

# Smoking and Covid-19

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## Key points:

- **Smoking is well known to cause or worsen respiratory diseases and has a known negative impact on the immune system. Smoking also involves repetitive hand-to-mouth contact which can provide a route of entry for the virus.**
- **Evidence continues to mount that smoking can increase the severity of Covid-19 infections. During a previous MERS-CoV outbreak, smoking was associated with a higher mortality rate.**
- **While it is unknown how stopping smoking during an outbreak can change the risk associated with a Covid-19 infection, we do know that the health benefits from quitting are immediate. Within 12 hours, the levels of carbon monoxide in the blood return to normal, and after 2-3 weeks lung function and circulation improve. After 1-9 months, the lungs begin to recover and coughs and shortness of breath will decrease.**

## *Introduction*

The Covid-19 pandemic continues to develop rapidly and new information about the virus emerges on an almost daily basis. While governments and public health bodies around the world have a myriad of pressing concerns related to the outbreak, it is important to consider what factors may contribute to the severity of infection or mortality of those infected with the virus.

Multiple co-morbidities have been identified as contributing factors to the severity of a Covid-19 infection including cardiovascular disease, diabetes, respiratory conditions, age and the use of immunosuppressive drugs.<sup>1</sup> A full list of conditions that may make a person more susceptible to becoming seriously ill from the virus can be found here:

<https://www.nhsinform.scot/illnesses-and-conditions/infections-and-poisoning/coronavirus-covid-19/coronavirus-covid-19-shielding>

Beyond co-morbidities, research has indicated smoking to be a factor which can increase the severity of Covid-19 infections. The connection between Covid-19 and smoking was first made in China where the majority of severe Covid-19 cases were seen in men, and smoking prevalence rates in China are drastically higher in men than in women.<sup>2</sup> Following this, many

doctors across the world have publicly expressed their concerns about the link between smoking and the severity of a Covid-19 infection.

### *Smoking and Covid-19*

The suddenness and speed with which the outbreak has spread means that hard data about the link between Covid-19 and smoking is thin on the ground. However, we know that smokers are twice as likely to contract influenza<sup>3</sup> and display severe symptoms and that in a previous MERS-CoV outbreak, smoking was associated with a higher mortality rate<sup>4</sup>. Smoking is also well known to cause or significantly worsen respiratory diseases, including asthma and COPD, and has a known negative impact on the immune system<sup>5,6,7</sup> and the cardiovascular system<sup>8</sup>. It is therefore reasonable to assume that smoking is a particular risk factor for Covid-19 infections.

Evidence continues to mount that substantiates this assumption. For example, a recent meta-analysis from a published paper in China concluded that smokers are 1.4 times more likely to have severe symptoms of Covid-19 and of those with severe symptoms, smokers are approximately 2.4 times more likely to be admitted to an ICU, need mechanical ventilation or die compared to non-smokers.<sup>9</sup> Similarly, a nationwide analysis of 1590 patients in China suggest that co-morbidities, like COPD, hypertension, diabetes, malignant tumours and having two or more co-morbidities are the most prevalent and highest risk factors for Covid-19 infections. Importantly this study also acknowledged that smoking itself is a risk factor for these for comorbidities.<sup>10</sup>

Writing in the British Medical Journal (BMJ) Opinion, Dr David Simons describes a direct mechanism which may contribute to the increased risk seen in smokers, “The virus has been shown to enter cells using the ACE-2 receptor, which is abundant in mucosal epithelial cells and the lung alveolar tissue. Research on a similar respiratory virus, respiratory syncytial virus, has shown that inhaled tobacco smoke increases the rate of transmission and severity of viral respiratory tract infections. Hence, it has been argued that smokers are at increased risk of contracting covid-19. Notably, smoking involves repetitive hand-to-face movements, which provide a route of entry for viral capsules. Smoking rates in countries that report sizable outbreaks of Covid-19 (e.g. China, South Korea, Italy) remain high at approximately 19-27% of the population”.<sup>11</sup> The World Health Organisation (WHO) has also acknowledged that repetitive hand-to-mouth contact increases the risk of contracting the virus.<sup>12</sup>

It should be noted, however, that not all research found a significant link between smoking and the severity of Covid-19 infections. One meta-analysis looking at five Chinese studies found ‘a trend towards higher risk’, albeit not statistically significant, between Covid-19 severity and active smoking.<sup>13</sup> There may be factors specific to China, such as the pollution levels in many cities, which may be linked to the severity of Covid-19 cases. Regardless, it is clear that a number of co-morbidities are directly associated with the severity of a Covid-19 infection, all of which can be caused or worsened by smoking.

## *E-Cigarettes and Covid-19*

Decades of science has clearly shown the profound and diverse harm to health associated with regular smoking, but for e-cigarettes, the science is still emerging. The lack of long-term evidence on the use of e-cigarettes makes it more difficult to identify or understand any potential link between vaping and Covid-19.

