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# THE EFFECT OF SMOKING ON COVID-19 PATIENTS; A CROSS-SECTIONAL STUDY

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**Abstract**

***Background:*** *The respiratory system is the primary target of COVID-19, leading to a severe acute respiratory syndrome induced by the SARS-CoV-2 virus. While recent research shows that smokers respond differently to the COVID-19 epidemic, little is known about the causes underlying the range of reactions that have been observed, such as the fact that some people smoke more while others smoke less. This study aims to investigate the fundamental causes of the disparate responses to smoking behavior during the ongoing COVID-19 crisis in order to provide an appropriate justification for these different responses.*

***Methodology:*** *An online national survey of adults (n = 86) aged above 18 years was conducted in different college/university students of Pakistan by sending online link of Google forms to their Email and Social accounts in March 2021 to May 2021.*

***Results:*** *Gender distribution shows 98% were male, 2% of them were females. 65% participants were Bachelor. 95% of Participants didn't have any chronic disease, 55% were regular smokers, 53% had acquired COVID-19 infection once as shown in table 1.When participants were asked if they had any change in their smoking habit after COVID-19 pandemic, 46% were non-smokers, why half of rest 54% tended to smoke less after COVID-19 pandemic. 16 percent stated they are smoking more than usual while 9% were smoking as they were before pandemic as shown in table 2.*

***Conclusion:*** *Smoking increases symptom severity and the likelihood of serious respiratory infections. Problems might arise from the increased susceptibility. Moreover, smoking damages the lungs, making them more vulnerable to the problems caused by SARS-CoV-2. Smokers may have increased difficulty in coping with the virus due to the detrimental consequences of smoking on the health of the lungs, which further increases vulnerability to SARS-CoV-2.*

## INTRODUCTION

Approximately 1.1 billion tobacco users worldwide are living in low-income countries where malnutrition poses a significant risk to immunity. Smokers also have a higher chance of developing a severe COVID-19 infection because of their weakened immune systems, susceptibility to cross-

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infection, and poor hygiene[1]. In individuals with COVID-19, male sex, older age, hypertension, diabetes, cardiovascular disease, and respiratory illness are risk factors for a bad prognosis [2]. As of July 28, 2020, 188 different countries had recorded 16,341,920 cases of severe acute respiratory syndrome coronavirus (SARS-CoV-2) infections, resulting in 650,805 fatalities. There is an urgent need for conclusive answers regarding the contentious impact of smoking on the clinical severity of COVID-19[3]. Due to damage to the upper respiratory tract and a reduction in pulmonary immune function, smoking, and using e-cigarettes increase the risk and severity of respiratory infections[4]. Smokers, in particular, are more likely to contract COVID-19 and die from it[5]. The widespread chronic airway condition identified as chronic obstructive pulmonary disease (COPD) is characterized by an irreversible deterioration of lung functionality. COPD may be highly prevalent in the COVID-19 group and might worsen the clinical outcomes of these patients, as it makes sense given that COVID-19 primarily affects the respiratory system[6].

Acute respiratory distress syndrome (ARDS) can strike people with severe illness 8-12 days after the illness first manifests. Smoking has been linked to a higher chance of infection and poorer outcomes for numerous viral and bacterial infections[5,6]. In addition, there is a range of 9.5 to 12 days from the start of the disease and admission to the intensive care unit (ICU).There are known risk factors for both severe COVID-19 and a higher chance of dying[9]. The link between tobacco use and the severity of COVID-19 infection is still contentious, despite consensus regarding the correlation between severe COVID-19 and the comorbidities listed above[7]. Smokers have a five-fold increased risk of influenza and a two-fold increased risk of pneumonia. Tobacco smoking is a significant risk factor for both bacterial and viral respiratory infections[10]. Under such conditions, it is crucial to investigate the connections between smoking and Covid-19 in more detail and ascertain whether these connections are due to the effects of nicotine or smoke itself [11].

