POINT OF VIEW
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Reflections on passive smoking and COVID-19

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SUMMARY

Despite substantial evidence on the negative effect of active smoking to Covid-19, the impact of passive smoking in the course of disease remains largely unclear. Our aim was to reflect passive smoking as a risk factor in the current pandemic. Studies are needed to increase our knowledge on passive smoking and Covid-19 implications. The reflections current findings strongly support interventions and policies to curb the tobacco epidemic.

KEYWORDS: Tobacco Smoke Pollution. Coronavirus Infections. Smoking Prevention.

Active smoking has been a global concern and is considered an ancient pandemic with long and chronic progression[1,2]. Currently, the number of deaths due to smoking is estimated at 8 million, including 157,000 in Brazil[2].

Although underestimated, passive smoking, that is, the inhalation of second-hand smoke from tobacco derivatives, is also an important public health concern as it exposes non-smokers to the same carcinogens[3]. Thus, it is an important risk factor for chronic noncommunicable diseases, especially lung cancer[1,4].

According to the World Health Organization (WHO), 900,000 passive smokers die annaully[2]. In Brazil, a survey conducted in the 26 state capitals and the Federal District reported that 6.8% of household members were passive smokers, including 7.0% of women and 6.6% of men. The percentage of passive smokers in the workplace was 6.6% and was higher for men (10.0%) than for women (3.7%)[5].

The harmful effect of tobacco was first reported in 1928[6]. Since then, efforts have been made to establish coping strategies. However, the United States Department of Health demonstrated the causal relationship between passive smoking and lung cancer only in the year 1964. In 2005, the WHO Framework Convention on Tobacco Control (FCTC/WHO) provided tools and guidelines to be implemented by more than 192 member countries[7].

Even with most countries implementing anti-smoking policies, approximately 80% of people remain vulnerable to harmful effects resulting from passive smoking[8]. Cigarette burning produces smoke that contains more than 7,000 chemical compounds. Of which 250 are proved to be harmful, and nearly 70 of these compounds and substances cause cancer[9]. Oral and nasal inhalation of cigarette smoke is believed to profoundly decrease *in vivo* mucociliary transport, making the person susceptible to respiratory diseases[9].

At the beginning of the coronavirus disease (COVID-19) outbreak in late December 2019 in Wuhan, China, the tropism of lung epithelial cells was identified, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)[10,11]. Smokers are considered among the vulnerable groups to health complications resulting from COVID-19[11].

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Smoking increases the expression of angiotensin-converting enzyme 2 (ACE2), a known SARS-CoV-2 receptor. While some studies have proposed the higher ACE2 expression in smokers as a possible link between smoking and COVID-19, these mechanisms have not yet been fully elucidated[12,13]. Although this relationship remains controversial, there are large investments in research on this topic. However, studies on passive smoking and COVID-19 remain scarce; thus, this condition may be an important risk factor that has not been considered in the recommendations for pandemic control.

A study by Vázquez and Redolar-Ripoll[11] conducted in Spain showed that, although the percentage of men (50.4%) and women (49.6%) infected by SARS-CoV-2 was similar, the mortality rate was significantly higher in men (4.7%) than in women (2.6%). These authors suggested that these discrepancies could be owing to differences in smoking patterns and prevalence between the sexes, as corroborated by statistical data on the prevalence of male smokers (25.6%) and female smokers (18.8%) in Spain.

A recent meta-analysis including data of 11,322 COVID-19 patients published in the International Prospective Register of Systematic Reviews (PROSPERO) has shown an association between smoking history and severe COVID-19 disease (OR 2.17, 95%CI 1.37–3.46, p<0.001) as well as current smoking and severe COVID-19 disease (OR 1.51, 95%CI 1.12–2.05, p<0.008)[14].

Additionally, some studies have shown that smoking cessation, over time, leads to normalization of a part of the respiratory epithelium architecture, with decreased hyperplasia and downregulation of ACE2 levels. It also significantly improves endothelial function[15]. However, this relationship has not been established in passive smokers.

Although there is no robust evidence of this association, the WHO strongly advises that smokers to quit smoking to minimize its direct risks[2]. In this context, it is necessary to consider the limited discussion of passive smoking, which is so common in society, as a risk factor for COVID-19. This discussion encourages the disclosure of warnings on tobacco product packaging and media campaigns that inform the dangers of passive smoking[2,16].

