



A REVIEW STUDY ON TUBERCULOSIS AND COVID-19 CO-INFECTION

Public Health

Auwalu Ibrahim	School of Nursing and Health Science, Department of Public Health, Noida International University, Greater Noida, Uttar Pradesh, India
Ajoke Akinola*	School of Nursing and Health Science, Department of Public Health, Noida International University, Greater Noida, Uttar Pradesh, India*Corresponding Author
Dr. Jamilu Ibrahim Shinkafi Jagaba	School of Nursing and Health Science, Department of Public Health, Noida International University, Greater Noida, Uttar Pradesh, India

ABSTRACT

Tuberculosis (TB) and COVID-19 are highly infectious pathogens that primarily affect the lungs. The symptoms of both diseases are similar such as cough, fever, and dyspnea (difficulty in breathing). Although the incubation period of TB is longer and the onset of the disease is moderate in collation with COVID-19, Health services, including national programs to battle TB. Active engagement in ensuring an effective and rapid response to COVID-19 is required while ensuring that TB services are maintained. WHO universal TB Program, WHO territorial and national offices developed an information note to support health authorities. Precise diagnostic tests are required for both TB and COVID-19. WHO and international partners endorsed the establishment of TB laboratory networks for COVID 19 diagnosis and surveillance. TB program staff, with their experience and capacity, including an ongoing case finding coupled with contact tracing, are well placed to spread understanding, skills, as well as provision of technical and logistical support. After a TB patient coughs, sneezes, shouts, or sings, tubercle bacilli residue hangs in the air, the droplet nuclei rest for several hours, and people who inhale them can get infected. COVID-19 transmission has primarily been attributed to the direct breathing of droplets expelled by someone with COVID-19. Tuberculosis (TB) causes more deaths than any other infectious disease globally, and Africa has one of the highest TB infection rates globally, especially in Namibia. In 2018, an estimated 13,000 people in Namibia fell ill with TB, and more than 5,000 were not diagnosed. Given that, there is a need to raise more awareness and adequate preventive majors that are effectively curving the menace of Tuberculosis.

KEYWORDS

Tuberculosis, Covid-19, and Treatment

Introduction:

Tuberculosis (TB) is a potentially severe infectious disease caused by a bacterium named *Mycobacterium tuberculosis*. The bacteria mostly attack the lungs, but they can also damage other parts of the body. The bacteria that cause TB are spread from person to person through tiny droplets released into the air via coughs and sneezes. In general, 1.4 million people died from TB in 2019. Hence TB is regarded as a single infection with a high mortality rate. An estimated 10 million people fell ill with TB worldwide In 2019. Multidrug-resistant TB (MDR-TB) remains a public health threat. In general, 206,030 individuals with multidrug- or rifampicin-resistant TB (MDR/RR-TB) were detected and notified in 2019, and a 10% increase from 186 883 in 2018. TB incidence drop at approximately 2% annually, and between 2015 and 2019, the cumulative reduction was 9% and even less than halfway to the End TB Strategy milestone of a 20% reduction between 2015 and 2020 [1-2].

The most frequent symptoms of lung TB include cough with bloody cough with sputum, weakness, chest pains, fever, night sweats and weight loss. WHO recommends using rapid molecular diagnostic tests as the initial diagnostic test in all persons with signs and symptoms of TB. There is a high diagnostic accuracy and will lead to significant improvements in the early detection of TB and drug-resistant TB. Diagnosis is primarily conducted by microscopic examination of stained smears of sputum of suspected patients. However, smear microscopy can detect only 50–60 per cent of all cases (smear-positive). More sensitive methods of diagnosing TB and detecting resistance to drugs have recently become available, although they are more expensive. The onset of disease and when the diagnosis is made and treatment initiated is often protracted, and such delays allow disease transmission [3-4].

Furthermore, the incubation period of TB is more extended, and the onset of the disease is moderate in collation with COVID-19 [5]. Clinical data and adequate information of patients with both COVID-19 and TB is still limited. Some research articles suggested that patients with both TB and COVID-19 may encounter delayed treatment outcomes. Therefore, TB infected individuals should adhere to the safety and precautionary measures stated by health care authorities to prevent themselves from being infected by COVID-19 and continue their TB treatment as prescribed [6].

