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Original Research Article

Relationship between Alcoholism and Severity of COVID-19 Infection: An Institution Based Study

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Abstract

Background: Pandemic caused by Covid 19 infection witnessed several patients suffering from severe acute respiratory syndrome (SARS) due to severe inflammatory response. Risk factors that contributed to severe covid 19 infection include age, diabetes, previous lung disease, liver and kidney disease. Several other risk factors like smoking, alcoholism, hypertension and obesity are also being studied to understand their contribution in causing severe covid 19 infection and death. Alcohol is well known to cause immunosuppression and multiple organ injury including liver, pancreas and lung. It is a necessity to understand the effect of alcoholism on covid severity and risk of infection to create better awareness and understand the prognosis of covid 19 infection among alcoholics. The relationship of Alcoholism and COVID-19 infection is still controversial. In the literature, fewer studies are done to assess alcoholism and covid severity.

Objective: The present study is done to find out the relationship of alcohol consumption on Covid severity among individuals admitted at Covid designated tertiary care hospital.

Materials and Methods: This retrospective, cross sectional study was carried out in a covid designated tertiary care hospital. After approval from Institute Ethics Committee (Human studies), the patients admitted for covid illness from January 2021 to June 2021 were taken up for the study and their case records from medical records department were studied. Telephonic conversation was also done for patients with inadequate data. The collected data was entered in google forms and MS excel sheet and analysis done using descriptive statistics involving SPSS (version 24).

Result: A total of 1109 patients were included in the study. Most of the patients in our study were males- 851(76.73). The male:female ratio was 3.2:1. The maximum patient belonged to the age range 30 to 60 years. CT severity was mild in most of the patients (32.82%). Diabetes was the most common (33.18%) comorbidity among the study population. Majority of the admitted patients were Non-alcoholics 884 (79.7%). Among alcoholics and non-alcoholics, majority showed normal, mild to moderate CT severity. There is no statistically significant

association between alcoholism and CT severity score compared to non-alcoholics (p value=0.947). Also, there is no significant association between alcoholism and Covid severity among Diabetic and Hypertensive patients compared to patients without these medical morbidities.

Conclusion: In conclusion, majority of the patients who required admission in hospital for covid illness treatment were non-alcoholics. There is no significant association between alcoholism and covid-19 severity compared to general population. Also, there is no significant association between alcoholism and Covid severity among Diabetic and Hypertensive patients. Further human and experimental studies with more sample size is needed for further clarification of our findings

Keywords: Covid-19, Alcoholism, SARS, CT severity

Background

In the month of December 2019 there was an outbreak of viral pneumonia cases at Wuhan, china [1]. The virus identified as novel coronavirus was scientifically named severe acute respiratory syndrome coronavirus2 (SARS-CoV-2) [2]. On the 11 March 2020, WHO acknowledged that the virus would likely spread to all countries across the globe and declared the coronavirus outbreak a pandemic [3]. Coronaviruses belong to the Coronaviridae family in the Nidovirales order [4]. The coronavirus disease 19 (COVID-19) is a highly transmittable and pathogenic viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [4]. COVID-19 is thought to be primarily transmitted via human-to-human transmission pathways, through mediators such as droplets, contact, and fecal-oral transmission [4]. Entry of SARS-CoV2 virus is by tightly binding to ACE II receptor on the host cell [5-7]. ACE II receptors are abundant in type 2 alveolar cells in the lungs and in cilia of the glandular epithelial cells of the GI tract except the oesophagus that lacks ACE II receptors [5-7]. The symptoms included fever, fatigue, cough, myalgia anorexia, and sore throat [9]. The incubation period is 14 days [8]. The severity of covid differs due to distinct demographic features, comorbidities, and immune system responses among different populations [8]. Severe form of coronavirus infection can cause severe acute respiratory syndrome and other organ injuries [9]. Individuals at all ages are at risk for infection and severe disease. Elderly patients with associated comorbidities like diabetes mellitus, hypertension, liver and lung diseases seemed to suffer from serious illness and death [10,11].

