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Quantitative Original Article

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Evolución del Covid-19 en pacientes con Tuberculosis pulmonar. Hospital especializado en problemas pulmonares. Guatemala. 2020-2022

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ABSTRACT

Introduction: COVID-19 and pulmonary tuberculosis are pathologies that share similarities in terms of the lung involvement they cause, and when they occur concomitantly, they can worsen the patient's clinical condition. **Objective:** to describe the evolution of COVID-19 in patients with pulmonary tuberculosis at the Hospital de Referencia Nacional de Enfermedades Respiratorias, 2020-2021. **Method:** quantitative, descriptive, cross-sectional study. 25 medical records were reviewed, of which 3 were discarded for not meeting the inclusion criteria. The principle of data confidentiality was complied with, variables were operationalized, and techniques and procedures for obtaining information, processing and analysis, discussion, and synthesis were used. **Results:** the average age of the population was 49 years old. Diabetes mellitus was the most frequently observed concomitant disease (68.18%). Male patients were the predominant cases. All patients with COVID-19 and Tuberculosis received treatment for each condition, which was individualized according to the requirements of the clinical case. Three patients presented in severe condition with COVID-19; two of them did not survive, and one was transferred to another healthcare center, while the nineteen who presented with a mild or moderate level of the disease survived and were able to continue with their antibiotic treatment. **Conclusions:** the patients did not present severe complications that did not allow them to continue their antifungal treatment in the hospital or upon discharge.

Keywords: Tuberculosis; COVID-19; Evolution; Medical records; Risk factor; Confidentiality; Mellitus diabetes; Disease; Pulmonary tuberculosis.

RESUMEN

Introducción: *el Covid-19 y la tuberculosis pulmonar son patologías que comparten similitudes en cuanto a la afectación pulmonar que provocan, y al presentarse de manera concomitante pueden empeorar el cuadro clínico del paciente.* ***Objetivo:*** *describir la evolución del Covid-19 en pacientes con tuberculosis pulmonar en el Hospital de Referencia Nacional de Enfermedades Respiratorias, 2020-2021.* ***Método:*** *estudio cuantitativo, descriptivo, transversal. Fueron revisados 25 registros médicos de los cuales fueron descartados 3 por no cumplir los criterios de inclusión. Se cumplió con el principio de confidencialidad de los datos, se operacionalizaron variables y se utilizaron técnicas y procedimientos de obtención de la información, de procesamiento y análisis, de discusión y síntesis.* ***Resultados:*** *la edad promedio de la población fue de 49 años. La diabetes mellitus fue la enfermedad concomitante que se observó con mayor frecuencia (68.18%). Los pacientes masculinos eran los casos predominantes. Todos los pacientes con Covid-19 y Tuberculosis recibieron tratamiento para cada afección, el cual fue individualizado según los requerimientos del caso clínico. Tres pacientes se presentaron en estado grave de Covid-19, dos de ellos no sobrevivieron y uno fue trasladado a otro centro asistencial; mientras que los diez y nueve que se presentaron con un nivel leve o moderado de la enfermedad sobrevivieron y pudieron seguir con su tratamiento antifímico.* ***Conclusiones:*** *los pacientes no presentaron complicaciones severas que no permitieran seguir con su tratamiento antifímico en el hospital o al ser egresados.*

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Palabras clave: *Tuberculosis; Covid-19; Evolución; Registros médicos; Factor de riesgo; Confidencialidad; Diabetes mellitus; Enfermedad; Tuberculosis pulmonar.*