Fever and respiratory symptoms, including cough, sputum production, and dyspnea, are the primary clinical symptoms. Extrapulmonary symptoms such as diarrhea, liver and renal damage, and heart function impairment can appear in certain people. Acute respiratory distress syndrome, multiple organ dysfunction syndromes, and even death are possible presentations for some patients with severe illness[12]. Smoking has been linked to an increased risk of acquiring many respiratory viral diseases, such as MERS, RSV, influenza, and others. Smoking causes inflammation of the lung epithelium, which damages the epithelial cells and results in the production of cytokines, increased mucus secretion, and poor mucociliary clearance[13]. Nicotine chemical compounds cause blood clotting and deadly embolism by damaging blood vessels, dissolving the lungs' protective lining, and altering the endothelium's surface[14].

Furthermore, the mortality rate for COVID-19 infections in smokers are 25.8%. Therefore, it is challenging to enforce stringent cross-infection controls when smoking is present. Smoking increases the risk of COVID-19 spreading from hand to mouth since it involves putting fingers and tainted cigarette shafts in contact with lips[15]. Even when people take precautions to keep a safe distance from smokers, contaminated surfaces, the air around them, and aerosol from smoking tobacco through different devices can passively infect non-smokers[16]. In a sample of patients with lung adenocarcinoma, it was recently discovered that, after adjusting for age, gender, and ethnicity, ACE2 gene expression is higher in ever smokers (both present and past) compared with never smokers in normal lung tissue[17]. Tobacco usage and the risk of COVID-19 infection are not entirely related, according to the epidemiological data. However, there is convincing evidence linking tobacco use to worse clinical outcomes, such as an increased risk of mortality; smokers who are currently using tobacco have a higher probability of dying in hospitals (9.4% vs. 5.6% for nonsmokers)[18].

Smoking has not been linked to the severity of COVID-19, even though previous research has examined several risk variables , but they have still lack of association between smoking and Covid-19 which will be defined in this study. This study have an important view on the severity of Covid symptoms and smoking as well. However this study investigates the connection between an individual's smoking behavior and the severity of their COVID-

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19 infection. The research highlights the elevated risk that smokers experience, establishing a link between smoking and a higher vulnerability to serious problems. The results demonstrate the complex interactions between respiratory disorders caused by smoking and the worsening of COVID-19 symptoms. The significance of focused public health initiatives is underscored by these findings, particularly as the world community struggles to contain the pandemic. Reducing smoking and encouraging quitting are essential for respiratory health in general as well as for minimizing the impact of COVID-19 on people that are vulnerable around the world. Even though the study provides insightful information, further research is necessary to fully understand every aspect of this relationship and develop more advanced public health solutions that will protect people and communities all around the world.

**Aims and Objectives**

1. To investigate whether smoking status and the severity of COVID-19 symptoms in patients are correlated.
2. To examine how the disease progresses in smokers and non-smokers.
3. To evaluate the relationship between smoking and comorbidities, or preexisting medical conditions that could potentially make COVID-19 outcomes more severe.

**Methodology:**

**Study Design:**

The current study aimed to identify the effect of smoking on covid-19 patients and its severity. For this reason a descriptive cross-sectional online survey study was conducted, in order to explore symptoms severity of covid-19 patients in relation to smoking. The past smokers are also consider current smokers in the study.

**Study Setting and Period:**

This study was conducted in different college/university students of Pakistan by sending online Google forms to their email/whatsapp. A cross-sectional study was carried from March 2021 to May 2021 after permission from ethical review board. One month was spent for data collection, one month for data analyses and one month for report writing.

**Sample size:**

The sample size was calculated through Expanded Program on Immunization (EPI) portal of Centers for Disease Control and Prevention (CDC). By calculation the researcher obtained 86 sample size with reference population of 8000 multiple college/university students studying in Pakistan with 95% confidence level, 5% margin of error and response distribution is 50%.

**Sampling Technique and Selection:**

A self-designed questionnaire with two parts was used: the first part included consent, demographics, level of education, and any comorbidities, and the second part included questions about their smoking status, SARS CoV-2, family/friends smoking status and their covid-19 history and symptoms severity during the COVID-19 infection.

