

Relationship between ABO blood groups and COVID-19: study design matters

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Dear Editor:,

We read with interest the study by Zhao and colleagues [1] describing a relationship between the ABO blood groups and the COVID-19 susceptibility. In this case control study, authors compared ABO blood group distributions in 2,173 COVID-19 patients with local control populations and found that blood group A was associated with an increased risk of infection (susceptibility) or death (severity), whereas group O was associated with a decreased risk of infection or death.

Concerning susceptibility, numerous studies [1–9] (Table 1) have analysed the relationship between blood group and COVID-19. Almost all other studies also compared ABO distributions on patients hospitalized with SARS-CoV-2 infection with ABO types from a background healthy population in the same area and found similar results. Three studies have a different design. The first one epidemiologically analysed the relationship between blood-group distribution (i.e. proportion of subjects with blood-group O, and A, B, and AB) and SARS-CoV-2 infection (i.e. COVID-19 prevalence) in nations around the world [8]. The second one compared the distribution of SARS-CoV-2 in blood groups in people exposed at the same time and in the same place (an aircraft carrier) to SARS-CoV-2 [9]. None of these two studies found a relationship between ABO blood group and COVID-19 susceptibility. The third one included all patients who received COVID-19 testing across five hospitals and found that patients with blood types B and AB who received a test were more likely to test positive [7]. Thus, results differ according to the study design.

Case control studies could be criticized for the lack of data about patient exposure to the virus before developing COVID-19 and probably not including all forms of the disease. As specified by the authors chronic preexisting medical conditions that could potentially affect the chance and severity of SARS-CoV-2 infection were not addressed in the study. One important epidemiological clinical characteristic of COVID-19 is the enrichment of hospitalized patients with cardiovascular disease carriers. Since non-O and especially the A allele of the ABO blood group is associated with an increased risk of developing cardiovascular diseases as reported by several studies [10] this might influence the observed ABO distribution when comparing hospitalized versus non hospitalized cohorts.

However, concerning severity literature shows contradictory results (Table 1) and a meta-analysis showed no relationship between ABO blood group and COVID-19 mortality.

In conclusion, considering all the publications on the subject, we believe that in this SARS-CoV-2 epidemic period, no one can consider themselves more or less at risk in relation to their blood type.

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Reference :

1. Zhao J, Yang Y, Huang H, et al. Relationship between the ABO Blood Group and the COVID-19 Susceptibility. medRxiv **2020**; :2020.03.11.20031096.
2. Fan Q, Zhang W, Li B, Li D-J, Zhang J, Zhao F. Association Between ABO Blood Group System and COVID-19 Susceptibility in Wuhan. Front Cell Infect Microbiol **2020**; 10. Available at: <https://www.frontiersin.org/articles/10.3389/fcimb.2020.00404/full>. Accessed 14 August 2020.
3. Ellinghaus D, Degenhardt F, Bujanda L, et al. Genomewide Association Study of Severe Covid-19 with Respiratory Failure. New England Journal of Medicine **2020**; 0:null.
4. Zietz M, Tatonetti NP. Testing the association between blood type and COVID-19 infection, intubation, and death. medRxiv **2020**; :2020.04.08.20058073.
5. Li J, Wang X, Chen J, Cai Y, Deng A, Yang M. Association between ABO blood groups and risk of SARS-CoV-2 pneumonia. British Journal of Haematology n/a. Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1111/bjh.16797>. Accessed 10 June 2020.
6. Leaf RK, Al-Samkari H, Brenner SK, Gupta S, Leaf DE. ABO Phenotype and Death in Critically Ill Patients with COVID-19. Br J Haematol **2020**;
7. Latz CA, DeCarlo C, Boitano L, et al. Blood type and outcomes in patients with COVID-19. Ann Hematol **2020**; :1–6.
8. Takagi H. Down the Rabbit-Hole of blood groups and COVID-19. British Journal of Haematology n/a. Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1111/bjh.17059>. Accessed 15 August 2020.
9. Boudin L, Janvier F, Bylicki O, Dutasta F. ABO blood groups are not associated with risk of acquiring the SARS-CoV-2 infection in young adults. Haematologica **2020**;
10. Dai X. ABO blood group predisposes to COVID-19 severity and cardiovascular diseases. Eur J Prev Cardiol **2020**; :2047487320922370.

Table 1: Studies evaluating relation between ABO blood groups and COVID-19.

Study	Study design	Covid 19 cases	Susceptibility (infection)	Severity (death)
Zhao et al[1]	Retrospective: Case control	2173	Decreased risk for blood type O Increase risk for blood type A	Decreased risk for blood type O Increase risk for blood type A
Fan et al[2]	Retrospective: Case control	105	Increase susceptibility for females with blood type A	Not evaluated
Ellinghaus et al[3]	Retrospective: Case control	1980	Decreased risk for blood type O Increase risk for blood type A	No relationship
Zietz et al[4]	Retrospective: case control	2206	Decreased risk for blood type O Increase risk for blood type A	No relationship
Li et al[5]	Retrospective: case control	265	Decreased risk for blood type O Increase risk for blood type A	No relationship
Leaf et al[6]	Retrospective: cohort	3239	not evaluated	No relationship
Latz et al[7]	Retrospective: cohort	1289	Decreased risk for blood type O Increase risk for blood type B and AB	No relationship
Takagi et al[8]	Retrospective: Nation-level epidemiological design	8.9 million	No relationship	Decreased risk for blood type O-Rh(+)
Boudin et al[9]	Retrospective: cohort	1279	No relationship	Not evaluated