RÉSUMÉ

Introduction: *le COVID-19 et la tuberculose pulmonaire sont des pathologies qui partagent des similitudes quant à l'atteinte pulmonaire qu'elles provoquent, et lorsqu'elles surviennent de manière concomitante elles peuvent aggraver l'état clinique du patient.* ***Objectif:*** *décrire l'évolution du COVID-19 chez les patients atteints de tuberculose pulmonaire à Hospital de Referencia Nacional de Enfermedades Respiratorias, 2020-2021.* ***Méthode :*** *étude quantitative, descriptive et transversale. 25 dossiers médicaux ont été examinés, dont 3 ont été rejetés car ne répondant pas aux critères d'inclusion. Le principe de confidentialité des données a été respecté, les variables ont été opérationnalisées et des techniques et procédures d'obtention d'informations, de traitement et d'analyse, de discussion et de synthèse ont été utilisées.* ***Résultats:*** *l'âge moyen de la population était de 49 ans. Le diabète sucré était la maladie concomitante la plus fréquemment observée (68,18 %). Les patients de sexe masculin étaient les cas prédominants. Tous les patients atteints de COVID-19 et de tuberculose ont reçu un traitement pour chaque pathologie, individualisé en fonction des exigences du cas clinique. Trois patients se sont présentés dans un état grave du COVID-19, deux d'entre eux n'ont pas survécu et un a été transféré dans un autre centre de santé; tandis que les dix-neuf qui présentaient un niveau léger ou modéré de la maladie ont survécu et ont pu poursuivre leur traitement antifimique.* ***Conclusions:*** *les patients n'ont pas présenté de complications graves ne leur permettant pas de poursuivre leur traitement antifongique à l'hôpital ou à leur sortie.*

Mots-clés: *Tuberculose; COVID-19; Évolution; Dossiers médicaux; Facteur de risque; Confidentialité; Diabète mellitus; Maladie; Tuberculose pulmonaire.*

RESUMO

Introdução: *A COVID-19 e tuberculose pulmonar são patologias que compartilham semelhanças em relação ao comprometimento pulmonar que causam, e quando ocorrem de maneira concomitante, podem agravar o quadro clínico do paciente.* ***Objetivo:*** *Descrever a evolução da COVID -19 em pacientes com tuberculose pulmonar no Hospital de Referência Nacional de Doenças Respiratórias, 2020-2021.* ***Método:*** *Estudo quantitativo, descritivo, transversal. Foram revisados 25 prontuários médicos, dos quais 3 foram descartados por não atenderem aos critérios de inclusão. O princípio da confidencialidade dos dados foi respeitado, variáveis foram operacionalizadas e técnicas e procedimentos para obtenção, processamento e análise de informações, discussão e síntese foram utilizados.* ***Resultados:*** *A idade média da população foi de 49 anos. A diabetes mellitus foi a comorbidade observada com mais frequência (68,18%). Os pacientes do sexo masculino eram predominantes. Todos os pacientes com COVID-19 e tuberculose receberam tratamento individualizado para cada condição, de acordo com as necessidades de cada caso clínico. Três pacientes apresentaram quadro grave de COVID-19, dois deles não sobreviveram e um foi transferido para outro centro de saúde; enquanto os dezenove pacientes que apresentaram quadro leve ou*

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moderado da doença sobreviveram e puderam continuar com o tratamento contra a tuberculose. ***Conclusões:*** *Os pacientes não apresentaram complicações graves que impedissem a continuidade do tratamento no hospital ou após a alta hospitalar.*

Palavras-chave: *Tuberculose; COVID-19; Evolução; Prontuários médicos; Fator de risco; Confidencialidade; Diabetes mellitus; Doença; Tuberculose pulmonar.*

INTRODUCTION

Due to the new context in which COVID-19 left the population and especially the lack of knowledge of how this new disease could affect people with latent pulmonary tuberculosis since both diseases particularly affect the respiratory system, the present research aims to observe whether the evolution of COVID-19 significantly affected the suffering of tuberculosis.

Pulmonary tuberculosis is an infectious disease caused by Mycobacterium tuberculosis, transmitted through the air when an infected person who has not received treatment for pulmonary TB coughs or sneezes, producing flügge microdroplets generated in the lungs.[1]

Tuberculosis (TB) is one of the oldest diseases that affect the human species. Its morbidity and mortality can be considered the ones that cause the most damage throughout time.[2] Pulmonary tuberculosis is a curable pathology with a favorable prognosis. However, it has become one of the most important communicable infections worldwide. [3]

COVID-19 is a contagious respiratory disease caused by the SARS-CoV-2 virus. The person may or may not have symptoms. The virus can be transmitted from the mouth or nose of a carrier in the form of small liquid particles expelled when coughing, sneezing, talking, or breathing. Other variables of interest were the age and sex of the patients to analyze them together and describe whether there are associated risk factors.

