



A single-center observational study on smoking behavior and preventive measures for COVID-19

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TO THE EDITOR,

Studies have shown that people living with cardiovascular and respiratory diseases have poor outcomes associated with COVID-19,^(1,2) both conditions being more common among smokers.⁽³⁾ Liu et al.⁽⁴⁾ analyzed factors that indicate poor prognoses in hospitalized patients with COVID-19 and found that smoking history was an independent risk factor for disease progression. Recently published comments, reviews, and observational data describe some factors that may explain the link between susceptibility to infection by SARS-CoV-2, the virus that causes COVID-19, and smoking behavior, such as upregulation of the angiotensin-converting enzyme 2 receptor and depressed immune function.⁽⁵⁾ Therefore, it is important to analyze patterns of smoking behavior during the pandemic period, as some studies have found a bidirectional impact: people with less nicotine dependency and financial instability were more likely to attempt smoking cessation, whereas, in other groups, the smoking habit had worsened.⁽⁶⁾ Additionally, a recent study in elderly people showed that, during the pandemic period, mask use was more common in former smokers than active smokers.⁽⁷⁾ However, the true relationship between tobacco use and poor adherence to self-care behavior warrants further exploration.

In this sense, our study aimed to analyze the relationship between smoking status and percentual adherence to preventive measures against COVID-19 in a young population living in a middle-income country. In addition, we analyzed smoking status and adherence to preventive measures according to socioeconomic status.

A brief analysis and report, nested within a larger cross-sectional study, was conducted according to STROBE guidelines and included a sample of military personnel stationed in an army unit in Southern Brazil. Using a digital Google Form self-reported questionnaire, we collected sociodemographic data, self-reported smoking status (active smoker, former smoker, or never smoked), and information on comorbidities and adherence to preventive measures. The socioeconomic status was divided by monthly income and was categorized into < 2, 2-4, 4-10, or > 10 times the national minimum monthly wage. Active smokers also reported the number of cigarettes smoked per day and whether the pandemic period intensified their smoking behavior for descriptive purposes.

Adherence to preventive measures against COVID-19 was assessed based on six points: social isolation outside the workplace, means of transportation to work, frequency of mask use, frequency of handwashing, frequency of guests at home, and the level of agreement with the recommendations for preventing COVID-19. Most of the questions were formulated in ordinal scale format. A scoring system was developed, summarizing adherence to healthy and preventive behavior for COVID-19 into a quantitative percentage, varying from 0% (none of the questions were answered with the optimal choice) to 100% adherence to preventive measures (all six questions were answered with the optimal choice).

The ANOVA test was performed according to the Bonferroni method as a post hoc analysis when a significance level of < 0.05 (p-value) was found in the initial assessment to document the impact of smoking status on mean percentage adherence to preventive behavior. The partial eta squared was calculated to measure effect size. The same process was used to analyze socioeconomic status. Finally, when appropriate, the Chi-square or Fisher's test was conducted to measure the association between socioeconomic status and smoking status and to define whether smoking status was an independent risk factor. This study was approved by our institution's ethical committee, was carried out according to ethics standards, and all participants provided informed consent. The statistical analysis was conducted using the IBM SPSS Statistics software, Ed. 24.

A total of 475 participants were included, 9 of whom did not provide answers about smoking behavior, 2 did not answer questions related to socioeconomic status, and 7 did not answer questions regarding adherence to preventive measures against COVID-19. The data were collected in July (20.5%) and August (78.9%), 2020, concomitant to the first peak of new cases of COVID-19 in Southern Brazil;⁽⁸⁾ the remaining 0.6% of data was collected in September. The majority of participants were male (97.7%), with low income (58.6% earned < 2 minimum wages per month), without health issues (87.4%), and never smoked (69.7%). The median percentage of adherence to preventive measures according to the devised scoring system was 50% (IQR 50% - 79.2%). Among the study participants, 46.2% had their smoking habit worsened, with a median increase of 6 cigarettes per day (IQR 5 - 10 cigarettes).

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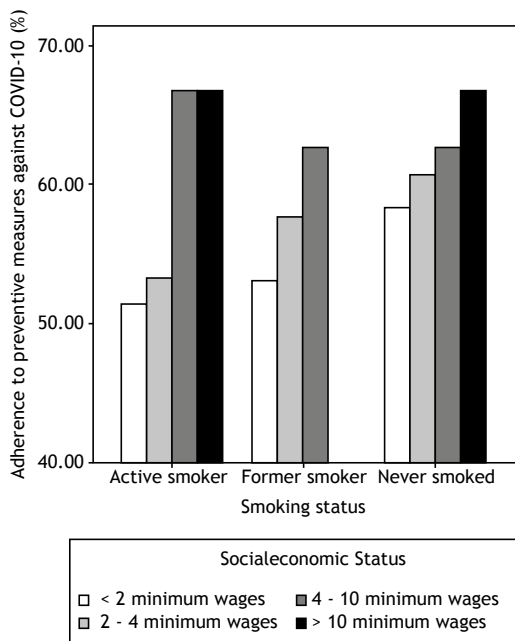


Figure 1. Mean percentage adherence to preventive measures according to smoking status and sociodemographic status.

Significant differences were found regarding adherence to preventive measures for COVID-19 according to smoking status ($F(2, 463) = 4.380$; $p = 0.013$; $\eta^2_p = 0.019$) and socioeconomic status ($F(2, 464) = 2.943$; $p = 0.033$; $\eta^2_p = 0.019$). In the Bonferroni post hoc analysis, a significant difference was observed between the active smoker status and never smokers ($p = 0.014$) and between the < 2 minimum wages group compared to the 4 to 10 minimum wages per month group ($p = 0.037$), as shown in Figure 1. We also found a significant association between smoking status and socioeconomic status ($p = 0.002$).

Our study suggests important associations of household income, smoking behavior, and the set of actions deemed essential for COVID-19 prevention. A clear dose-response relationship in adherence to preventive measures can be observed, as income rates decrease and smoking behavior increases (Figure 1). The smoking status seemed to have a greater influence on the lower-income subgroup. This finding is in agreement with another Brazilian study with an elderly population that showed a relationship in the same direction.⁽⁷⁾ Other studies have already demonstrated that low-income populations have poorer self-care behavior and a higher frequency of smoking,⁽⁹⁾ both of which can be important factors for more severe COVID-19 presentation.^(4,10)

This study presented some limitations. The sample consisted of military personnel and included male and young subjects; thus, we must be careful about extrapolating these results to the general population. Our transversal design precludes differentiation of causation and correlation. Furthermore, our analysis, which was based on the partial eta square method, revealed a modest effect size. This may have been due to limitations inherent to our metric for preventive measures. Other ways that quantify compliance to preventive measures might show a greater difference among groups.

Finally, our study highlights an important aspect of the smoking habit: it may work as a marker for a personal tendency to undesirable behaviors in self-care, impacting on the risk of transmissible or non-transmissible diseases.

AUTHOR CONTRIBUTIONS

SRRD, ED, and EGB: study conception and design. SRRD and ED: data collection. SRRD and EGB: data analysis and interpretation. SRRD: statistical analysis. SRRD: writing of the manuscript. EGB: critical revision of the manuscript for intellectual content.

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