**Inclusion Criteria:**

Inclusion criteria were as follows:

i. COVID-19 patients older than 18 years and diagnosed COVID-19 according to WHO criteria
ii. Current smokers with mild and severe COVID-19

Exclusion Criteria:

**Exclusion criteria were as follows:**

i. COVID-19 patients less than 18 years
ii. Non-smokers

**Data Collection Procedure:**

A semi structured questionnaire created on Google forms was circulated and was filled by college/university students. Data was obtained in form of excel sheet.

**Data Analysis:**

Data analysis was done by using Microsoft excel software and SPSS version 20.0 by IBM Corporation. Frequencies, percentages, means and standard deviations will be calculated and in order to compare means across gender independent sample "T test" will also be calculated.

**Expected Outcomes:**

Relation between smoking and covid-19 and its progression of symptoms.

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**Results**

Gender distribution shows 98% were male, 2% of them were females. 65% participants were Bachelor. 95% of Participants didn't have any chronic disease, 55% were regular smokers, 53% had acquired COVID19 infection once as shown in table 1.

**Table 1 Demographics**

| Demographics | | | |
|---|---|---|---|
| Variable | | Frequency | Percentage |
| Gender | Female | 2 | 2 |
| | Male | 84 | 98 |
| Education level | 12 years | 22 | 26 |
| | Bachelor | 56 | 65 |
| | < Matric | 2 | 2 |
| | Master | 6 | 7 |
| Chronic Disease | No | 82 | 95 |
| | Yes | 4 | 5 |
| Past Smoker/Smoker | No | 38 | 44 |
| | Yes | 48 | 55.8 |
| COVID Virus Infection | No | 40 | 46.5 |
| | Yes | 46 | 53.5 |
| Smokers in Family | No | 18 | 20.9 |
| | Yes | 68 | 79.1 |
| COVID Infection in family members | No | 36 | 41.9 |
| | Yes | 50 | 58.1 |

**As shown in figure 1, most of participants were holding bachelor's degree.**

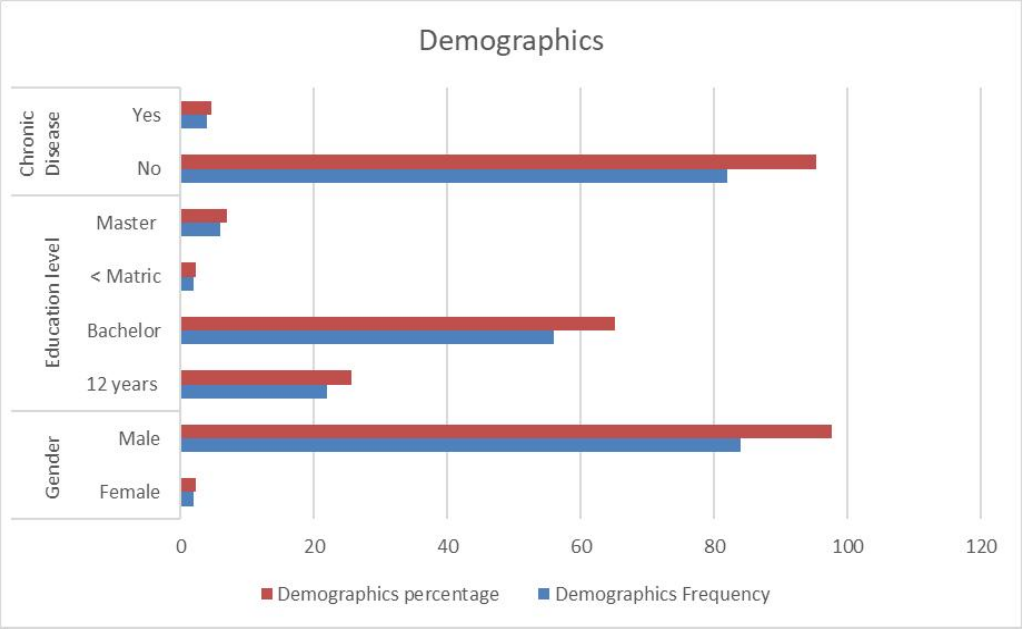


**Figure 1 Table of demographics**

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**Table 2 Descriptive**

| | Smoking | Frequency | Percentage |
|---|---|---|---|
| After COVID Pandemic | Non smoker | 40 | 46.51163 |
| | I smoke less than usual | 24 | 27.90698 |
| | Smoke more | 14 | 16.27907 |
| | Smoke as usual | 8 | 9.3023256 |

