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Short Communication

Diabetes Mellitus and COVID-19: A Bad Prognosis Association

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Diabetes is a risk factor for bad prognosis of COVID-19. The high prevalence of diabetes on the African continent, particularly in North Africa (12.2%), constitutes a threat of increased morbidity and mortality linked to COVID-19. We must pay particular attention to this fragile population, with more time and resources, especially for the elderly, obese or those with chronic complications of diabetes who have a high risk of developing severe forms.

To the editors of the European Journal of Respiratory Medicine

New pneumonia caused by a new coronavirus named SARS-COV2 appeared in China at the end of 2019 and quickly spread around the world (it approaches 5 million cases in 188 countries at the time of writing of this letter). The case fatality rate varied so much internationally, In China it was between 1 and 2%, in Europe it was around 9% in some countries and in Africa it is 3.2%. This disparity in rates is explained by the quality of screening and the nature of the population. We have noticed in Morocco, that the lethality rate went from 7% in April to 2.7% in May, this decrease was proportional to the increase in the number of screening tests per day. In the literature, the most distinctive comobidities related to a poor prognosis of COVID-19 pneumonia are cardiovascular (hypertension and ischemic heart disease), metabolic (diabetes, obesity), chronic or respiratory renal diseases [1]. Table 1 summarizes the main comorbidities associated with COVID-19 infection in Italy [2] . Diabetes is one of the most common comorbidities in infected patients, the second in China and Italy after hypertension [2-4]. Data from China have reported an increased incidence of COVID-19 in diabetics [1,2]. However, a recent meta-analysis of 12 studies including a total of 2,108 Chinese patients concluded that diabetes paradoxically does not increase the risk of infection by the virus [5]. Regarding the impact of diabetes on the prognosis of the disease, only 6 of 12 Chinese studies have been able to provide information, and they confirmed that diabetes should be considered as a risk factor for a rapid progression and bad prognosis of COVID-19 [5]. Similarly, based on data from the Chinese center for disease control including more than 44,000 confirmed cases, the fatality rate was multiplied by 3 in the presence of diabetes (2.3% *vs* 7.3%) [5]. In virology, this finding is not new, it has already been reported for other respiratory viral infections including seasonal flu, influenza A (H1N1) in 2009 and the two previous COVID infections: SARS in 2002 and MERS in 2012 [6,7]. A recent French observational study was the first to focus on the predictors of severe forms in hospitalized diabetic patients; they were similar to those found in the non-diabetic population, such as age and obesity, but adding that the presence of complications of diabetes was positively associated with death. Insulin (the agent of choice to control sugars in hospitalised patients with COVID-19), like other antihypertensive medications that interact with the renin-angiotensin-aldosterone system, is not a risk factor for severe form of COVID-19 [8].

Many mechanisms can explain the bad prognosis of COVID-19 in diabetics, but they remain hypothetical, several factors have been mentioned in the literature

Type 2 diabetes, often associated with obesity predisposes to a pro-inflammatory state via increased inflammatory mediators IL-6 and TNF-α, which might facilitate the cytokine storms, which in turn appears to be the cause of the severe cases of Covid-19 pneumonias and of death of many patients. A high mortality rate in the presence of chronic complications of diabetes, particulary macrovasculars, was raised in Chines series and confirmed in the French study [8,9]. Inflammation increases insulin resistance and the need for insulin, which affects glycoregulation and increases the risk of ketoacidosis, on the other hand SARS-Cov-2 could directly damage beta cells, this hypothesis has been raised to explain the large number of new cases of diabetes and also the need for high doses of insulin in infected patients. Indeed pancreatic beta cells express also the ACE2 receptor (the coronavirus binding site), such as lung, heart and kidney cells [3]. This hypothesis suggests screening for diabetes in patients with COVID-19 infection. Hypercoagulability appers also to be the cause of the severe cases of Covid-19 pneumonias. It is known that diabetes is associated with hypercoagulability and endothelial dysfunction which is only partially corrected by optimal glycemic control. In addition the association with a procoagulant infection by the cytokine storms will increase hypercoagulability, this explains why the level of D-dimer was significantly higher in diabetic patients infected with the coronavirus in several series [9,10]. Conversely, hypoglycemia increases also the inflammatory state and platelet reactivity, this is why strict glycemic control during coronavirus infection could be deleterious. So rigorous monitoring of capillary blood glucose and therapeutic adaptations are strongly recommended, especially in the case of treatment with hydroxychloroquine. The latter, with an unknown hypoglycemic action, is approved by most African medical societies for the treatment of SARS-Cov-2 in combination with azithromycin. Finally, an even more worrying aspect of the interaction of two pandemics, is the asymptomatic character in

Table 1: Main Comorbidities Associated with COVID-19 infection in Italy.

Type of comobidity	(%)
Hypertension	73.8
Diabetes mellitus	33.9
Ischemic heart disease	30.1
Atrial fibrillation	22
Chronic renal failure	20.2

the initial phase of the infection which was noted in the Chineses series, with less fever, chills and shortness of breath. This could be responsible for a delay in treatment and an increase in the incidence of severe forms [9].

Conclusion

In light of these findings and seen the high prevalence of diabetes on the African continent, particularly in North Africa (12.2%), there are a threat of increased incidence of morbidity and mortality linked to COVID-19. In addition to chronic complications, the pneumonia caused by COVID-19 worsens the prognosis of our diabetic patients. We must pay particular attention to this fragile population, with more time and resources, especially for the elderly, obese or those with chronic complications of diabetes who have a high risk of developing severe forms. Without forgetting that COVID-19 infection is an opportunity to screen for diabetes. The future research will explain on the behaviour of COVID-19 in patients with diabetes.

Competing Interests

The authors declare no competing of interests.

Authors' Contributions

All the authors contributed equally in drafting of the manuscript. All the authors read and agreed to the final manuscript.

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