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Case Report

Case study of tuberculosis and COVID-19 coinfection in a tertiary hospital in Benue state, Nigeria: Rationale for integration of surveillance activities

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ABSTRACT

Several intervention strategies have been implemented to eliminate tuberculosis (TB) over the past three decades. The emergence of COVID-19 has disrupted most of these strategies, thereby reversing the gains made in the management of TB over time. This study highlighted the literature on TB and COVID-19, the challenges in making the diagnosis of TB and COVID-19 coinfection, and the rationale for the integration of surveillance activities using a case report of a 69-year-old pulmonary TB and COVID-19 coinfected patient who was first managed with COVID-19 in a tertiary health facility in Benue State, Nigeria, without much improvement. She was later re-assessed, diagnosed with drug-sensitive TB, and cured after a 6-month course of anti-TB regimen. This case indicates that the initially missed diagnosis of TB and the catastrophic effects could have been avoided if the TB and COVID-19 services were integrated.

Keywords: COVID-19, Tuberculosis, Epidemics, Integration services, Nigeria

INTRODUCTION

Tuberculosis (TB) is a bacterial disease caused mainly by *Mycobacterium tuberculosis* which was declared a global health emergency in 1993, but it still remains a public health threat, especially in resource-limited settings.[1-3] In 2020, an estimated 10 million people were reported to have TB worldwide (5.6 million men, 3.3 million women, and 1.1 million children). Of the total new cases, eight countries account for two-thirds, with India dominating, followed by, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa.[4] Coronavirus Disease 2019 (COVID-19) is a novel disease caused by SARS-CoV-2, was first reported to the World Health Organization (WHO) on December 31, 2019, and declared a public health emergency in January 2020.[5,6]

TB and COVID-19 both primarily attack the lungs and are spread by close contact between people. However, the incubation period from exposure to disease in TB is longer (averagely 5 years) and often with slow onset, but that of COVID-19 is 1–14 days (averagely 5–6 days). COVID-19 and TB share similar symptoms of cough, fever, and or difficulty breathing.[3-8]

In addition to the common symptoms, active lung TB may as well present with a cough associated with blood, chest pain, weakness, weight loss, and night sweats, while COVID-19 may also present with, sneezing, mild/moderate respiratory distress, and loss of smell.[2,3,5,9] About 2.3 billion people have latent TB globally. This group of individuals has been infected by TB bacteria but is not yet ill with the disease.[10] Similarly, there are asymptomatic COVID-19 patients who have the SARS-CoV-2 but still do not manifest the symptoms of the disease.[9,11] Source control of both TB and COVID-19 involves early identification of infected individuals and prompt treatment, but the similarities in the clinical symptoms make it difficult to have a quick diagnosis of either of the two.[8,9,11]

Throughout history, pandemics of viral infections have disrupted healthcare systems, including the prevention and control of endemic diseases. Such disruption has resulted in an increased burden of endemic diseases in the post-pandemic period.[12] TB is never an exemption. Several intervention strategies implemented to mitigate the effect of TB disease have yielded tremendous results over the years.[13-15] With the emergence of the COVID-19 pandemic, most TB services were disrupted in 2020. This coupled with other challenges such as inadequate human resources for health and funds results in reversing the gains made to TB management over the years.[11,13] Data collated by the WHO from high TB burden countries in 2020 show a sharp drop of 59% in referrals of presumptive TB cases to appropriate service delivery points for diagnosis and treatment.[13] This finding, coupled with the high burden of latent TB in society,[10] becomes worrisome in terms of complications that may arise from undetected cases of TB.

Health system integration as defined by Armitage *et al*.,[16] is a system where "provider, and organizations from across the continuum work together so that services are complementary, coordinated, in a seamless unified system, with continuity for the client." Integration is not a goal of its own; but rather an approach that provides support to a bigger goal, such as better service, improved coordination, efficiency, and financial sustainability. Therefore, integrated service delivery is essential to address some of the diagnostic and treatment challenges for patients and healthcare providers. This paper aimed at presenting the rationale for the integration of surveillance activities in a disease epidemic using a case study of a 59-year-old patient with TB and COVID-19 coinfection who had an initially missed diagnosis of pulmonary TB due to the presence of COVID-19.