Table 1: Prisma Table

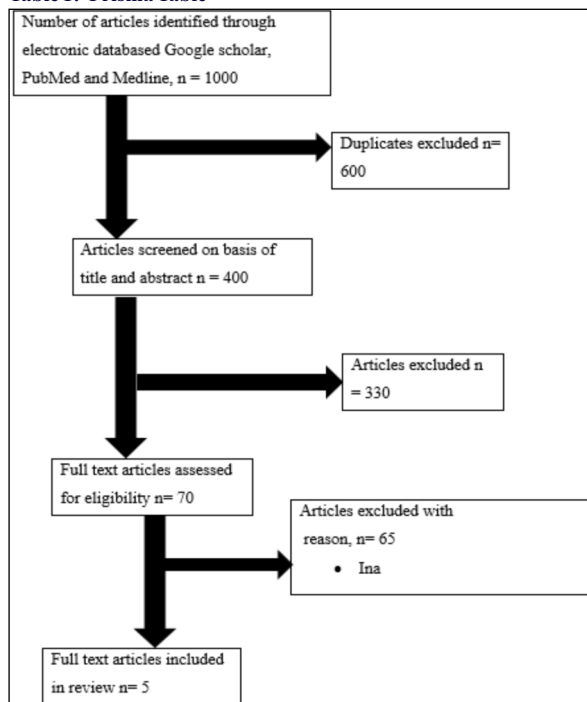


Table: Descriptive Table

Author Year of the publication/ Country	Study design	Sample technique	Sample size	Result	Conclusion
1- Arkapal Bandyopadhyay, et al 2020 India	Cohort	cluster randomiz ed trial	340	The clinical characteristics of patients are presented in. COVID-19 cases were	This review provides an insight into the neglected paradigm

				defined based on a documented positive SARS-CoV-2 PCR swab result; hospitalized non-COVID-19 patients all had a SARS-CoV-2 PCR-negative result and no detectable SARS-CoV-2 nucleocapsid-specific IgG measured in blood collected at enrollment	of long-standing infectious disease, tuberculosis amidst the ongoing covid19 pandemic. though multi-faceted approaches are in place to deal with the pandemic.				experience with COVID-19 infection in TB patients is still limited, it is predicted that people with TB and COVID-19 may have poorer treatment outcomes, especially if TB treatment is postponed.
2- D. Visca, et al 2020 Italy	Cross-sectional	purposive sampling	856	Both of SARS-CoV-2 and M. tuberculosis tests were requested on the clinical and radiological grounds in 30 patients. Here we discussed 2 patients who were both COVID-19 and TB positive.	We want to emphasize that while considering COVID-19 primarily during these pandemic days, we should not forget one of the "great imitators", tuberculosis within differential diagnoses.				This case report suggests, after 10 days of admission with triple infections, there is a good clinical prognosis and survival from COVID-19. On admission, further diagnosis and investigations of TB co-infection should be performed for all patients admitted with COVID-19 due to their similar and non-specific clinical manifestations.
3- S. Soltani et al, 2021, Iran	Observational study	Multi stage sampling	870	Overall, 8700 studies were found through databases, and 138 studies were identified through other sources (SSRN: 4, Medrxiv: 8, grey literature: 8, bacteriology expert: 3, and handsearching: 115). After excluding redundant articles, 7260 studies remained. Screening was done in three steps.	Because of the proven track of bacterial coinfection in increasing morbidity and mortality rate in previous viral outbreaks and pandemics, proving information about the incidence and prevalence rate of them are crucial for health administrators and clinicians,				
Mitra Rezaei 4- et al 2020 Tehran, Iran	cross-sectional study	Simple random sampling	200	Of the eleven patients in this study, seven were male and four were female, with a mean age of 56.6 years (minimum age 27 years and maximum age 91 years).	: Tuberculosis and COVID-19 are both common infections of the respiratory system and have common signs and symptoms and these similarities may cause overlapping the two diseases. While				
5- Tadesse Tolossa et al, 2021 Ethiopia;	case control study	purposive sampling	400						

Meta-analysis

All steps in this systematic review and meta-analysis study were based on preferred reporting items for systematic review and meta-analysis guidelines [10] and registered in the International Prospective Register of Systemic Reviews with CRD42021240030. Using related keywords such as "COVID-19", "Coronavirus", "SARS-CoV-2 infection", "SARS-CoV-2", "Polymicrobial Infection", "Bacterial AND Coinfections", "Bacterial AND Secondary Infections", and "Mixed Infections", all related articles were retrieved

DISCUSSION

Essential Tb Services During Covid-19 Pandemic

Health services, including national programs to battle TB, active engagement in ensuring an effective and rapid response to COVID-19 is required while ensuring that TB services are maintained. WHO universal TB Program and WHO territorial and national offices developed an information note to support health authorities in doing so [7-8].

