Original Research Article

Association of Smoking and Covid Severity - A Cross Sectional Study

Sri Vengadesh Gopal[1], Rakesh Raj E[2], Saravanan Pandian[3], Arulprakash Ramesh[4], Arun Tipandjan[5]

[1]Associate Professor, Department of General Surgery, Indira Gandhi Medical College & Research Institute, Puducherry, India
[2]Assistant Professor, Department of General Surgery, Indira Gandhi Medical College & Research Institute, Puducherry, India
[3]Assistant Professor, Department of General Surgery, Indira Gandhi Medical College & Research Institute, Puducherry, India
[4]Junior Resident, Department of General Surgery, Indira Gandhi Medical College & Research Institute, Puducherry, India
[5]Radiology Assistant, Department of Radiology, Indira Gandhi Medical College & Research Institute, Puducherry, India

Abstract

Background: Novel Corona virus (SARS-COV2) infection discovered in late 2019 in china, became a pandemic and caused mortality due to severe acute respiratory syndrome (SARS). Smoking causes acute and chronic injury to respiratory epithelium and parenchyma leading to chronic obstructive pulmonary disease (COPD). The relationship of cigarette smoking and coronavirus infection is paradoxical. There is no clear conclusion regarding the relationship between smoking and covid infection and its severity.

Objective: The purpose of the current study was to determine how smoking affected Covid severity among patients admitted at Covid-designated tertiary care hospital.

Material and Methods: In a tertiary care institution that has been designated for treating COVID positive patients, this retrospective, cross-sectional study was conducted. The patients who were admitted for covid illness between Jan 2021 and June 2021 were included in research. After receiving clearance from the institute's ethics committee for human studies, and the medical records department case files were reviewed. Patients hospitalized for observation for fewer than 24 hours, patients with missing or untraceable data, and patients for whom a CT scan of the chest was not performed were all excluded from our research. To ensure the integrity of the data, the acquired information was put into Epicollect. Using SPSS, descriptive statistics were used to analyze the data (version 24).

Result: The majority of the participants in our study (n=1109) were men [848 (76%)]. The ratio of men to women was 3:1. The majority of patients (715, or 64.47%), were between the age range of 30 to 60 yrs. Majority of patients (363; 32.7%) had mild CT severity. The most prevalent [369 (33.27%)] comorbidity in the study population was diabetes. Most of the patients who were hospitalized were nonsmokers[987(89%)]. The majority of smokers and non-smokers had CT severity that was normal or mild to moderate. Smokers and non-smokers had comparable distribution of CT severity.

Conclusion: The majority of individuals who needed hospital admission for the management of COVID illness were nonsmokers. In our study, there was no correlation between smoking and the severity of the COVID infection. For further clarification of our findings, more research with a larger sample size is required.

Keywords: Covid, Smoking, severe acute respiratory syndrome, CT severity

Introduction

Novel Coronavirus belonging to the family *Coronaviridae,* possess non segmental positive sense RNA virus [1]. It is widely distributed in humans and other mammals [1]. Unlike the other SARS viruses, the SARS-CoV2 virus enters the host cell by strongly attaching to the ACE II receptor [2]. There are many ACE II receptors in type 2 alveolar cells in lungs [3,4]. During pandemic, Covid-19 infected patients presented with extensive spectrum of clinical manifestations ranging from asymptomatic to serious illness and death. Patients with severe disease had multi-organ failure in particular acute respiratory distress syndrome (ARDS) [5-9]. Patients with ARDS needed intensive care unit (ICU) care and mechanical ventilation which increased during pandemic causing severe public health care burden [5,6]. Various factors increasing risk of covid severity are studied including age, diabetes, hypertension, smoking and alcoholism [10]. Smoking is well known to cause COPD and decreased immunity in lung epithelium leading to infection [11]. Hence it becomes a necessity to understand association between nicotine and SARS. It is also important to study other risk factors causing severe covid illness for proper management. Tobacco in any form is injurious to health. Cigarette smoking cause lung damage and increase the risk of respiratory infections both bacterial and viral [12]. Smoking is also a preventable threat factor for lung cancer and cardiovascular diseases [13]. Some studies have shown negative relationship between smoking and Covid severity [14]. Several studies on smoking as risk factor have variable results.