In the past, respiratory virus epidemics and pandemics demonstrated the significant role of multifaceted approaches to smoking cessation through behavioral, cultural, and pharmacological interventions[17]. These approaches may also be useful to decrease passive smoking in the current pandemic.

Considering the high viral transmissibility, severity in most vulnerable groups, and, above all, current lack of a proven vaccine and treatment, social isolation has always been the transversal axis of COVID-19 prevention and control measures. However, aspects related to prevention practices and attitudes toward risk factors, such as passive smoking, have not been adequately addressed.

A Chinese study showed a higher proportion of lung cancers attributable to passive smoking in the household (19.5%) than in the workplace (7.2%) among women. The main explanation was the greater number of women exposed to passive smoking in the household (66.0%) than at work (19.6%)[18].

According to a survey conducted on adults aged ≥40 years in China, 37.7% of people who never smoked and reported exposure to passive smoking were usually exposed at home and only 7.1% were exposed at work. Therefore, the household is the predominant place of exposure to passive smoking, mainly for women and children. This may cause a displacement effect owing to smoke-free legislation, with a net effect of people increasingly smoking at home to avoid restrictions in public places, and owing to the social isolation caused by the COVID-19 pandemic. The main recommendation is to establish public health policies to reduce passive smoking in the household in times of pandemic[18] and to invest in studies that analyze the impact of active smoking on SARS-CoV-2 infection.

The potential smoking-related COVID-19 disseminators require reviewing. Hookahs, popular among younger population owing to their reduced damage, produce much more smoke than commercial cigarettes[19], directly interfering with the air quality and the health of nearby people. Additionally, the mouthpieces are shared, facilitating SARS-CoV-2 transmission[2,20].

The transmission of diseases such as influenza, cold sores, and tuberculosis through hookah mouthpieces has also been reported[21]. Sharing electronic smoke devices also increase the risk of SARS-CoV-2 transmission[2,19].

Thus, people who are exposed daily to thousands of toxic substances from tobacco smoke are at risk of developing serious disorders[22]. such as cardiovascular diseases, chronic obstructive pulmonary disease, and cancer, and may additionally be more susceptible to SARS-CoV-2.

This review concludes with the idea that passive smoking may be an important risk factor for COVID-19 and provides reflections on the associated factors and processes that involve respiratory diseases, as well as their significance. It is important for the population to be aware of these risks of passive smoking, since the use of tobacco in certain forms discussed above may increase the risk of developing COVID-19, leading to more serious and potentially fatal conditions.

The possible relationship of government finance with the tobacco industry should also be considered, with these data informing potential tobacco control measures in Brazil. It is important to increase the awareness of the dangers of smoking

cigarettes, as well as the importance of reducing their use, regardless of their harm[1,23,24].

The current COVID-19 pandemic is the right time to pass on these recommendations, mainly to non-active smokers, as well as to the users of tobacco, who should be greatly concerned about their health. Increased smoking cessation rates could positively impact the community transmission of SARS-CoV-2 and decrease the risks and concerns of passive smokers.

Thus, campaign practices and concepts should be reviewed, with a focus on the results of populations who are currently experiencing social isolation in enclosed environments. An increased understanding of the impact of these factors on the daily lives of smokers, informed by established theoretical tools, will allow the modification of pedagogical strategies.

The current situation reinforces the need to increase awareness about the risks of passive smoking. There is a critical window of opportunity to help individuals quit smoking and increase surveillance in both the active and passive smoking population to prevent, detect, and quickly treat COVID-19.

Reflection on these findings indicates the need for greater instrumentalization from everyone involved in this process to guarantee the quality of the interventions. Reviews of these concepts, how they are presented to the public, and how they are related to the primary objective of health campaigns, namely, health promotion and the effects of the quality of life of population are needed.

This review may contribute to the proposed reflection process and expanded discussions on this topic to strengthen strategies and expand their scope not only quantitatively but also qualitatively. Studies and healthcare practices related to the current pandemic are needed to increase our knowledge on passive smoking and COVID-19 implications.

Finally, the SARS-CoV-2 epidemic should be an impetus for patients and people at risk to maintain good health practices and to quit smoking not only because of the current situation but also permanently.

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AUTHORS' CONTRIBUTION

LPRRG: Conceptualization, Supervision, Writing – Original Draft. **CCSA:** Conceptualization, Writing – Original Draft. **AHMA:** Conceptualization, Writing – Original Draft. **MAM:** Conceptualization, Supervision, Writing – Original Draft, Writing – Review & Editing.

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