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The Covid-19 Pandemic and Tb - Impact and Implications

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Abstract:
Introduction*-COVID-19 has affected and is affecting mankind round the globe. Certain studies have shown that co-morbid conditions like chronic obstructive pulmonary disease (COPD), cerebrovascular disease, hypertension, diabetes, and cardiovascular disease are major risk factors for disease progression in COVID- 19 patients. However, very few studies have focussed on the impact of tuberculosis on COVID- 19. We performed a retrospective study to assess whether tuberculosis is associated with an increased susceptibility, severity and risk of death in COVID- 19 patients.*
Material and methods*-Patients with either positive COVID -19 RT-PCR (Reverse transcriptase polymerase chain reaction), or positive COVID-19 RAT (rapid antigen test) were included in the study. Detailed history was taken to rule out old pulmonary tuberculosis. Those having clinical suspicion of co-infection were subjected to sputum microscopy and CBNAAT (cartridge based nucleic acid amplification test). This was a retrospective observational study from April 2020 to December 2020.*
Result*– A total of 2,360 patients admitted and tested positive for Covid -19 were included in the study. Among them 60.97% (n = 1439) were successfully treated and discharged while 39.02% (n = 921) patients died. Out of 2360,0.67% (n = 16) cases have association with TB. From these 16, around 93.75% (n = 15) were having past history of TB and 6.25% (n = 1) had active tuberculosis infection.*
Conclusion*-People with active TB are not more likely to get COVID-19, but those having past history of TB has a higher chance of developing serious complication when affected from COVID-19.*
Key Words*-SARS CoV-2, COVID-19, RT-PCR.co-infection, outcome.*

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I. Introduction

The COVID-19 pandemic is a subject of interest because of its rapid spread, severity, high mortality rate, and burden on healthcare systems. Caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), transmission of COVID-19 occurs mainly through droplets**.** [1]

The 2019 novel coronavirus originated from Wuhan City of Hubei Province of China in December 2019, eventually involving 203 countries [2]. WHO declared this disease as a pandemic on 11th March 2020. As of January 2021, 96,877,399 confirmed cases with 2,098,879 deaths were reported globally. In India around 10,639684 confirmed cases were reported with 153,184 deaths. [3]

The clinical features of COVID-19 vary from asymptomatic state to pneumonitis, acute respiratory distress syndrome and multi-system disorder. However, tuberculosis (TB) already exists as pandemic. Globally, an estimated 10.0 million (range, 8.9–11.0 million) people contracted TB in 2019. There were an estimated 1.2 million (range, 1.1– 1.3 million) TB deaths among HIV-negative people in 2019 (a reduction from 1.7 million in 2000), and an additional 2,08,000 deaths (range, 177 000–242 000) among HIV-positive people (a reduction from 6,78,000 in 2000). Around one-fourth of world population is estimated to have latent TB infection (LTBI). In India, notifications of people newly diagnosed with TB rose from 1.2 million to 2.2 million between 2013 and 2019. [5]

The COVID-19 pandemic threatens to reverse recent progress observed in reduction of the global burden of TB. The four countries that account for 44% of global TB cases, India, Indonesia, Philippines and South Africa, showed reduction in diagnosed cases of TB between January and June 2020. Compared with the same 6-month period in 2019, overall reductions in India, Indonesia and the Philippines were in the range 25–30%. [5] To our knowledge, the co-infection of SARS-CoV-2 and TB has not yet been studied extensively. This study was carried out to assess whether TB serves as a co-morbid condition in COVID-19, and affects the outcome such patients.