To understand the association of COVID infection and smoking, retrospective cross-sectional research was carried out in tertiary care hospital designated for treating COVID infected patients with the aim of determining impact of smoking on severity of Covid among patients who were admitted, along with other comorbidities like diabetes and hypertension.

Materials and Method

In a tertiary care institution that has been designated to treat COVID patients, this retrospective, cross-sectional study was conducted. After receiving clearance from institute ethics committee (Human studies) (NO. 372/IEC -33 / IGMC&RI / PP-06 / 2022), patients hospitalized for covid illness from Jan 2021 to June 2021 were included in research. Their case records from medical records department were evaluated. All patients over the age of 18 who are hospitalized for Covid-19 treatment were included in the study. Patients hospitalized for observation for less than 24 hours, those whose data are unavailable and untraceable, and those for whom CT chest scan was not performed, were all eliminated from this study. Patients under the age of 18 and women who were pregnant were also excluded. Patient records from the medical records department were analyzed, and data was gathered, after clearance from institute's research and ethics committee. Phone calls were made to patients who had insufficient

information, and extensive information on smoking was gathered. After obtaining the patient's approval, the phone call was recorded, and it was assumed that this constituted informed consent for the research. Sociodemographic information, CT severity, comorbidities, and smoking history were among the study's criteria. Chang *et al* proposed CT grading system based on the proportion of lung involvement was used to determine the severity of the CT [15].

As per centers for disease control (CDC) and prevention, an adult who has smoked at least 100 cigarettes in their life time and now smokes daily qualifies as a smoker. For simple data analysis, the acquired information was put into Google Forms and Microsoft Excel sheets. SPSS was used to analyze the data using descriptive statistics (version 24). To determine the significance of a relationship between different components, multinominal regression analysis and the chi-square test (p value < 0.05 was regarded as significant) were utilized.

Results

In this study population(n=1109), it was observed that more males 848 (76%) were infected with covid-19 compared to females (3: 1 ratio) (figure.1)
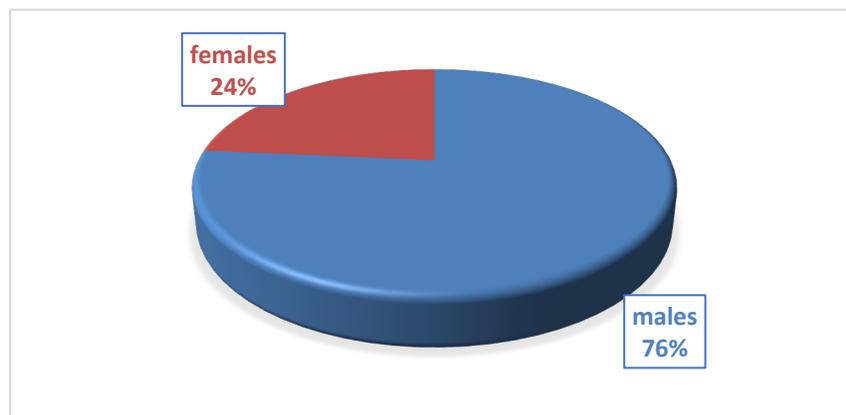

Figure 1: Gender distribution

No significant association between gender and CT severity (fig, 2) (p value=0.774).
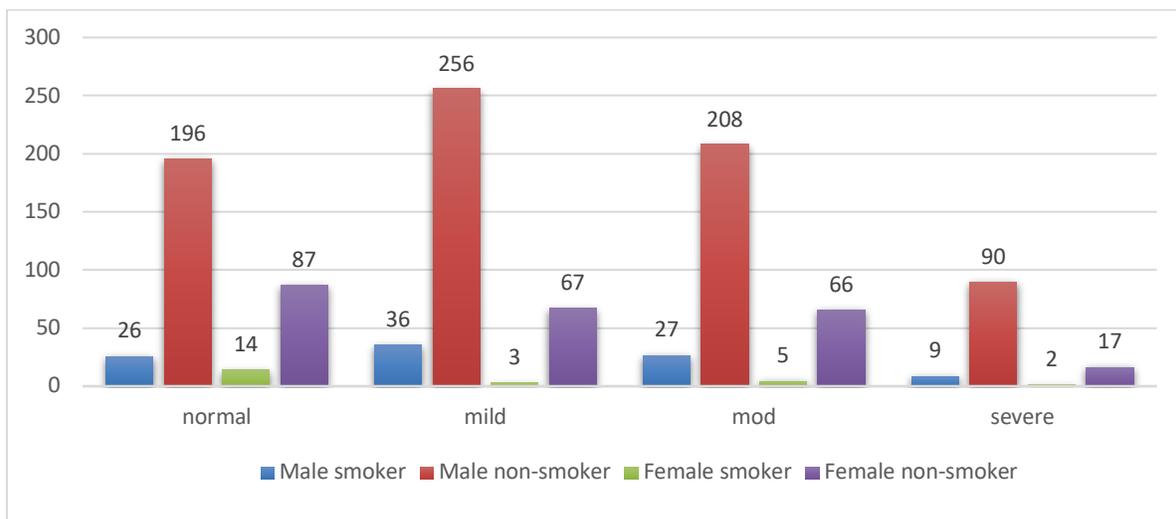
Figure 2: CT severity between gender groups