At the end of November 2019, in Wuhan, Hubei province (China), the first case of pneumonia caused by a new CoV was described, initially designated 2019-nCoV by researchers in China. On February 11, 2020, it was renamed SARS-CoV-2, and the disease was named COVID-19.[4] The first case in Latin America was recorded in Brazil on February 26, 2020[5], and in Guatemala on March 13, 2020.[6]

COVID-19 and TB attack the lungs and present similar symptoms, such as cough, fever, and difficulty breathing. Although both biological agents are transmitted through close contact, the incubation period from exposure to the disease is longer in TB and usually has a slow onset.[6] And "although experience with COVID-19 infection in TB patients is limited, it is anticipated that people sick with TB and COVID-19 may have worse treatment outcomes, especially if TB treatment is interrupted."[7]

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COVID-19 can affect people infected or sick with TB before, during, or once cured, facilitating, in some cases, the transition from latent infection to disease due to alteration of the immune system. Also, it increases the possibility of making the evolution of TB more severe due to a greater extent of lung lesions.[2]

Guatemala is an endemic country for tuberculosis in all its forms due to the multiple social, economic, and environmental risk factors in which the population lives. In recent years, COVID-19 has become part of everyday life, making it a growing issue for people worldwide. The authors of the research seek to enrich knowledge about the management and status of these two diseases when they coexist in patients treated at the hospital studied.

METHOD

This quantitative, descriptive, cross-sectional study from 2020 to 2021 at the Hospital de Referencia Nacional de Enfermedades Respiratorias. Twenty-five medical records were reviewed; three were discarded because they did not meet all the required data.

The information obtained was tabulated in an Excel database. Subsequently, outputs were prepared that allowed each variable of interest to be analyzed. Descriptive Statistics tools, such as absolute and relative frequency distributions and linear correlation, were used to analyze the data. The results were presented in tables to facilitate understanding.

The population studied were patients diagnosed with pulmonary tuberculosis and COVID-19 from the Hospital de Referencia Nacional de Enfermedades Respiratorias through medical records. The information was accessed through an authorization letter previously sent to the institution, which allowed a review of medical records. We worked with the entire population of patients with TB and COVID-19.

This study is committed to protecting the intellectual property of the referenced authors and the sources used, which is why bibliographic references were cited accurately. Likewise, he assured respect for the integrity of the hospital and the personal information obtained from the population.

When working with the patient's clinical records, the principle of confidentiality of the data was complied with. The data was presented collectively and not individually. Furthermore, the information was only used by the researchers for investigative purposes. The results of the present investigation were compared with those of similar ones in different contexts.

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RESULTS

Based on the data obtained from the 22 medical records, it was found that the average age of the population was 49 years. Regarding sex, 41% were women, and 59% were men. It was observed that 50% (11/22) of the patients were in an age range of 15-49 years, of which 63.64% (7/11) were male. Therefore, the most affected population was at the age of work production. (See table 1)

Table 1. Patients with COVID-19/pulmonary tuberculosis by sex and age range. Hospital de Tercer Nivel de Referencia Nacional de Enfermedades Respiratorias. Guatemala 2020 to 2021

Age group	Sex		Total	%
	F	M		
15-49	4	7	11	50.00
50-59	5	4	9	40.91
60-69	0	2	2	9.09
Total	9	13	**22**	**100.00**

Source: Medical records

The tests for COVID-19 in 95% (21/22) of the patients with COVID-19 and tuberculosis who were admitted to the hospital from 2020 to December 2021 were PCR positive. The case of a female patient with a positive antigen test was identified. (See table 2)

Table 2. Patients with COVID-19/pulmonary tuberculosis with positive swab type and sex.

Proof	Sex		Total	%
	F	M		
PCR	8	13	21	95.45
Antigen	1	0	1	4.55
Total	9	13	**22**	**100.00**

Source: Medical records

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Table 3 shows that of the patients admitted to the hospital, 63.64% (14/22) resided in the department of Guatemala.

Table 3. Patients with COVID-19/pulmonary tuberculosis by place of residence and sex.

Place of residence	Sex		Total	%
	F	M		
Guatemala	6	8	14	63.64
Escuintla	1	2	3	13.64
Others	2	3	5	22.73
Total	9	13	**22**	**100.00**

Source: Medical records

Regarding the occupation variable in the patients admitted to the hospital, 36.36% (8/22) were housewives, and 13.64% (3/22) who were dedicated to agriculture were male. The other occupations were added to the other category, representing 50% (11/22). (See table 4)

Table 4. Patients with COVID-19/pulmonary tuberculosis by occupation and sex.