However, a 2019 review on the respiratory effects of e-cigarettes in *The British Medical Journal* concluded:

“Given the survey data showing increased symptoms of respiratory disease and the many lines of human, animal, and in vitro experimental evidence that e-cigarette aerosol can negatively affect multiple aspects of lung cellular and organ physiology and immune function, e-cigarettes will likely prove to have at least some pulmonary toxicity with chronic and possibly even short term use. Several important principles will determine how lung disease manifests and how severely: as with smokers, vapers are likely to have variable susceptibility to lung injury, influenced by many interacting genetic and environmental factors; certain variations of e-cigarette technology (atomizer construction, coil power, nicotine exposure, and flavorants) will prove more harmful than others; dual use with combustible cigarettes, the dominant adult use pattern, may potentiate toxicity; a critical factor will be the extent to which vaping alters the susceptibility to and trajectory of bacterial and viral lung infections; and the continued rapid technological evolution of these devices may mitigate or potentiate particular toxicities.”<sup>14</sup>

Based on current evidence – and in line with the consensus statement on e-cigarettes – vaping is definitely less harmful than smoking. However, e-cigarettes are not risk-free and have been associated with adverse health effects on the immune and respiratory systems so further investigation is needed to identify any potential links between Covid-19 and the use of e-cigarettes. Like smoking, repetitive hand-to-mouth contact when vaping could increase the risk of contracting the virus.

## *Conclusion*

It is highly likely that smoking contributes to the severity of a Covid-19 infection, either through its association with existing co-morbidities, increasing the infection rate through hand-to-mouth contact or the direct effect of smoking on infection. It is unknown, beyond reducing the infection rate through hand-to-mouth contact, how stopping smoking may change the risk associated with Covid-19. However, we know that the benefits from stopping smoking can be seen very quickly. Within 12 hours, the levels of carbon monoxide in the blood return to normal and after just 2-3 weeks, lung function and circulation improve. After 1-9 months of being smoke-free, the lungs begin to recover and coughs and shortness of breath will decrease.

- [1] NHS inform., (2020) Coronavirus (COVID-19): Shielding. *NHS Scotland*. 07 April 2020 <https://www.nhsinform.scot/illnesses-and-conditions/infections-and-poisoning/coronavirus-covid-19/coronavirus-covid-19-shielding>
- [2] Wang M, Luo X. et al. (2019). Trends in smoking prevalence and implication for chronic diseases in China: serial national cross-sectional surveys from 2003 to 2013. *The Lancet Respiratory Medicine*, 7(1), pp.35-45.
- [3] Park JE, Jung S, Kim A. (2018) MERS transmission and risk factors: a systematic review. *BMC Public Health*. 2018;18(1):574. doi:10.1186/s12889-018-5484-8.
- [4] Arcavi L, Benowitz NL. (2004) Cigarette smoking and infection. *Arch Intern Med*. 2004;164(20):2206-2216. doi:10.1001/archinte.164.20.2206.
- [5] Mattiuzzi C, Lippi G. (2020) Estimation of Worldwide Burden of Smoking-Related Asthma. *International Archives of Allergy and Immunology*. pp1-4. doi:10.1159/000505024
- [6] Strzelak A, Ratajczak A, Adamiec A, Feleszko W. (2018) Tobacco smoke induces and alters immune responses in the lung triggering inflammation, allergy, asthma and other lung diseases: A mechanistic review. *Int J Environ Res Public Health*. 15(5):1033. doi:10.3390/ijerph1505103
- [7] Arcavi L, Benowitz NL. (2004) Cigarette smoking and infection. *Arch Intern Med*. 164(20):2206–2216. doi:10.1001/archinte.164.20.2206
- [8] The pathophysiology of cigarette smoking and cardiovascular disease An update. *Journal of the American College of Cardiology*. 43:10(1731-1737) doi:10.1016/j.jacc.2003.12.047
- [9] Vardavas CI, Nikitara K. (2020) COVID-19 and smoking: A systematic review of the evidence. *Tob Induc Dis*. 2020;18:20. 20/03/2020. doi:10.18332/tid/119324
- [10] Guan W, Liang W, Zhao Y. et al (2020) Comorbidity and its impact on 1590 patients with Covid-19 in China: A Nationwide Analysis. *European Respiratory Journal*. doi:10.1183/13993003.00547-2020
- [11] World Health Organisation. (2020) COVID-19 and NCDs: Information note on COVID-19 and noncommunicable diseases. 23/03/2020 <https://www.who.int/internal-publications-detail/covid-19-and-ncds>
- [12] D Simons, O Perski, J Brown (2020) Covid-19: The role of smoking cessation during respiratory virus epidemics. *BMJ Opinion*. Published March 20, 2020. Accessed at: <https://blogs.bmj.com/bmj/2020/03/20/covid-19-the-role-of-smoking-cessation-during-respiratory-virus-epidemics/>

[13] Lippi G, Henry B. (2020) Active smoking is not associated with severity of coronavirus disease 2019 (COVID-19). *European Journal of Internal Medicine*  
doi:10.1016/j.ejim.2020.03.014

[14] J E Gotts, S Jordt, R McConnell, R Tarran. (2019). What are the respiratory effects of e-cigarettes? *The British Medical Journal*. 366:l5275 doi:10.1136/bmj.l5275

[15] NHS Health Scotland. (2017) E-cigarettes consensus statement. 17/09/2017 Accessed at: <http://www.healthscotland.scot/publications/e-cigarettes-consensus-statement>