Susceptibility to Covid-19 infection among western Libyan patients according to blood type.

Mostafa M. O. Abdoarrahem[1], Ali Azbida[2] and Wafa Mohamed[3]

[1]Biotechnology Department, Faculty of Science- Al Zaytouna University.
[2,3] Laboratory Department at the Faculty of Medical Technology- Al Zaytouna University.

المستخلص:

أظهرت الدراسات الحديثة أن فصائل الدم تلعب دوراً مهماً في قابلية وشدة إصابة الأشخاص للإصابة ب COVID-19 . الهدف من هذا البحث هو دراسة العلاقة بين فصائل الدم و COVID-19 في مرضى المنطقة الغربية بليبيا. تم جمع بيانات من 310 مريض وتم تقسيمهم إلى ثلاث مجموعات بناء على العمر وفصائل الدم ABO ثم تم تحليل هذه البيانات. أظهرت النتائج أن نسب فصائل الدم O و AB و B و A بين الحالات المصابة كانت على النحو التالي 40٪ ، 14.19٪ ، 21.29٪ ، 24.52٪ على التوالي. أوضحت النتائج أن الإصابة ب COVID-19 كانت أكثر شيوعاً بين الأشخاص الذين فصيلة دمهم O منها في الأشخاص من ذوي الفصائل الأخرى. الخلاصة: أشارت نتائج الدراسة الحالية إلى أن المرضى الذين فصيلة دمهم O كانت لديهم أعلى قابلية للإصابة بـ COVID-19 ، في حين أن المرضى من فصيلة الدم AB كانت لديهم أقل قابلية.

Abstract:

Recent studies have shown that blood groups play an important role in a person's susceptibility and severity of COVID-19 infection. The aim of this research is to study the relationship between Blood groups and COVID-19 in patients from the western region of Libya. Data of 310 patients were collected and divided into three groups according to age and the ABO blood group system and were analyzed. The results have displayed that the blood groups O, AB, B, and A were represented as following 40%, 14.19%, 21.29%, and 24.52% respectively. The finding illustrated that COVID-19 infection was more common in blood

group O rather than other groups. Conclusion: The study findings have indicated that patients with O blood group had a highest susceptibility to COVID-19, whereas patients of the AB blood group had a lowest susceptibility to the infection.

Keywords: COVID-19, blood groups, susceptibility, Libya.

Introduction:

The Covid-19 pandemic of the novel coronavirus (SARS-CoV-2) since its emergence in Wuhan of Chania on the end of 2019 has spread worldwide very quickly and led to overburdened healthcare resources in all countries including Libya. The Covid-19 infection in humans is still not fully understood as the disease causes severe symptoms in some people making them suffer from the infection more than others. Some people feel only mild symptoms, while others may need an oxygen and requires an admission to hospital or isolation center. Therefore, the identification and prioritization of individuals at risk is a critical challenge to control the disease **(Zhou et al., 2020)**. The causes of pathogenicity of severe Covid-19 and associated respiratory failure are not yet well established; however, Covid-19 severity is linked to some factors including older age and being a male.

Covid-19 with severe symptoms is more likely to be seen in patients of chronic illnesses for instant; hypertension, diabetes, being obese, and cardiovascular disease **(Dentali et al., 2012)**. Many studies have illustrated that the ABO blood group is an important risk factor for many diseases such as myocardial infarction, acute kidney failure and tumor cancers **(Sun et al., 2015)**. The ABO blood type has been found to influence the susceptibility of SARS-COV-1 and its severity in Hong Kong **(Cheng et al., 2005)**. Therefore, this work aimed to study the relationship between blood groups and the risk of infection with SARS-Cov-2 (COVID-19) in patients from the Western part of Libya.

Materials and Methods:

A total of 310 Covid-19 patients' data from the western region of Libya were included in this study since December 2020 to April 2021. Data included demographic data, epidemiological data, and laboratory tests. Every patient was confirmed positive SARS-COV-2 via real-time reverse transcription-polymerase chain reaction (RT-PCR), which, was carried out by the National Center of

disease Control (NCDC) in Libya. Patients were divided into three age groups; the first age group included the cases aged 15 to 35 years, the second age group 36 to 45 years, and the third age group over 45 years, with a mean age of 48.35 (SD ± 6) with a male to female ratio of 178(57.42%) and 132 (42.58%), respectively.

Results:

The ABO blood groups for 310 Covid-19 patients from the Western region of Libya were collected to study the relationship between blood groups and the risk of infection with COVID-19 and the results are illustrated as following.