Occupation	Sex		Total	%
	F	M		
Housewife	8	0	8	36.36
Farmer	0	3	3	13.64
Others	1	10	11	50.00
Total	9	13	**22**	**100.00**

Source: Medical records

The most common symptom was cough, with 31.8% (7/22). Then, there was a history of fever and general malaise in 27% (6/22) of the patients. (See table 5)

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Table 5. Patients with COVID-19/pulmonary tuberculosis and their initial COVID-19 symptoms.

Symptom	He had symptoms			
	Yeah	%	No	%
Fever >38°C	2	9.1	20	90.9
History of fever	6	27.3	16	72.7
General discomfort	6	27.3	16	72.7
Muscle or joint pain	2	9.1	20	90.9
Headache	3	13.6	19	86.4
Cough	7	31.8	15	68.2
Anosmia	1	4.5	21	95.5
Rhinorrhea	1	4.5	21	95.5
Vomiting or diarrhea	1	4.5	21	95.5
Dyspnoea	3	13.6	19	86.4
Subcostal indrawing	1	4.5	21	95.5

Source: Medical records

27% of the patients (6/22) were completely cured, while 59% (13/22) were better. These results are related to the mild or moderate COVID type. Of the three patients who were admitted with a serious state of the disease, two died, and one (he did not improve but did not die) was transferred to another healthcare center, the final result being unknown. 50% were admitted with a mild state of COVID-19, 36% with a moderate state and 13.6% with a severe state. (See table 6)

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Table 6. Discharge condition of patients with COVID-19/Pulmonary tuberculosis.

	Type of COVID-19				
Discharge condition	Mild	Moderate	Serious	**Total**	**%**
Cured	1	5	0	6	27.3
Improved	10	3	0	13	59.1
Not improved	0	0	1	1	4.5
Deceased	0	0	2	2	9.1
Total	11	8	3	22	
%	50	36.4	13.6		

Source: Medical records

Regarding the risk factors, it was possible to identify that 68.18% (15/22) of the patients had diabetes mellitus. Of the 15 patients with diabetes mellitus, 60% present two or more concomitant diseases, such as chronic adult malnutrition, chronic obstructive pulmonary disease, HIV, arterial hypertension, and neuro-motor deficiency. However, concerning chronic malnutrition as an adult, the body mass index (BMI) is in the analysis.

95.45% (21/22) of the patients did not present any severe complications that would make it difficult to continue their antifungal treatment in the hospital or after discharge. The antigenic treatment could have been started inside or outside the room. Only 4.55% of patients died in the process, with a fatality rate of 9.09 per 100 TB and COVID-19 patients.

DISCUSSION

COVID-19 did not influence the interruption, follow-up, and improvement of pulmonary tuberculosis in their out-of-hospital life since a high percentage did not present severe complications. However, one of them died after discharge.

According to the article *Developing health policies in patients presenting with SARS-CoV-2: consider tuberculosis,* one of the factors that can most predispose patients with pulmonary tuberculosis to aggravate the symptoms of COVID-19, including diabetes mellitus, chronic obstructive pulmonary disease, immunosuppression, and variable age [8]. In the present investigation, just over half had diabetes, and chronic adult malnutrition was also observed. The median age for this population is 49

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years, but this variable is not a determining factor for the length of hospitalization since its correlation coefficient was 0.2.

According to this study, the male population is at greater risk because they are more frequently exposed to the virus and are an active population from a work perspective. The results agree with those obtained by the study presented in the article Active tuberculosis, sequelae and COVID-19 co-infection: a first cohort of 49 cases carried out by the European Respiratory Journal, which presented in 81.6% of male patients 9 even though in the present investigation, the figures were just over half. 59.09% of the patients who participated in the study were diagnosed with TB before being diagnosed with COVID-19; 22.73% after, and 9.09% on the same day, figures that, in the first two cases, coincide with the study carried out by Keddy, Migliori, and Walt[8] where 53.0% of the 49 patients studied were diagnosed with tuberculosis before after the diagnosis of COVID-19, 28.5% of the patients were initially diagnosed with COVID-19, and 18.3% were diagnosed with both diseases in the same week. They concluded that "COVID-19 could have precipitated the diagnosis of pre-existing and undiagnosed tuberculosis".[8]