Several research studies are done to identify the various factors that increase risk of covid 19 infection, severe organ injury and death. Modifiable risk factors like smoking, alcohol and obesity are also studied as possible risk factors in causing severe disease and death. Several studies related to change in pattern of alcohol consumption and its abuse are done throughout the world [12]. Fewer studies are done to assess alcohol consumption and covid severity. It is very important to study the effects of alcohol in causing severe covid 19 infections to create awareness. Alcohol is known to cause damage to liver, lung and cause immunosuppression. Many studies suggest alcoholism may increase the risk of covid 19 severity. Some studies have shown no association of alcoholism on covid severity. In view of the above, a retrospective, cross sectional study was conducted in covid designated tertiary care

hospital with an aim to find out the relationship of alcoholism on Covid-19 infection and its severity.

Method

This retrospective, cross sectional study was carried out in a covid designated tertiary care hospital. After approval from Institute Ethics Committee (Human studies) (NO. 372/IEC -33 / IGMC&RI / PP-06 / 2022), the patients admitted for covid illness from January 2021 to June 2021 were taken up for the study and their case records from medical records department were studied.

Inclusion criteria composed of all patients above 18years of age admitted at tertiary care hospital for Covid-19 treatment. Whereas, patients admitted for observation for less than 24hrs, patient's data which are not available and who are not traceable and patient whom CT chest was not done were excluded from our study. Patients less than 18years and Pregnant patients were also excluded.

After approval from the Institute Research Committee and Institute Ethics Committee, Patient records were analysed from medical records department and data was collected. The patients with inadequate data were contacted over phone and detailed history of smoking and alcoholism was obtained. The conversation was recorded in phone after getting patients permission and it was taken as informed consent for study. The study parameters included socio-demographic details, CT severity, Comorbidities, History of Smoking and Alcoholism. CT severity was based on scoring system proposed by Chang *et al* according to percentage of lung involvement [13].

Criteria for alcoholic include more than 7 Standard drinks per week/ more than 3 Standard drinks per day. One standard drink was taken as 350 ml Beer/ 200ml Toddy/ 150 ml Wine/ 45 ml Whiskey or Arrack. The collected data was entered in google forms and MS excel sheet for easy analysis of data. Data analysis using descriptive statistics was done using SPSS (version 24). chi-square test (p value<0.05 was considered significant) and multinominal regression analysis was used to calculate significance of association between various factors.

Results

A total of 1109 patients were included in the study. In our study, majority 851(76.73%) admitted for covid were males (figure 1).