Majority of patients were in 30 to 60 yrs age group 715 (64.47%) (figure. 3).

Figure 3: CT severity among various age groups

Majority of patients admitted for covid illness were nonsmokers 987(89%). Only 11% of the patients were smokers (figure 4)

Figure 4: study population

11(9.01%) patients with smoking history had critical CT severity score. 32(26.22%) smokers had moderate score, 39(31.96%) had mild score and 40(32.78%) were normal.

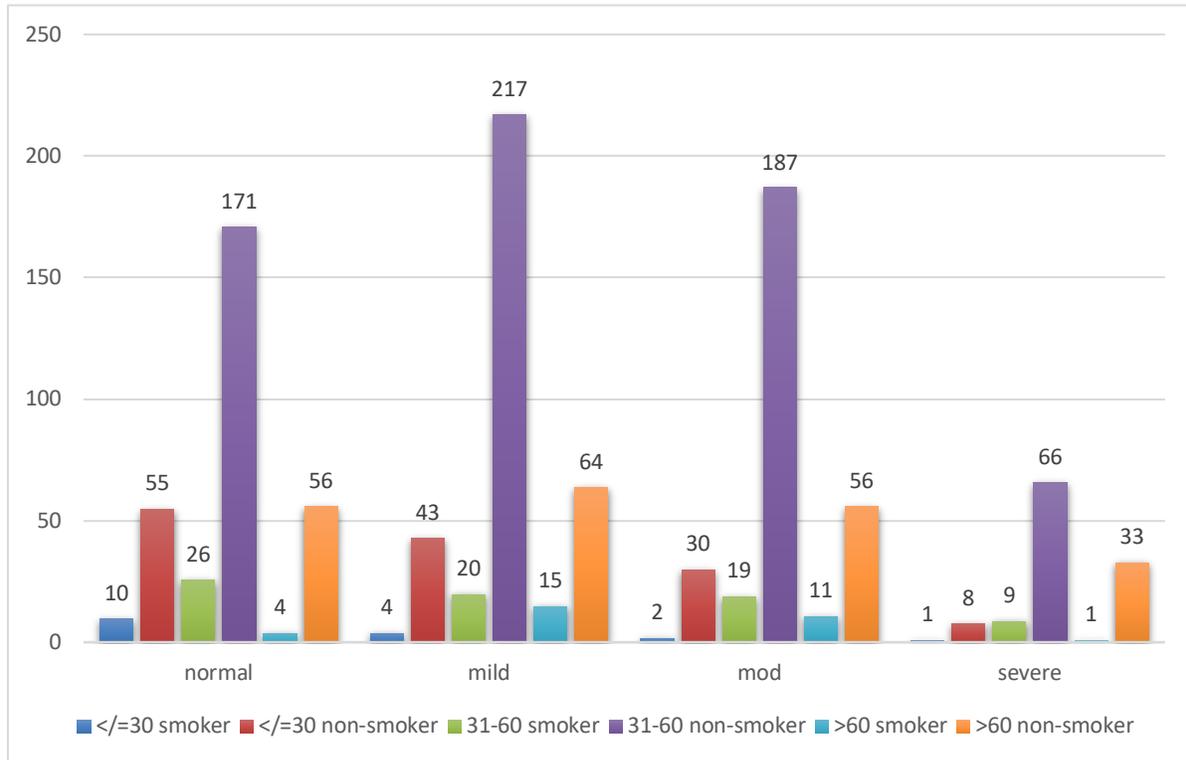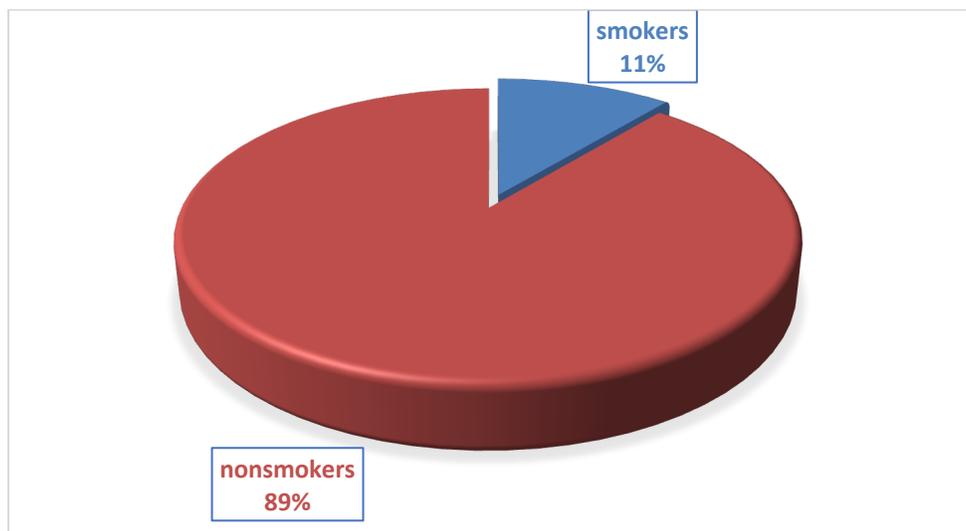**Table 1: Relationship of CT severity and smoking in study group**