Prevention:

Measures must be taken to regulate the TB and COVID-19 in congregate settings and health care facilities, as per WHO guidelines [9].

Diagnosis:

Precise diagnostic tests are required for both TB and COVID-19. WHO and international partners supported the establishment of TB laboratory networks. These networks and specimen transportation mechanisms could also be used for COVID 19 diagnosis and surveillance [10].

Treatment and care:

TB program staffs with their experience and capacity, including an ongoing case finding coupled with contact tracing, are well placed to spread understanding, skills, as well as provision of technical and logistical support. The use of digital health technologies should be set

up to support patients and programs through information management, counseling, care improved communication and other benefits [11].

Human resources:

Pulmonologists, Respiratory physicians, staff of all levels in the pulmonology department, TB specialists, and health workers at community level of different primary health care may be connecting marks for patients with pulmonary complications of COVID-19 [12].

Mode of transmission:

After a TB patient coughs, sneezes, shouts, or sings, tubercle bacilli residue hangs in the air, the droplet nuclei rest for several hours, and people who inhale them can get infected. The magnitude and concentration of these droplet nuclei is a determining factor for their infectiousness. Their concentration decreases with ventilation and exposure to direct sunlight [13-14].

The prime factor for COVID-19 transmission has been ascribed to the direct inhalation of an aerosol containing droplets expelled by an individual infected with COVID-19 (people may be infectious before clinical features become apparent). Droplets are produced by speaking, coughing, sneezing, exhaling, settling on objects and surfaces, and contacts can get infected with COVID-19 by touching them and then touching their eyes, nose, or mouth. Hand sanitizing and washing, in addition to respiratory precautions that are crucial in controlling COVID-19 and TB [15].

Treatment of TB amidst the COVID-19 Pandemic

Tuberculosis (TB) lead to high mortality rate than any other infectious disease globally, and Africa has one of the highest TB infection rates globally, especially in Namibia. In 2018, approximately 13,000 individuals in Namibia fell ill with TB, and above 5,000 of these were not diagnosed. This is exceptionally worrying in the course of COVID-19 widespread because both of the diseases (TB and COVID-19) affect the lungs. Universally it is confirmed that increase patients with chronic respiratory diseases, including TB, are at high risk for severity of the illness or death from COVID-19 [16].

The Effort Of Health Workers In Protecting Patients From Tb And Covid-19

The prime personnel at the forefront in providing preventive plans are community health workers (CHWs). The health workers contribute significantly in reducing the number of visits these clients need to make to their local clinic and providing more TB services to patients where they live. This suppresses the clients' chance of acquiring infection with COVID-19 at healthcare facilities if the spread of the virus started in the communities. Patients who need to visit a healthcare provider are advised to see a smaller and less busy facility, which helps maintain social distancing. However, providing adequate medical facilities in the community is something to put forward post-COVID-19 [17].

CONCLUSION

As a lesson from previous outbreaks, hospital treatment for patients with Tuberculosis should be limited to severe cases to prevent the spread of SARS-CoV-2 in TB cases. Despite the increasing number of cases, the data should predict the impact of the COVID-19 pandemic on patients with TB. Given the severity and worst outcome in patients with COVID-19 and TB, more evidence are required to outline the most effective treatment strategy and understand the detrimental effect of both COVID-19 and TB.