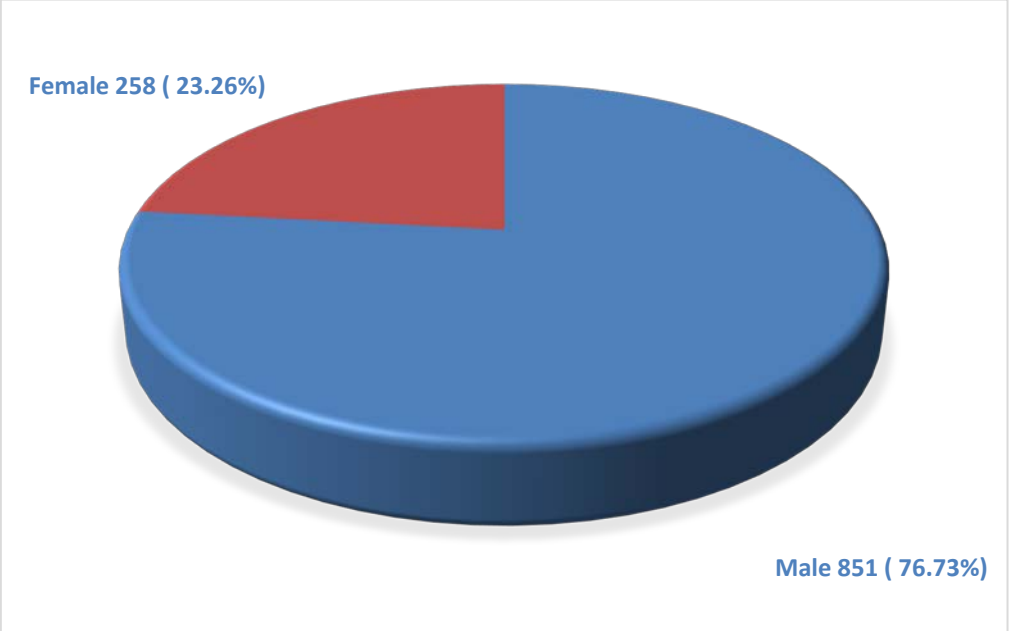

Figure 1: Gender Distribution

More alcoholics were present in male gender when compared to females. The distribution of CT severity was also similar in both gender (figure. 2).

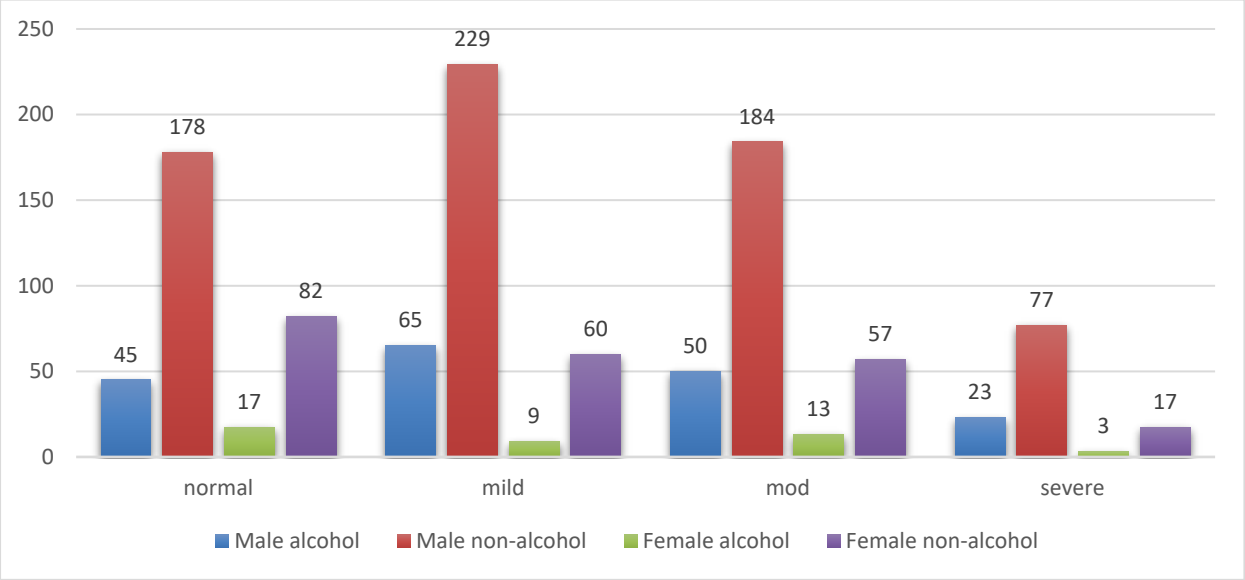

Figure 2: CT severity among gender groups

78.3% of patients were below 60yrs and 21.64% were above 60yrs old (figure. 3).