			CT severity				Total(n)
			Normal(%)	Mild(%)	Moderate(%)	Severe(%)	
Smoking Histroy before illness	Yes		40(32.78)	39(31.96)	32(26.22)	11(9.01)	122
	No		282(28.57)	324(32.82)	274(27.76)	10710.84)	987
Total			322	363	306	118	1109

Chi-square test; p value = 0.772

Table 2: Association of smoking and CT-severity between diabetic and non-diabetic patients

DM			CT severity				Total(n)	P value
			Normal(%)	Mild(%)	Moderate(%)	Severe(%)		
Yes	Smoking History before illness	Yes	15(30.61)	16(32.6)	11(22.44)	7(14.28)	49	0.771
		No	86(26.87)	95(29.68)	95(29.68)	44(13.75)	320	
No	Smoking History before illness	Yes	27(36)	23(31.50)	21(28.76)	4(5.47)	75	0.582
		No	195(29.32)	229(34.43)	178(26.76)	63(9.47)	665	
							1109	0.767

Table 3: Relationship of CT severity and smoking among hypertensives

Hypertension			CT severity				Total(n)	P value
			Normal(%)	Mild(%)	Moderate(%)	Severe(%)		
Yes	Smoking History before illness	Yes	12(26.08)	18(39.13)	12(26.08)	4(8.69)	46	0.748
		No	8(2.99)6	92(34.45)	59(22.09)	30(11.23)	267	
No	Smoking History before illness	Yes	31(39.24)	21(27.63)	20(26.31)	7(9.21)	79	0.367
		No	195	232	213	77	717	
						total	1109	0.770

Table 4: Association of CT severity among gender groups

Gender			CT severity				Total(n)	P value
			Normal(%)	Mild(%)	Moderate(%)	Severe(%)		
male	Smoking History before illness	Yes	26(26.53)	36(36.73)	27(27.55)	9(9.18)	98	0.858
		No	196(26.13)	256(34.13)	208(27.73)	90(12)	750	
female	Smoking History before illness	Yes	14(58.33)	3(12.5)	5(20.83)	2(8.33)	24	0.158
		No	87(36.70)	67(28.27)	66(27.84)	17(7.17)	237	
						total	1109	0.774

Table 5 association of age and smoking with CT severity in study group

AGE GROUP(in years)			CT severity				Total	P value
			Normal(%)	Mild(%)	Moderate(%)	Severe(%)		
</=30	Smoking History before illness	Yes	10(58.82)	4(23.52)	2(11.76)	1(5.88)	17	0.515
		No	55(40.44)	43(31.61)	30(22.05)	8(5.88)	136	
31-60	Smoking History before illness	Yes	26(35.13)	20(27.02)	19(25.67)	9(12.16)	74	0.368
		No	171(26.7)	21733.85)	187(29.17)	66(10.29)	641	
>60	Smoking History before illness	Yes	4(12.5)	15(46.87)	11(34.37)	2(6.25)	32	0.038
		No	56(26.79)	64(30.62)	56(26.79)	33(15.78)	209	
	total						1109	