II. Material and Methods

The present study is a retrospective observational study from April 2020 to December 2020. Patients with either positive COVID-19 RT-PCR (Reverse transcriptase polymerase chain reaction), or positive COVID-19 RAT (rapid antigen test) were included in the study. The nasopharyngeal samples collected from such patients were transported in triple-layer packaging, maintaining the cold chain, to the Viral Research and Diagnostic Laboratory, Department of Microbiology with minimal delay. RNA (Ribonucleic Acid) extraction was carried out by both, the manual and automated technique, with extraction control. The extracted RNA was then subjected to real time RT-PCR, with the amplification of extraction control determining the validity of the reaction. Various kits approved for use by the ICMR (Indian Council of Medical Research) were used for RT-PCR according to the then-current government guidelines. The targets for amplification were E-gene or S-gene as a screening assay, and RdRP gene, ORF1b gene, or N-gene as a confirmatory assay, according to the kit used. Lateral flow assay in the form of Rapid antigen test for detection of SARS-CoV-2(causing COVID-19) specific antigens was used. Nasopharyngeal swab used as sample for testing.

Detailed history was taken to rule out old TB. Those having clinical suspicion of co-infection were subjected to sputum microscopy (Fluorescent Microscopy) and if smear positive, LPA (Line probe Assay) done and for smear negative CBNAAT (cartridge based nucleic acid amplification test) done which is a DNA-PCR technique for detection of TB and Rifampicin resistance. The data obtained were compiled using Microsoft Excel. Statistical tests of significance were used to analyse the data.

III. Results

The present study included 2360 patients, admitted in various wards of our hospital tested COVID-19 positive either by rapid antigen test or RTPCR. Out of these 60.97% (n = 1439) patients were discharged and 39.02% (n = 921) died.

Table 1- COVID positive with or without TB. Total (n = 2360)

	Without past/ present h/o TB	With past/ present h/o TB
COVID-19 positive	2344(99.32%)	16(0.67%)

Of these 2360 only 0.60% (n = 16) had past or present h/o TB. Fischer's test was applied to see the association of COVID-19 infection with TB, p = 0.1360 and that is statistically not significant.

Table 2 - Outcome of COVID Positive without any past /present history of TB. Total (n = 2344).

	Dead	Discharged
COVID-19 positive without TB	911(38.60%)	1433(60.72%)

From 2344 patients 60.72% (n = 1433) were successfully treated and discharged while 38.60% (n = 911) died.

Table 3 - Outcome of COVID Positive with any past /present history of TB. Total (n = 16)

	Dead	Discharged
COVID-19 positive with TB.	10 (62.50%)	6 (37.5%)

From 16 patients 62.50% (n = 10) died while 37.5% (n = 6) completely treated.
To see whether association TB affect the outcome of a COVID positive patient, Fischer test was applied p value was 0.03 which is significant.

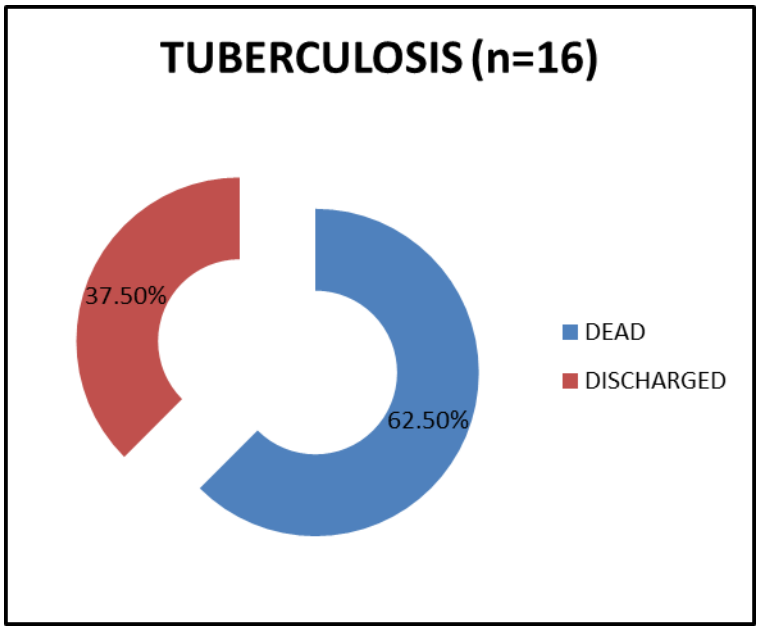

Table 4 - Demographics. Total (n = 16)

	< 60 years	> 60 years
Male	3	10
Female	2	1

Age group **< 60 years** had 60% (n = 3) males and 40% (n = 2) females. Age group **> 60 years** had 90.90% (n = 10) males and 9.09% (n = 1) females.