REFERENCES:

1. Bloom BR, Atun R, Cohen T, et al. Tuberculosis. In: Holmes KK, Bertozzi S, Bloom BR, Jha P, eds. *Major Infectious Diseases*. 3rd ed. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; November 3, 2017.
2. Sable SB, Posey JE, Scriba TJ. Tuberculosis Vaccine Development: Progress in Clinical Evaluation. *Clin Microbiol Rev*. 2019;33(1):e00100-19. Published 2019 Oct 30. doi:10.1128/CMR.00100-19
3. Peters JS, Andrews JR, Hatherill M, et al. Advances in the understanding of *Mycobacterium tuberculosis* transmission in HIV-endemic settings. *Lancet Infect Dis*. 2019;19(3):e65-e76. doi:10.1016/S1473-3099(18)30477-8
4. Grandjean L, Gilman RH, Martin L, et al. Transmission of Multidrug-Resistant and Drug-Susceptible Tuberculosis within Households: A Prospective Cohort Study. *PLoS Med*. 2015;12(6):e1001843. Published 2015 Jun 23. doi:10.1371/journal.pmed.1001843
5. Jain VK, Iyengar KP, Samy DA, Vaishya R. Tuberculosis in the era of COVID-19 in India. *Diabetes Metab Syndr*. 2020;14(5):1439-1443. doi:10.1016/j.dsx.2020.07.034
6. Visca D, Ong CWM, Tiberi S, et al. Tuberculosis and COVID-19 interaction: A review of biological, clinical and public health effects. *Pulmonology*. 2021;27(2):151-165. doi:10.1016/j.pulmoe.2020.12.012
7. <https://www.who.int/teams/global-tuberculosis-programme/covid-19-retrieved 7th may 2021>
8. <https://www.cdc.gov/globalhealth/stories/2020/tb-covid.html> March 23, 2021, retrieved 5th may 2021

9. Mishra A, George AA, Sahu KK, Lal A, Abraham G. Tuberculosis and COVID-19 Co-infection: An Updated Review. *Acta Biomed*. 2020 Nov 10;92(1):e2021025. doi: 10.23750/abm.v92i1.10738. PMID: 33682808; PMCID: PMC7975929.
10. Tiberi S, Vjecha MJ, Zumla A, Galvin J, Migliori GB, Zumla A. Accelerating development of new shorter TB treatment regimens in anticipation of a resurgence of multidrug resistant TB due to the COVID-19 pandemic [published online ahead of print, 2021 Mar 10]. *Int J Infect Dis*. 2021;S1201-9712(21)00153-3. doi:10.1016/j.ijid.2021.02.067
11. Santos FLD, Souza LLL, Bruce ATI, et al. Patients' perceptions regarding multidrug-resistant Tuberculosis and barriers to seeking care in a priority city in Brazil during COVID-19 pandemic: A qualitative study. *PLoS One*. 2021;16(4):e0249822. Published 2021 Apr 9. doi:10.1371/journal.pone.0249822
12. Duarte R, Aguiar A, Pinto M, et al. Different disease, same challenges: Social determinants of Tuberculosis and COVID-19 [published online ahead of print, 2021 Feb 19]. *Pulmonology*. 2021;S2531-0437(21)00048-9. doi:10.1016/j.pulmoe.2021.02.002
13. Tamuzi JL, Ayele BT, Shumba CS, Adetokunboh OO, Uwimana-Nicol J, Haile ZT, Inugu J, Nyasulu PS. Implications of COVID-19 in high burden countries for HIV/TB: A systematic review of evidence. *BMC Infect Dis*. 2020 Oct 9;20(1):744. doi: 10.1186/s12879-020-05450-4. PMID: 33036570; PMCID: PMC7545798.
14. Crisan-Dabija R, Grigorescu C, Pavel CA, Artene B, Popa IV, Cernomaz A, Burlacu A. Tuberculosis and COVID-19: Lessons from the Past Viral Outbreaks and Possible Future Outcomes. *Can Respir J*. 2020 Sep 5;2020:1401053. doi: 10.1155/2020/1401053. PMID: 32934758; PMCID: PMC7479474.
15. Nahid P, Dorman SE, Alipanah N, et al. Official American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America Clinical Practice Guidelines: Treatment of Drug-Susceptible Tuberculosis. *Clin Infect Dis*. 2016;63(7):e147-e195. doi:10.1093/cid/ciw376
16. Gopalaswamy R, Subbian S. Corticosteroids for COVID-19 Therapy: Potential Implications on Tuberculosis. *Int J Mol Sci*. 2021;22(7):3773. Published 2021 Apr 6. doi:10.3390/ijms22073773
17. Visca D, Ong CWM, Tiberi S, et al. Tuberculosis and COVID-19 interaction: A review of biological, clinical and public health effects. *Pulmonology*. 2021;27(2):151-165. doi:10.1016/j.pulmoe.2020.12.012