Among non-smokers, 282 (28.57%) had a normal CT severity score, 274 (27.76%) had a moderate score, 324 (32.82%) had a mild score, and 107 (10.84%) had a severe score (table 1). The distribution of CT severity between smokers and nonsmokers was quite comparable. According to our study, there is no correlation between smoking & CT severity (p value = 0.772).

Our data was analyzed using multi-nominal regression analysis and Mantel-Henzel method. Compared to people without medical morbidities, chi-square analysis revealed no statistically significant correlation among smoking and severity of covid in diabetic and hypertensive patients (Tables 2,3). Taking into account various age and gender groups, there was no consistent correlation between smoking and CT severity (Tables 4,5).

Discussion

Cigarette smoking is generally the risk factor for many lung diseases. In this covid pandemic, various data are coming from different parts of the world regarding the association of smoking with covid infection and SARS. Stay-at-home and face mask orders have been issued by governments across world, isolating majority of people from one another over extended periods of time. Excessive cigarette smoking has become public health problem during this epidemic, compounded by increasing unemployment.

Smoking tobacco reduces innate and adaptive immune responses and mucociliary clearance [16]. Smoking prevents effective T cell activation, smoking also inhibits B cell proliferation and antibody production from proliferating and producing antibodies, which prevents humoral immunity from functioning normally [17]. Poor outcome in this subset of COVID-19 patients with smoking history may be caused by increased

inflammation (Chen *et al.*, 2020) [17]. In animal model acute respiratory distress syndrome a hallmark of severe COVID-19, has been demonstrated to be prevented by nicotine, an agonist of nicotinic cholinergic system [18]. Recent research confirms that nicotine upregulates ACE2 [19]. This is proposed as potential mechanism to increase susceptibility of covid in smokers [20,21].

After examining 19 peer-reviewed publications for their meta-analysis, Patanavanich *et al.* came to conclusion that smoking is a risk factor for covid progression compared to never smokers [22]. Tsigaris *et al.* observed negative correlation between smoking prevalence and COVID-19 occurrence at population level in 38 European nations [23] in another ecological study. In different study, Paleiron *et al.* came to conclusion that current smoking status was not effective means of infection prevention even if it was related with lower risk of acquiring Covid-19 [24]. To learn why smokers are less vulnerable to SARS-CoV-2 virus, more research is required.

Multiple factors including age is risk factor for severe covid disease [25]. Mengyuan *et al*, in their multicenter study in wuhan concluded that Cigarette Smoking is a risk factor for severe illness & increasing mortality during SARS-CoV-2 infection [16]. Ornell *et al.*, 2008 showed tobacco is a risk for COVID-19 and influenza infection and poorer prognosis [26]. Dai *et al* conducted a meta-analysis and concluded that smoking due to its effect on lung and immunity are vulnerable to COVID-19 [16]. Liu *et al.*, 2020 study found that smokers are more likely to progress from covid-19 to pneumonia [27].

In our study, majority of individuals with COVID illness who were hospitalized were non smokers. Most smokers and non-smokers had CT severity that was normal or mild to moderate. Smokers and non-smokers had comparable distributions of CT severity.

The prevalence of smoking in a poplation in pondicherry was 13% [28]. Further investigations are required on the therapeutic effects of nicotine and the association of smoking to the development of SARS respectively [29,30].

The retrospective design at single institution is one of the study's shortcomings. The proportion of patients who have smoked in the past may be understated since some patients may not disclose quantity of smoking. Additionally, due to a lack of data, individuals who passed away with COVID illnesses were not included in the study.

Conclusion

The majority of individuals who needed hospital admission for the management of covid illness were nonsmokers. In our investigation, there was no correlation between smoking and the severity of the COVID infection. Additionally, there is no link between smoking and the severity of COVID in those with diabetes and high blood pressure. Our findings should prompt more research involving humans as well as animals to better understand association among smoking and Covid-19 severity.

Ethical approval: The study was approved by the Institute Ethics Committee (Human studies)

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