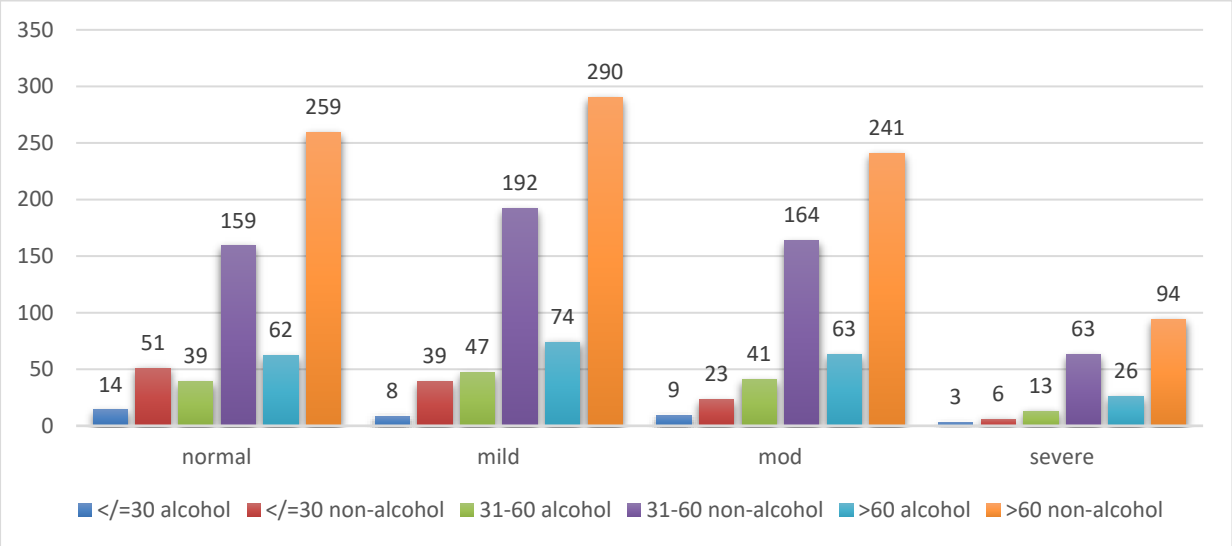

Figure 3: CT severity in different age groups

Among 1109 patients, 20.3% were alcoholics. Majority (79.7 %) of the patients admitted for covid illness were non-alcoholics(figure. 4).

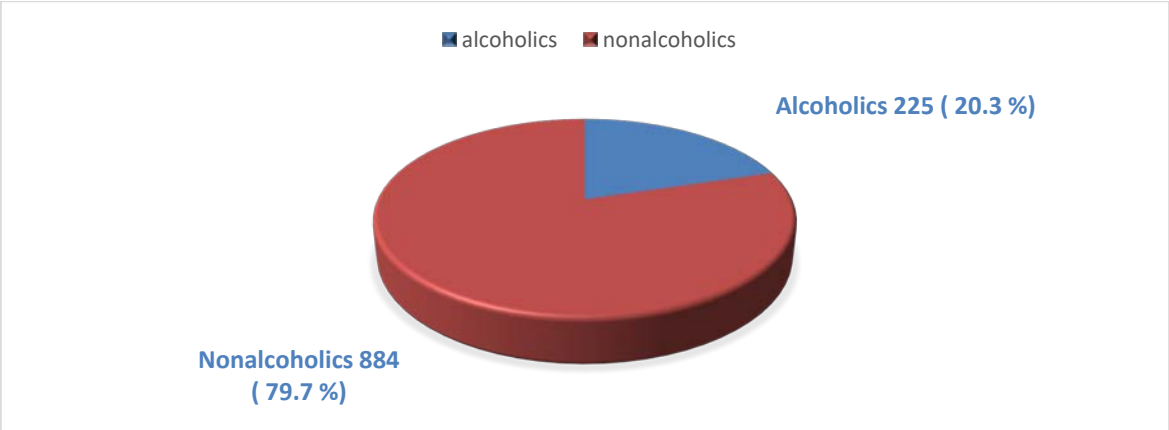

Figure 4: Study population

Table 1: Association of CT severity among study population

		CT severity				Total
		Normal (%)	Mild (%)	Moderate (%)	Severe (%)	
Alcoholism before illness	Yes	62(27.55)	74(32.88)	63(28)	26(11.55)	225
	No	259(29.29)	290(32.80)	241(27.26)	94(10.63)	884
Total		321	364	304	120	1109