IV. Discussion

Since the pandemic started it is observed that COVID-19 and TB share many similarities, but also had some differences [2]. Both the disease manifest with similar respiratory symptoms such as fever, cough, breathlessness and weakness with varying severity, but there is chronicity of symptoms in TB as compared to acute or rapid progression in COVID-19. TB is caused by bacteria Mycobacterium tuberculosis, whereas for COVID-19 it is caused by novel coronavirus SARS-CoV-2. Both are transmitted mainly through close contacts [2]. TB is primarily transmitted through droplet nuclei of aerosols generated by infected person, who may be infectious for usually longer duration before initiation of effective treatment [2]. SARS-CoV-2 mainly transmit through droplets and fomites. The incubation period from exposure to disease in TB is usually longer, with slow onset and existing in active (10%) or latent form depending upon the immune status. Whereas COVID-19 may appear 2-14 days after exposure with a median incubation period of 5 days and latent period is not defined. COVID-19 can present with a variety of clinical presentations, asymptomatic to mild being most common (80%), severe (14%) and critically ill (6%) [2,3]. A person, once infected with SARS-CoV-2, can transmit infection to at least 2 persons, but a person infected with TB can infect additional 1 to 4 persons [5].

The present study was a retrospective observational study. Around 2360 patients who were COVID positive and hospitalised were included. From that 60.97% (n = 1439) got successfully treated and 39.02% (n = 921) died. Out of 2360 patients 0.67% (n = 16) had association with either past or present history of TB. Of these 0.67% (n = 16), 31.25% (n = 5) were in age group <60 years, 68.75% (n = 11) were >60 years. Males were 81.25% (n = 13) and females 18.75% (n = 3).

A very less number 0.67% (n = 16) from 2360 had an association with past /present history of TB, statistical analysis was done Fischer's exact test applied and p value came out to be p = 0.1360 which is statistically not significant. India TB report 2021 mentions about bidirectional screening of TB and COVID-19 to aid in the case finding of both the diseases, less than 1% were found to be positive for both TB and Covid-19.This finding can be attributed to many behavioural practices adopted by public such as better cough etiquettes, wearing masks in public places, physical distancing [12].

Of these 16 patients 93.75% (n = 15) had past history of TB and 6.25% (n = 1) had active TB. This relationship between MTB infection and COVID-19 pneumonia suggests that individuals with past history may be more susceptible to SARS-CoV-2 infection, and that COVID-19 disease progression may be more rapid than latent or active TB [7] From the 16 patients 10 (62.50%) died while 6(37.5%) were successfully treated.

Fischer's test was applied to assess the association of TB and outcome in COVID-19 positive patients p value was 0.03 which is statistically significant. Similar findings reported by liu *etal* with severe patients

showing 1.47% higher prevalence of TB than that in non-severe patients [7]. Chen *etal* reported higher TB prevalence in non-survivors than survivors [10].

When a patient suffers from a previous respiratory disease their lung function is impaired and their resistance to viruses is low and they land to develop ARDS (Acute respiratory distress syndrome). Therefore, TB may be a risk factor for disease progression and severity of COVID-19 [3,9,11].

V. Conclusion

Co-infection with TB must always be suspected in addition to COVID-19 in current scenario in patients with non-specific clinical features and unexplained or prolonged clinical course. Post-tubercular sequelae can exist in the form of obstructive, restrictive or mixed airway impairment which leads to chronic respiratory failure. This residual damage to lungs can be a probable risk factor for developing more severe COVID19 symptoms and complications.

To conclude people with active TB are not more likely to get COVID-19 .This finding can be attributed to many behavioural practices adopted by public such as better cough etiquettes, wearing masks in public places , physical distancing .On the other hand if there is past history of TB there is higher chance of developing serious complication from COVID-19.

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