When participants were asked if they had any change in their smoking habit after COVID19 pandemic, 46% were non-smokers, why half of rest 54% tended to smoke less after covid19 pandemic. 16 percent stated they are smoking more than usual while 9% were smoking as they were before pandemic as shown in table 2.

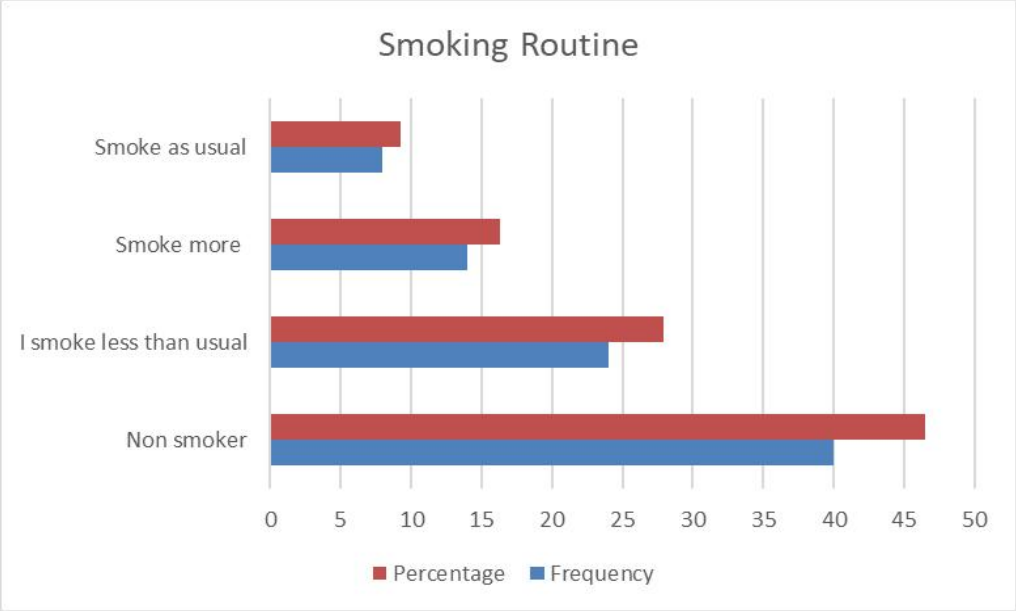


**Figure 2 Smoking routine after covid19 routine**

**Figure 2 shows smoking routine among participant after pandemic.**

In table 4, age and mean of age and symptom severity, mean of symptom severity of (N= 86) participants was 3.61, while mean for age was 25.72.

**Table 3 Descriptive Statistics**

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| **Parameters** | **N** | **Minimum** | **Maximum** | **Mean** | **Std. Deviation** |
| COVID-19 Symptom severity on Scale 1-10 | 86 | 0 | 9 | 3.6162791 | 3.087617 |
| Age | 86 | 18 | 46 | 25.72093 | 5.7284659 |

T-test was run on symptom severity between smokers and non-smokers. Results showed (N=86), mean of symptom severity, Smoker (M=4.00, S.D=2.975), while for non-smokers (M=3.13, and S.D=3.19) with t=1.30 and p=0.1 as shown in table 5.