Chi-square test; p value=0.947

Table 2: Association of CT severity among DM in study population

Diabetes mellitus			CT severity				Total	P value
			Normal (%)	Mild (%)	Moderate (%)	Severe (%)		
Yes	Alcoholism before illness	Yes	25(29.06)	27(31.39)	22(25.58)	12(13.95)	86	0.925
		No	75(26.59)	85(30.14)	82(29.07)	40(14.18)	282	
No	Alcoholism before illness	Yes	35(24.82)	50(35.46)	42(29.78)	14(9.92)	141	0.769
		No	183(30.5)	205(34.16)	158(26.33)	54(9)	600	
	Total						1109	

Table 3: Association of CT severity among patients with hypertension

Hypertension			CT severity				Total	P value
			Normal (%)	Mild (%)	Moderate (%)	Severe (%)		
Yes	Alcoholism before illness	Yes	21(26.92)	34(43.58)	16(20.51)	7(8.97)	78	0.394
		No	76(32.47)	77(32.90)	54(23.07)	27(11.53)	234	
No	Alcoholism before illness	Yes	44(29.33)	40(26.66)	47(31.33)	19(12.66)	150	0.498
		No	182(28.12)	213(32.92)	185(28.59)	67(10.35)	647	
	Total						1109	

Table 4: Association of CT severity among gender groups

Gender			CT severity				Total	P value
			Normal (%)	Mild (%)	Moderate (%)	Severe (%)		
Male	Alcoholism before illness	Yes	46(25)	65(35.32)	50(27.17)	23(12.5)	184	0.941
		No	177(26.53)	229(34.33)	184(27.58)	77(11.54)	667	
Female	Alcoholism before illness	Yes	17(40.47)	9(21.42)	13(30.95)	3(7.14)	42	0.830
		No	82(37.96)	60(27.77)	57(26.38)	17(7.87)	216	
	Total						1109	

Table 5: Association of CT severity among different age groups

Age Groups			CT severity				Total	P value
			Normal (%)	Mild (%)	Moderate (%)	Severe (%)		
</= 30	Alcoholism before illness	Yes	14(41.17)	8(23.52)	9(26.27)	3(8.82)	34	0.564
		No	51(42.85)	39(32.77)	23919.32)	6(5.04)	119	
31-60	Alcoholism before illness	Yes	39(27.85)	47(33.57)	41(29.28)	13(9.28)	140	0.954
		No	157(27.25)	192(33.33)	164(28.47)	63(10.93)	576	
>60	Alcoholism before illness	Yes	9(17.64)	19(37.25)	13(25.49)	10(19.60)	51	0.375
		No	51(26.98)	59(31.21)	54(28.57)	25(13.22)	189	
	Total						1109	

There is significant association of CT severity in patients above 60 Years

Among the study population, associated co-morbidities like DM and hypertension were studied. Multinominal regression analysis and Mantel Henzel Method was used to analyse our data. Chi-square test showed no significant association of alcoholism and covid severity among Diabetic and Hypertensive patients compared to patients without medical morbidities. (Tables 2 and 3).

There is no significant association between gender and different age range in severity among study population (table 4,5)

10.82% had severe CT severity score, 27.41% had moderate score, 32.82 % had mild score and 28.94% were normal. This severity distribution was similar among alcoholics and nonalcoholics (Table 5).

There is significant association of CT severity in patients above 60 yrs.

