

The Role of Smoking on Incidence and Prognosis of Covid-19 Patients Admitted to Tishreen University Hospital

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Abstract

Background: In February 2020, the World Health Organization identified Covid-19 and identified SARAS-COV2 as the cause of the disease. So far, the number of infected people has exceeded 633 million, while the death toll has exceeded 6.6 million. Since the start of the pandemic, there have been conflicting reports about smoking in terms of incidence and prognosis.

Objective: The aim of this study was to investigate the effect of smoking on incidence and prognosis of COVID-19 patients.

Patients and Methods: An Analytic Observational Cohort study was conducted in patients with a proven diagnosis of COVID-19. They are selected from Pulmonary Medicine department, Tishreen University Hospital in Lattakia-Syria between June 2020 and December 2020. Study population were divided into two groups according to the patient's smoking status; group I included smoker (237 cases), and group II included non-smoker (277 cases).

Results: The population of 514 patients was predominantly male (66.1%), with a mean age of 61.76±14.9 years. 46.1% of the patients were smoker with presence of associated chronic diseases in 341 cases (66.3%). There were no significant differences between two groups regarding gender and comorbidities ($p>0.05$). Patients were significantly older in group I than in group II (71.22±13.2 versus 60.88±15.2, $p:0.001$). The rate of oxygen-based treatment was higher in smokers compared non-smokers (84.8% versus 67.9%, $p:0.03$). Non-invasive mechanical ventilation was necessary in 31 patients (13.1%) in group I versus 73 patients (26.4%) in group II, $p:0.04$. The duration of hospitalization was longer in non-smoker group (7.2±4.1 versus 5.7±3.9, $p:0.001$). Recovery rate was higher in non-smoker patients (81.2% versus 68.4%). In addition to, 75 patients (31.6%) in smoker group died versus 52 patients (18.8%) in non-smoker group, $p: 0.005$.

Conclusion: The current study demonstrated presence of favorable inverse associations of smoking with duration of hospitalization and the need to non-invasive mechanical ventilation in COVID-19 patients.

Keywords: COVID-19, outcome, smoking

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Introduction

Coronavirus disease (COVID-19) represents a global pandemic caused by Severe Acute Respiratory Syndrome Coronavirus -2(SARS-CoV-2) virus¹. It has resulted in high morbidity and mortality, in which approximately 73 million cases and 1.5 million deaths have been reported worldwide². The clinical manifestations of COVID-19 vary from asymptomatic to severe respiratory failure which requires intensive care and advanced ventilator support³. Early detection of the disease has become crucial to prevent spread of infection, and more attention should be paid to risk factors for developing severe COVID-19 to prevent severity⁴.

Smoking is the leading cause of preventable morbidity and mortality worldwide. It is estimated that there are approximately 1 billion smokers in the world, of whom 80% of them live in low- and middle income countries⁵. According to the World Health Organization(WHO), tobacco will kill more than eight million people worldwide annually by the year 2030 if the current trends continue⁶. It harms nearly every organ in the body, and is associated with a higher risk of viral respiratory infections, chronic diseases, and malignancies⁷. The mechanisms by which smoking increases the risk of respiratory infections are incompletely understood, which might include: structural changes in the respiratory tract, reduced lung function and a decrease in immunologic host defenses⁸. Growing epidemiological studies have reported an inverse relationship between tobacco smoking and COVID-19 occurrence, but these results are contradictory with the results of previous studies which found that smokers were more likely to develop serious illness from COVID-19 than non-smokers⁹. Therefore, the objective of the study was to: 1- explore the effect of smoking on COVID-19 prevalence 2- study the effect of smoking on prognosis and survival rate of COVID-19 patients.

Patients and Methods

This is an Analytic Observational Cohort study of a group of patients attending Department of Pulmonary Medicine at Tishreen University Hospital in Lattakia-Syria during six-months period (June 2020 and December 2020). The inclusion criteria were: patients older than 15 years, males or females, with a positive PCR, and who didn't receive vaccination. Complete history, review of systems, physical examination, and laboratory investigations were performed.

Radiological investigation was performed, and laboratory confirmation of COVID-19 diagnosis was done based on using real-time PCR with a standard protocol. Patients were stratified according to the smoking status into two groups: group I included COVID-19 patients who were smoker, and group II included COVID-19 patients who were non-smoker. Demographic variables, requirement to respiratory support and final outcome were compared between two groups.

Ethical consideration: All patients were provided a complete and clear informed consent after discussion about the study. This study was performed in accordance with the Declaration of Helsinki.

Statistical Analysis

Statistical analysis was performed by using IBM SPSS version 20. Basic Descriptive statistics included means, standard deviations(SD), Frequency and percentages. To examine the relationships and comparisons between the two group, chi-square test was used. Independent t student test was used to compare 2 independent groups. All the tests were considered significant at a 5% type I error rate($p < 0.05$), β :20%, and power of the study:80%.

Results

The study included a group of 514 patients with a diagnosis of COVID-19. The baseline characteristics of patients were as shown in Table (1). Age ranged from 19 to 92 years, with a mean age of 61.76 ± 14.9 years. Patients were classified according to age into two groups: <70 (42.6%) and ≥ 70 (57.4%). Males represented 66.1% and females 33.9% of the patients. Of the 514 patients included for the analysis, 341(66.3%) presented some comorbidity, and 237 patients (46.1%) were smokers.