Figure 1: The distribution of the study sample according to age

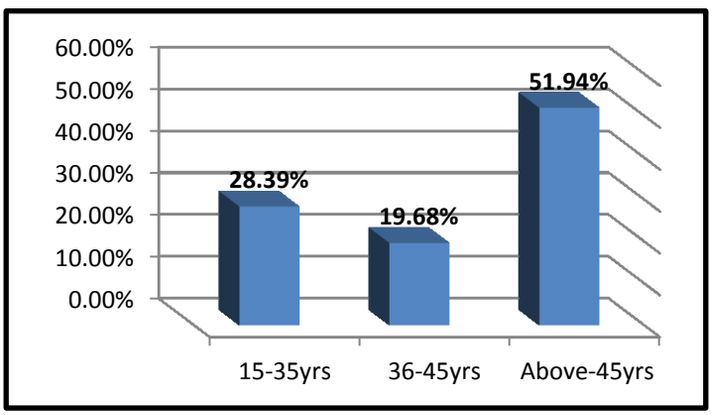
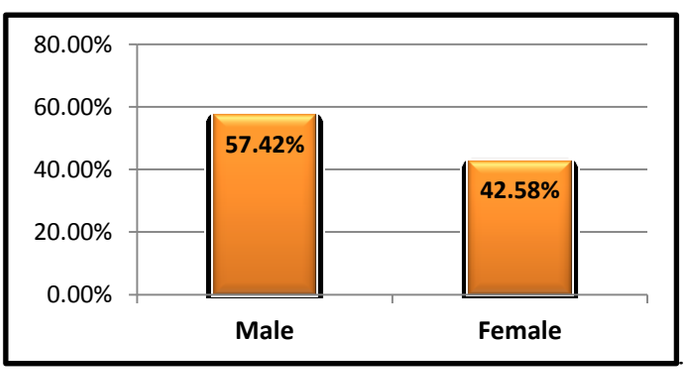


Figure 1, shows the distribution of study sample according to age into three age categories (<35, 36-45,> 45), where the age group of > 45 years was represented the highest ratio of infection with 51.94%.

Figure 2: shows the distribution of the study sample by gender.



The figure 2, Shows that males represent 57.42%, while the females are 42.58%.

Figure 3: The distribution of study sample by blood groups.

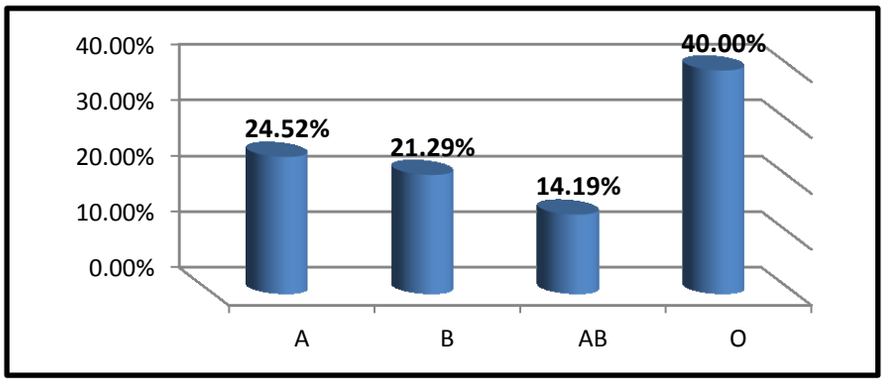


Figure 3, Shows that the proportion of blood groups (A, B, AB, and O) among study sample were 24.52%, 21.29%, 14.19% and 40.00%, respectively.

Figure 4: The distribution of infected cases by (ABO & Rh factor).

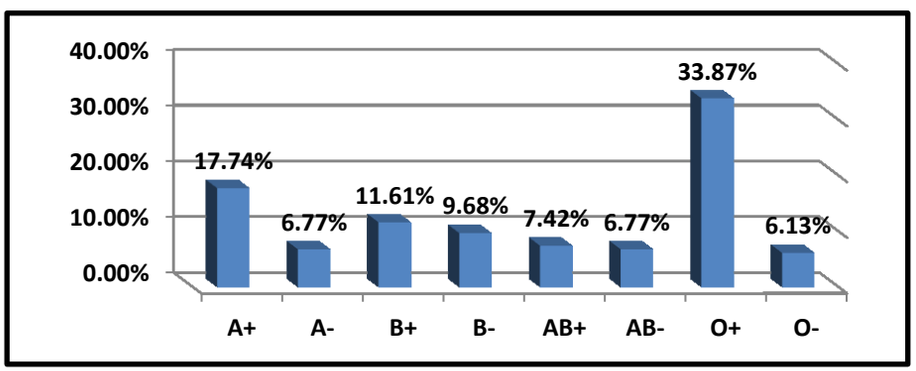


Figure 4, Shows the ratios of (A+, A-; B+, B-; AB+, AB-& O+, O-) were (17.74%, 6.77%, 11.61%, 9.68%, 7.42%, 6.77%, 33.87%, and 6.13%) respectively.

Figure 5: The percentages of cases according to ABO blood groups and Rh factor.