Discussion

Following covid-19 outbreak and lockdown alcohol consumption has significantly increased (Pollard *et al*., 2020; The Nielsen Company, 2020). Chronic consumption of alcohol leads to altered immune response to microbial infections (Barr *et al*., 2016; Szabo and Saha, 2015). Chronic alcohol consumption causes reduction in number and activity of NK cells, T cells and B cells, thereby decreasing immune response and antibody production [14]. Recent meta-analyses demonstrated that ethanol exposure may augment SARS-COV-2 induced inflammation by altering the activity of key inflammatory mediators [15] (Wenfei Huang *et al*).

A recent systematic review and meta-analysis found that high to low alcohol consumption was associated with significant risk of ARDS [16,18]. Alcohol can cause alveolar epithelium dysfunction, increase oxidative stress and interfer with alveolar macrophage function [17]. Ebrahim Abbasi-Oshaghi *et al* study showed chronic alcohol consumption increased oxidative stress and decreased antioxidant capacity in alveolar space affecting function of alveolar barrier function and type2 alveolar cells. Alcoholism lead to steatosis, cholestasis, fibrosis, or cirrhosis (Louvet and Mathurin, 2015), pancreatitis, coronary heart disease, nervous system disease. COVID-19 affects patients with underlying chronic lung disease, cardiovascular disease, renal function disease, hypertension, and diabetes and the elderly [20].

However, other studies show that light and moderate drinking may have protective effect on the cardiovascular system compared with long-term heavy drinking [20]. Diabetes and hypertension also adds to outcome of covid related morbidity and mortality. Alcoholism as a risk factor for contracting covid infection and leading to severe infection is still controversial.

Kristina L. Bailey *et al* in his study concluded heavy alcohol consumption

have higher risk of covid-19 infection and severe pneumonia [21]. Bechara *et al*. (2003) affirm that chronic ethanol intake increases angiotensin II type 1 receptor (AT2) expression in the alveolar epithelium and enhances tumor necrosis factor-alpha and angiotensin II induced cytotoxicity, both of which act via AT2 [22]. Daniela Benzano *et al* summarised that alcohol abusers have more risk of covid-19 and worse prognosis than general population with possibly higher morbidity [23]. Ademola Samuel Ojo 1 *et al* suggested excessive alcohol consumption and covid -19 infection can have synergistic effect in causing multiorgan injury like cardiac injury, acute respiratory syndrome, pulmonary fibrosis and liver damage leading to worsening disease and poor prognosis [25].

Shiva Arjun *et al*, in their retrospective analysis found that patients with chronic alcohol use did not have a statistically elevated risk of mortality than those without alcohol use. They concluded that Chronic immunosuppression from alcohol use and associated liver dysfunction may not be a significant contributing factor to worsening outcomes in patients with concomitant COVID 19 infections. Jacob Lebin *et al*, in their retrospective cohort study found that chronic alcohol use was not associated with a decreased incidence of COVID-19 infection.

In our retrospective study we tried to understand the severity of covid-19 infection among alcoholics compared to non-alcoholics. In our study, Non-alcoholic covid patients were more than the alcoholics. This can be explained by less alcohol abuse among the population in our region. The overall prevalence of alcohol use in local population among ≥18 years of age was 9.7% [28]. Also, the CT severity was similar among non-alcoholics and alcoholics and does not show any association with alcohol consumption.

Our study limitations include the retrospective design at a single institution. The percentage of patients with a history of chronic alcohol use may be underestimated as patient may not reveal the true volume of consumption. Also, patients who died due to covid illness were not considered in the study due to nonavailability of data.

Conclusion

In conclusion, majority of the patients who required admission in hospital for covid illness treatment were nonalcoholics. There is no statistical significance of covid severity among alcoholics compared to nonalcoholics. Also, there is no significant association between alcoholism and Covid severity among Diabetic and Hypertensive patients. Our findings should lead to further human studies with more sample size and also animal experiments for better understanding of the association of alcoholism with Covid-19 infection.

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