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Table 4 Hypothesis Testing (Independent t-test)

| Groups | Smoker n=48 | | Non Smoker n=38 | | | | 95%CL | |
|---|---|---|---|---|---|---|---|---|
| | M | S.D | M | S.D | t | p | LL | UL |
| Symptom Severity | 4.00 | 2.975 | 3.131 | 3.19 | 1.30 | 0.106 | -0.472 | 2.20 |

**Discussion:**

Previous research on smoking cessation has emphasized the need to examine the patient's smoking status, sensitizing them about smoking, and encouraging them to quit[19]. However the likelihood of contracting a tobacco-associated COVID-19 infection can be minimized after reducing smoking is an important topic to answer in order to establish causality as well as to advise and effectively treat patients[20]. The results of the meta-analysis indicate a correlation between the severity of SARS-CoV-2 and concomitant conditions such diabetes, COPD, and previous cardiovascular illness in some studies[21]. In relation to smoking and COVID-19, our data revealed a pooled prevalence of 16% current smokers (95% CI, 4%–14%), which is less than the 25.2% (25.1–25.4) estimated smoking prevalence in China[22].

The quality of data in China, the US, and other countries is unknown given the pandemic's conditions. However, hospitalized COVID-19 patients also had a similarly low smoking prevalence, even if a superior data collection technique had been employed to report smoking conditions[23]. The most recent systematic review summarized the key data to date and focused on the role of smoking in COVID-19 severity and mortality. It was released in pre-print on May 23, 2020. It looked at 22 studies that reported hospitalized patients' illness severity based on their smoking status[24]. Consistent with recent findings, the clinical features of 2019-nCoV ARD resembled those of SARS-CoV. In contrast to SARS-CoV, MERS-CoV, and influenza, fever and cough were the most common symptoms, whereas gastrointestinal symptoms were uncommon. This suggests that the viral tropism is different[25].

Furthermore; the increase of ACE2 expression in the respiratory tract is caused by cigarette smoke. But experts also understand that certain parts of cigarettes, such as nicotine, may affect ACE2 differently from entire smoke, and that smoking itself may change the amount of ACE2 in non-respiratory organs in distinct ways[26]. However, the evaluation of smoking history's impact on disease progression showed a considerable degree of variability, which is probably due to significant inter-study differences in how progression is defined [27]

By using a standardized questionnaire and precise criteria for smoking history and illness stages, our smoking-focused study demonstrates a significant and favorable effect size of smoking history for disease severity. Other epidemiology papers on the impacts of smoking may have inconsistent study designs with various findings[28], such as focusing exclusively on "current" smokers, patients who have not yet had a hospitalization outcome, or not having a criterion for smoking history or "survivors," as has been acknowledged. In this regard, by referencing relevant research and examining the connections between smoking, exercise, and the severity of COVID-19, our findings add to the growing body of literature[29]. Five previous research results indicate that patients with and without a history of smoking do not significantly differ in terms of COVID-19 severity. The results of the previously published investigations are in conflict with this study[30].

**Conclusion**

In conclusion, the thorough investigation of the association between smoking and COVID-19 cases highlights how crucial it is to recognize the possible effects of tobacco use on respiratory health in the event of a worldwide pandemic. While the data currently available indicates that smokers may be more vulnerable to serious consequences from viral infection, more investigation is required. Initiatives in the field of public health should keep stressing the harmful consequences of smoking on an individual's general health, paying special emphasis on how smoking could increase the severity of COVID-19. The results highlight the need for comprehensive tobacco control policies and initiatives to help people quit smoking to reduce risks and safeguard vulnerable groups against the combined threats of smoking and COVID-19. Ultimately, addressing the

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complex interactions between smoking and COVID-19 outcomes and fostering a stronger and more resilient global community requires a multimodal strategy which includes rigorous research, public awareness campaigns, and focused treatments.

**Future Prospects**

The current COVID-19 epidemic should be investigated in relation to tobacco use in both the nicotine and tobacco research communities. To support the link between smoking and COVID-19, additional evidence is required. It is important to locate databases and conduct analyses that concentrate on the relationship between this correlation and viral infection, sickness severity, recovery potential, and other factors. Data on smoking status among COVID-19 patients should be systematically collected and examined. For smokers with COVID-19 symptoms, we require information regarding the short- and immediate-term benefits of prevention. Quantifying the quantity of infectious agents present in tobacco products should be a primary objective of laboratory research, with shared items like water pipes receiving special attention. Information regarding the risk/benefit ratio for different nicotine delivery methods with COVID-19 will also be required.

**Conflict of Research**

There is no conflict of research.

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