Table 1: Demographic characteristics of the study population

Variable	Result
Age (years)	61.76±14.9
Age groups(years)	
<70	219 (42.6%)
≥70	295(57.4%)
Sex	
Male	340 (66.1%)
Female	174(33.9%)

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Variable	Result
Smoking	
Present	237(46.1%)
Absent	277(53.9%)
Chronic diseases	
Present	341(66.3%)
Absent	173(33.7%)

As shown in table (2), no significant difference was found between the two groups in terms of gender and presence of comorbidities ($p>0.05$). In group I, a mean age was 71.22 ± 13.2 years versus 60.88 ± 15.2 , $p:0.001$ in group II, $p:0.001$. Males represented 76.8% and females 23.2% of the patients with presence of comorbidities in 168 cases (70.9%) in group I. In group II, males represented 62.1% and females 37.9% of the patients, with presence of comorbidities in 173 cases (62.5%).

Table 2: Demographic characteristics of the study population by comparison of the two groups

Variables	Group I Smoker (n=237)	Group II Non-smoker (n=277)	P value
Age (years)	71.22 ± 13.2	60.88 ± 15.2	0.001
Sex			
Male	182(76.8%)	172(62.1%)	0.8
Female	55(23.2%)	105(37.9%)	
Comorbidities	168(70.9%)	173(62.5%)	0.09

During hospitalization, 201 patients (84.8%) required high-flow supplemental oxygen delivered with nasal cannula in group I versus 188 cases (67.9%) in group II, $p:0.03$. Non-invasive ventilation was used in 31(13.1%) patients in group I versus 73(26.4%) patients in group II, $p:0.04$, whereas invasive type was applied in 25 cases (10.5%) versus 34(12.3%) in group II, without significant difference, $p:0.5$. Hospital length of stay was significantly longer in in group II (7.2 ± 4.1 versus 5.7 ± 3.9 in group I, $p:0.001$). Patients were divided into three groups according to the length of hospital stay; 1-7 day (69.6%), 7-15(12.2%), and >15(18.2%) in group I versus 63.5%, 26%, and 10.5% in group II respectively, $p:0.02$. Recovery was occurred in 162(68.4%) patients in group I versus 225 cases (81.2%) in group II, and 31.6% of the patients died in group I versus 18.8% in group II, $p:0.005$.

Table 3: Outcome of the study population by comparison of the two groups

Variables	Group I (n=237)	Group II (n=277)	P value
Requirement for oxygen administration			
Present	201(84.8%)	188(67.9%)	0.03
Absent	36(15.2%)	89(32.1%)	
Mechanical ventilation			
Invasive	25(10.5%)	34(12.3%)	0.5
Non-invasive	31(13.1%)	73(26.4%)	0.04
Duration of hospitalization	5.7 ± 3.9	7.2 ± 4.1	0.001
Duration of hospitalization groups(day)			
1-7	165(69.6%)	176(63.5%)	0.02
7-15	29(12.2%)	72(26%)	
>15	43(18.2%)	29(10.5%)	
Final outcome			
Recovery	162(68.4%)	225(81.2%)	0.005
Death	75(31.6%)	52(18.8%)	

Discussion

The COVID-19 pandemic is a worldwide public health issue that has resulted in increased morbidity and mortality. To our knowledge, this study provides empirical evidence of the impact of smoking on prevalence of COVID-19 and final outcome of patients. The result of the current study revealed that approximately two-third of the patients were males with presence of smoking history in 46% of cases. Smoker patients were significantly older, and the rate of non-invasive mechanical ventilation was higher in non-smoker patients with presence of significant difference in non-invasive type. The duration of hospitalization was longer in non-smoker group. On the other hand, the rate of recovery was higher in non-smokers. The impact of tobacco smoking on outcome for participants with COVID-19 appear to be related to the differing effects of smoking that include: reduced production of pro-inflammatory cytokines (TNF, IL-1, IL-6) leading to protection effect against cytokine storm syndrome, decreasing the

risk of SARS/CoV-2 attachment through decreasing expression of ACE2, increasing production of nitric oxide that may inhibit potentially replication and entry of virus¹⁰. These findings are comparable with the results of previous studies.

Patanavanich et al (2020) demonstrated in a meta-analysis study conducted in 11590 patients with a diagnosis of COVID-19 presence of significant association between smoking and progression of COVID-19(OR:1.91, p:0.001)¹¹.

Albert et al (2021) revealed in an analytic study conducted in 402978 with a diagnosis of COVID-19 infection presence of association between smoking and the infection which modified by age. Smokers under age 69 year are at increased risk to exposure to SARS-COV-2 virus(RR:1.88), whereas older smokers were at higher rate of mortality from COVID-19 than non-smoker patients(RR:2.15)¹².

Meini et al (2021) demonstrated in a case-control study conducted in 218 patients with a diagnosis of COVID-19 infection who compared with 243 cases without COVID-19 infection that current smokers were significantly less likely to be hospitalized for COVID-19 compared with nonsmokers (OR: 0.23, p:0.001)¹³.

Paleiron et al (2021) showed in a study conducted in 1279 participants with confirmed or suspected COVID-19 who were compared with 409 cases without COVID-19 infection that current smoking status was associated with a lower risk of developing COVID-19 (OR:0.59, p<0.001)¹⁴.

In summary, the observed reduction in the rate of mechanical ventilation and shorter duration of hospitalization in smoker patients is consistent with a protective effect of smoking on the risk of COVID-19, but there is still considerable caution in interpreting this association as protective.

Conflict of Interest: Nil.

Source of funding: Self.

Ethical clearance: Taken from Tishreen University Hospital Committee.

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