. Association of ABO group with Covid-19 severity, acute phase reactants and mortality. Journal.pone. 2021 December14. .https://doi.org/10.1371/journal.pone.0261432.
7. Soares D M B et al. Correlation between ABO blood type, susceptibility to Sars Cov-2 infection and Covid-19 disease severity: A systematic review. https://doi.org/10.1016/j.htct.2022.11.001.
8. Silva Filho J C, Melo de C. G. F, Oliveria de J. L. The influence of ABO blood groups on Covid-19 susceptibility & severity: a molecular hypotheses based on carbohydrate – carbohydrate interactions. Medical Hypotheses,2020 November. 144. https://doi.org/10.1016/j.mehy.2020.110155.
9. Padhi S, Suvankar S, Dash D, Panda V, Pati A, Panigrahi J, Panda A K. ABO blood group system associated with Covid-19mortality: An epidemiological

investigation in the Indian population. Transfus Clin Biol, 2020 Nov: 27(4): 253-258.
10. Liu Y, Haussinger L, Steinacker M J, Lambracht A. D. Association between dynamics of Covid-19 epidemic& ABO blood type distribution. Cambridge University Press (online); 2021 January 7:149 e19.
11. Ibrahim S A, Boudova S, Rouse C E, Haas D M, Peipert J F, Tuuli M G. 975ABO blood group , rhesus type and risk of Covid -19 in pregnant women. Poster session IV Saturday; 2021January30: 224(2) s605.
12. Gheshlagh R.G, Ansari M, Dalvand P, Shabani F, Albatineh A. N. Association between ABO blood groupand Covid-19 infection : an updated systematic review and meta analysis.
13. Halim R M, Saha S et al. ABO blood groups and outcomes in patients with Covid-19 admitted in ICU: A Retrospective study in a tertiary level Hospital in Bangladesh. Journal of Multidisciplinary Healthcare.2021 September1. DOI: 10.2147/JMDH.S330958.