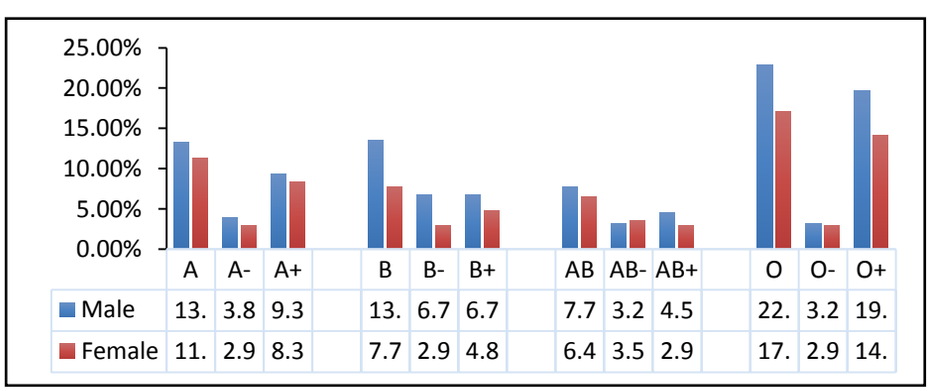


Figure 5, the comparison of the study sample between (Rh factor) blood group and gender for each group.

Discussion:

The novel coronavirus disease (COVID-19) caused by the SARS-CoV-2 virus has spread and reached all countries worldwide in less than two years, causing over 225430382 confirmed cases and more than 4643291 deaths Until 12-9-2021 (world meter). Age, sex, and chronic diseases are established as risk factors for COVID-19 infection morbidity **(Li et al., 2020)**.

In current study, the researchers studied whether age, sex and type of blood group might increase the risk of COVID-19 infection in patients from the western region of Libya. The ABO-Rh blood groups for 310 patients with COVID-19 were used to compare the distribution of the disease with sex and age. The study sample were classified into three age groups (≤35, 36-45, >45 years old), the results found that the age group of > 45 years represented the most ratio of infections (51.94%) compared to other age groups, this finding agrees with some previous studies **(Chowell and Mizumoto, 2021)**.

The role of gender is an important for understanding the risk of coronavirus infection, so the evaluation of underlying gender-related factors considered as critical step of actions to be implemented **(Gustafson, 1998)**. This study showed some differences between males and females infected with COVID-19 (57.42% 42.58%) respectively. These results are consistent with the fact that the distribution of ABO blood groups is known to have sex and age predilections.

The blood groups in this study have showed different associated risk factors for the SARS-CoV-2 infection. The results have showed that the proportions of blood groups (A, B, AB, and O) among study samples were 24.52%, 21.29%, 14.19% and 40.00%, respectively. Specifically, blood group O was associated with an increased risk of infection as 40.00% of patients belong to this blood type, whereas blood group AB was associated with a decreased risk with only 14.19% of patients. Thus, demonstrating that the ABO blood type may considered as biomarker for differential susceptibility of COVID-19. These findings agree with patterns of ABO blood groups for other coronavirus infection found in previous studies, which, reported that the SARS-CoV-1 infection susceptibility in Hong Kong was differentiated by the ABO blood group systems **(Cheng et al., 2005)**. Furthermore, **Bing et al**., have compared

overall 31,100 samples to other ABO blood type and have found that an increased COVID-19 infection among A blood group whereas O blood group showed decreased rate of COVID-19 infection. Furthermore, other study showed that individuals with blood group AB are linked to a higher risk to infection severity. While COVID-19 severity was lower to O blood group **(Yanardag and Bankir (2021)** and **(Samra et al., 2021)**.

The Comparison of our results with pervious work indicated that COVID-19 infection and severity are not linked to one blood type rather than others.

This study analyses the frequencies of ABO and Rh blood types in COVID-19 patients and the relationships of these frequencies with increased risk of infection, this work results have illustrated that blood groups [A- (6.77%), B- (9.68%), AB- (6.77%), O- (6.13%) and AB+ (7.43)] were associated with a lower risk of COVID-19 infection, whereas blood groups (A+, B+ and O+) were associated with higher risk as (17.74%, 11.61%, 33.87%) respectively.

Guillon et al, have stated that the Rh-type antibody may provide protection by inhibiting the interaction between the virus and ACE2 receptor of cells **(Guillon et al., 2008)**. In a previous studies of blood group analyses performed, the frequencies of blood groups of (Rh+**)** was reported as 84-92%, while the frequency of (Rh-) was 8-16% **(Akın and Dostbil, 2005; Zeng et al., 2019; Fan et al., 2020)**. The comparison of the previous studies results with the current results find a quite similar distribution of Rh blood groups, as well as a higher frequency of blood group (Rh+) in COVID-19 patients. The mechanism behind the susceptibility of Rh-blood group type to COVID-19 infection requires further investigations to be well established.

Conclusion:

The findings of this study suggest that individuals of O blood group had a high susceptibility to COVID-19 infection, whereas patients of AB blood group had a low susceptibility. Extra research on a large scale with a big sample size and controversies is required to establish the relationship between blood groups and Rh-blood group type and COVID-19 in Libyan patients.

Conflict of interests:

The authors declare that they have no conflicting interests.

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