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Research Article

The Effect of Smoking on COVID-19 Symptom Severity: Systematic Review and Meta-Analysis

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Background. Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SAR2-COV-2) and was first identified in Wuhan, China, in December of 2019, but quickly spread to the rest of the world, causing a pandemic. While some studies have found no link between smoking status and severe COVID-19, others demonstrated a significant one. The present study aimed to determine the relationship between smoking and clinical COVID-19 severity via a systematic meta-analysis approach. *Methods*. We searched the Google Scholar, PubMed, Scopus, Web of Science, and Embase databases to identify clinical studies suitable for inclusion in this meta-analysis. Studies reporting smoking status and comparing nonsevere and severe patients were included. Nonsevere cases were described as mild, common type, nonintensive care unit (ICU) treatment, survivors, and severe cases as critical, need for ICU, refractory, and nonsurvivors. *Results*. A total of 16 articles detailing 11322 COVID-19 patients were included. Our meta-analysis revealed a relationship between a history of smoking and severe COVID-19 cases (OR = 2.17; 95% CI: 1.37–3.46; $P < .001$). Additionally, we found an association between the current smoking status and severe COVID-19 (OR = 1.51; 95% CI: 1.12–2.05; $P < .008$). In 10.7% (978/9067) of nonsmokers, COVID-19 was severe, while in active smokers, severe COVID-19 occurred in 21.2% (65/305) of cases. *Conclusion*. Active smoking and a history of smoking are clearly associated with severe COVID-19. The SARS-COV-2 epidemic should serve as an impetus for patients and those at risk to maintain good health practices and discontinue smoking. The trial is registered with the International Prospective Register of Systematic Reviews (PROSPERO) CRD42020180173.

1. Introduction

Coronavirus disease 2019 (COVID-19), which is caused by severe acute respiratory syndrome coronavirus 2 (SAR2-COV-2), was first identified in Wuhan, China, in December of 2019. It has subsequently spread across the world, causing a global pandemic. This highly contagious disease has thus far infected 23.4 million people worldwide and killed approximately 808000 patients, yielding a case fatality rate (CFR) that varies between 0.7 and 12.7% (average: 3.4%) [1, 2].

COVID-19 primarily targets lung epithelial cells, causing viral pneumonia and acute respiratory distress syndrome (ARDS), especially in elderly patients. Therefore, mortality is higher in the elderly and in patients with at least one accompanying comorbid disease [3]. In the last report issued by the Centers for Disease Control and Prevention Institute, the incidence of respiratory disease was 9.2% in patients diagnosed with a severe COVID-19 clinical course [4]. Chronic obstructive pulmonary disease (COPD) and asthma are also common comorbidities in severe cases and are reported in

carrying cigarette packets in the pockets, and blowing of smoke. Similarly, exposure to passive smoke can alter ACE-2 gene expression and cause immune system changes. Naturally, these patients also have the potential to have severe COVID-19 symptoms, and smoke exposure is a potential risk factor for those around the patient, including their friends and family.

Future studies should continue to collect nicotine consumption information, including the number of cigarettes smoked per day, passive exposure, and degree of COPD, and should evaluate the dynamics of interactions between cigarette smoking and COVID-19. In addition, the effects of various smoking habits (e.g., mild versus heavy consumption, water pipe use, and electronic cigarettes use) on the transmission of SARS-COV-2, the clinical severity of COVID-19, and the clinical progression of COVID-19 should be investigated. Finally, the relationship between COPD severity and COVID-19, and the potential therapeutic effect of nicotine on severe COVID patients should also be examined and clarified. In addition, clinicians can pay more attention to the history of smoking of COVID-19 patients, and more further research may aim to determine mechanisms that drive or decrease this risk.

5. Conclusion

The present meta-analysis revealed that active smoking and a history of smoking are significantly associated with increased COVID-19 symptom severity. The SARS-COV-2 epidemic should serve as an impetus for patients and those at risk to maintain good health practices and discontinue smoking.

Data Availability

The data [data.oma and data.xls] used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

Authors' Contributions

AG performed the concept of the manuscript, data collection, design of tables and figures, analysis and interpretation of data, and writing and drafting of the manuscript; BU performed the data collection and quality analysis; BAY performed the acquisition of data, quality analysis, and writing and revising the manuscript; DD and OK performed the major role in reviewing and revising the manuscript.

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