CASE REPORT

This case study was approved by the Institutional Review Board of Benue State University Teaching Hospital (BSUTH) in accordance with the principles of the Declaration of Helsinki. Written informed consent for the research and publication was obtained from the patient. Mrs. FA, a 69-year-old female retired civil servant, was referred to the COVID-19 isolation unit of BSUTH, Makurdi, Nigeria, in June 2020 with a week history of cough productive of whitish sputum, chest pain, sore throat, mild difficulty in breathing, low-grade intermittent fever, running nose, and fatigue. There was an associated loss of appetite and loss of smell, no hemoptysis, orthopnea, paroxysmal nocturnal dyspnea or drenching night sweats. She had a history of traveling to Abuja (a COVID-19 hot zone at the time of presentation). She was not a known asthmatic, diabetic, or hypertensive patient; no history of TB or contact with a chronic cough patient. She does not smoke cigarettes or drink alcohol. She had no family history of diabetes, hypertension, asthma, or chronic lung disease.

On examination, she was an elderly-looking woman, well preserved, acutely ill-looking, weighing 68 kg, febrile (temperature = 38.6°C), not pale, anicteric, acyanosed, mildly dehydrated, no pedal edema, and no palpable peripheral lymph nodes. She had a pulse rate of 86b/min, regular, full volume; blood pressure of 130/90 mmHg (supine), Jugular venous pressure not elevated, and apex beat at the 5th left intercostal space within the midclavicular line; and heart sound was S1 and S2, no S3, and no murmur. The respiratory rate was 18 cpm, with dull percussion notes and reduced breath sounds on both sides. The other systems reviewed were essentially normal and the saturation of oxygen in the blood was 91% room air. At baseline, several investigations were carried out. These included: Malaria parasite, random blood sugar, urinalysis, full blood count and differentials, electrolytes, urea and creatinine, human immunodeficiency virus (HIV), hepatitis B surface antigen, and hepatitis B virus. All were normal, except for urinalysis which revealed protein ++.

She was admitted to the isolation unit of the BSUTH as a suspected case of COVID-19 based on the epidemiological and clinical findings. She was counseled on the rationale for her isolation, the signs and symptoms of complications of COVID-19, infection prevention and control measures, and the COVID-19 polymerase chain reaction (PCR) test. Her consent for this study and publication of the findings was also sought. Two samples (1 nasal and 1 oropharyngeal swab) were taken from the patient by the state COVID-19 laboratory team. The samples were put into a single tube of virus transport medium and transported to the National Reference Laboratory (NRL) in Abuja for the real-time PCR test and the results came out positive 24 h later.

The result was disclosed to her and she was managed as a confirmed COVID-19 patient in line with the Nigerian Center for Disease Control (NCDC) interim guideline for case management of COVID-19.[17] She was placed on oral hydroxychloroquine 200 mg daily for 5 days, azithromycin

500 mg daily for 5 days, vitamin C 1 g daily for 10 days, loratadine 10 mg twice daily for 10 days, zinc sulfate 20 mg twice daily for 10 days, vitamin B complex, and intravenous dextrose saline 500 mL 8 hourly for 48 h. In addition, she received psychosocial support from the clinical psychologist of the hospital. Her vital signs were monitored hourly with the aid of a symptom assessment checklist and pulse oximeter. A repeat nasal and oropharyngeal swab samples were taken and transported to the NRL for a PCR test on the 10th day of admission in the isolation unit. The result came back negative on day 13th (2 days after the sample was taken). She was discharged on day 14th to continue home isolation for a week.

Two days post-hospital discharge, the cough recurred and got worsened, with associated low-grade fever and difficulty in breathing. She was readmitted and reassessed by the management team and a working diagnosis of TB was made. A sputum specimen was collected for GeneXpert *M. tuberculosis*/resistance to rifampin and the result revealed drug-sensitive TB. Screening for HIV was negative. Samples for hematological and biochemical variables were also taken from her and the values were within normal limits. Her close contacts were enlisted and tested for COVID-19 and TB and the results were all negative. In line with the Nigerian National Tuberculosis, Leprosy, and Buruli Ulcer Control Program guideline, she was counseled and managed at home for 6 months.[18] With a pretreatment weight of 68 kg, she had four tablets of a fixed dose of rifampicin (150 mg), isoniazid (75 mg), pyrazinamide (400 mg), and ethambutol (275 mg) for 2 months, and rifampicin (150 mg) and isoniazid (75 mg) for 4 months (2[RHZE]/4(RH). In addition, she had pyridoxine (50 mg) daily for 6 months. The sample taken at the completion of the 6 months regimen was negative implying a cured outcome. This case indicates that TB was missed at first contact probably due to the emphasis that was placed on COVID-19.

DISCUSSION

This report demonstrates that COVID-19 and TB coinfection existed in Benue State, Nigeria, at the peak of the COVID-19 pandemic. Among the findings are the challenges associated with the diagnosis and delay in the commencement of the anti-TB regimen. As of June 24, 2020, when the index case was reported at the COVID-19 isolation center of BSUTH, Nigeria had 24,567 confirmed cases, 7613 discharged, and 565 deaths while Benue State where our patient lives had 486 confirmed cases, 435 recoveries, and 11 deaths. However, Benue State recorded its first case on March 28, 2020, while Nigeria recorded its first case on February 27, 2020.[19] The sudden increase in the reported cases at the national and state level was enough to divert all attention to COVID-19; more so that the disease was novel at that period.

In our study, the primary symptoms the patient presented with are in support of pulmonary TB.[3-8] However, the TB diagnosis was missed at the presentation, probably due to the emphasis that was placed on COVID-19 during that period. The patient underwent the entire duration of the COVID-19 management protocol described in the NCDC guideline before TB diagnosis was considered. Even though the patient was cured at the end of the TB treatment, the diagnosis of TB was more of an exclusion. Similar cases of missed diagnosis of coinfection indeed may have affected the total TB case notification of the state during that period. If this study was carried out on a larger population, the entire national notification rate must have been affected significantly. This is consistent with the WHO report of a sharp reduction in TB notification and referrals of presumptive TB cases to appropriate service delivery points for diagnosis and treatment in 2020.[13]

In addition, in our study, there was a suppression of the presenting symptoms, as, at the time, the patient was on empirical treatment with COVID-19. The azithromycin, hydroxychloroquine, loratadine, and vitamin C that were used for COVID-19 have not been proven to be effective in the management of TB. However, the suppression of the symptoms our patient presented with may be consistent with the report regarding the incubation period of TB and COVID-19. TB and COVID-19 share similar symptoms of cough, fever, and or difficulty breathing, but the incubation period of COVID-19 is shorter.[3-8]

It is possible that our patient already had some symptoms of TB which were neglected and that she only sought medical attention only when she became more severely ill with the superimposition of more acute and severe symptoms of COVID-19 disease. It is also possible that a recent reactivation of latent TB occurred in her because COVID-19 further suppressed her already age-induced low immunity.

This case study, therefore, highlights the rationale for integrated surveillance activities for diseases of public health importance.

The catastrophic effects of the late commencement of an anti-TB regimen cannot be overemphasized, the psychological torture of staying in the hospital for 2 weeks and readmission is unquantifiable. The relations may have as well been affected in one way or the other. If the services were integrated *abiInitio*, the effects could have been mitigated.

Moreover, in this study, the TB and COVID-19 screening conducted for the enlisted contacts of the index patient was negative. This may simply imply that her contacts had an intact immune system. The state response to COVID-19 may also be responsible for the negative result among the contacts of the patient. As of the time of this report, the Benue State COVID-19 rapid response team was fully inaugurated and a full outbreak response commenced the lockdown alongside other non-pharmaceutical measures like washing of hands

with liquid soaps, social distancing, and use of face masks in line with the Federal Government directives. These may have limited the exposure of the contacts.

CONCLUSION

Our study provides evidence that TB and COVID-19 are related respiratory diseases of public health importance, but TB was not considered at presentation due to the emphasis on COVID-19. The initially missed diagnosis of TB and the catastrophic effects could have been avoided if TB and COVID-19 services were integrated. Hence, integrated service delivery should be advocated for related diseases in all surveillance activities.

Data availability

The details of this case are domiciled in BSUTH where the patient was managed.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest among the authors.

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