According to these researchers, "SARS-CoV-2 could also negatively affect T cell-mediated immunity by causing lymphopenia, especially in people with a severe form of the disease, which could reactivate latent tuberculosis or make COVID-19 patients more susceptible to contracting a tuberculosis infection."[8]

It was also observed that for there to be a risk of serious illness and mortality in patients who already have pulmonary tuberculosis and become ill with COVID, the general health of the patient must be considered since two of the three patients who were admitted in serious condition had diabetes and chronic obstructive disease (COPD), one of them died, and the other did not improve. The other patient who died had dyspnea and was hypertensive, in addition to subcostal indrawing.

The implication that pulmonary tuberculosis has at the respiratory system level in patients presents different degrees of infiltrates that can be interstitial, diffuse, or bilateral, and COVID-19 contributes simultaneously to presenting an infiltrate at the basal level.

All patients received personalized antifimic treatment according to their clinical condition and the phase of infection in which they were, as the treatment scheme for phase 1 was Rifampicin, Isoniazid, Pyrazinamide, Ethambutol accompanied by drugs such as lansoprazole and pyridoxine, administered in 50 doses for 4 months. In phase 2, isoniazid and rifampicin were used.[10]

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Some of the medications administered based on the hospital's COVID-19 care protocol were Remdesivir, Ribavirin, Ivermectin, Lopinavir/Ritonavir, Morphine, Low Molecular Weight Heparin, Bemiparin, and Enoxaparin. These were administered according to the patient's history, comorbidities, and clinical requirements. It is important to note that at the beginning of the pandemic, Remdesivir was not provided to the hospital, so certain patients needed it until this medication was provided to the institution.

One of the questions the study sought to answer was, what effect did the COVID-19 vaccine have on patients with pulmonary tuberculosis? However, in March 2021, the entry of COVID-19 vaccines into Guatemala took place, and this was the third country in the Americas region to acquire them. [11] This study was carried out starting in 2020. As of December 2021, therefore, this data was unavailable and could not be analyzed since the start of the first phase of vaccination included only Health personnel.

The second phase, in June of the same year, included the population over 60 years of age and those over 45 years of age in November. Regarding this information, it can be inferred that the patients admitted to the Hospital de Referencia Nacional de Enfermedades Respiratorias in 2020, corresponding to 45% (10/22), were not vaccinated because the vaccines were not yet available. In patients over 60 years of age who were admitted to the hospital in 2021, it was observed that there was no vaccination data in the clinical record. Therefore, any adverse effects that may have occurred could not be described.

COVID-19 and tuberculosis are two infectious diseases with great global impact. While COVID-19 is caused by the SARS-CoV-2 virus and spreads primarily through respiratory droplets, tuberculosis is caused by the bacteria Mycobacterium tuberculosis and is transmitted through the air via aerosols. Both diseases affect the respiratory system and present significant challenges to public health, although their causes and management differ.[12, 13]

The COVID-19 pandemic has had a considerable impact on the fight against tuberculosis. During the pandemic, many healthcare resources were diverted to address the COVID-19 outbreak, resulting in disruptions in the diagnosis, treatment, and follow-up of tuberculosis patients. This, in turn, led to delays in the identification of new TB cases, lower adherence to treatment, and an increased risk of transmission.[12]

Additionally, some similarities between the two diseases can complicate diagnosis. For example, respiratory symptoms such as cough and difficulty breathing are common in both cases, leading to confusion and delays in accurately detecting each disease.[13]

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Conversely, strategies implemented to control COVID-19, such as mask use and social distancing, can positively reduce the transmission of tuberculosis and other respiratory diseases. However, social isolation can also limit access to health services and support for TB patients.

The interaction between COVID-19 and tuberculosis highlights the need for resilient health systems capable of addressing multiple challenges simultaneously.[14, 15] As the world moves forward in managing the COVID-19 pandemic, it is crucial to resume and strengthen anti-TB efforts to prevent an increase in the incidence of this disease and its global health consequences.

CONCLUSIONS

The treatment of patients with pulmonary tuberculosis was not affected because after leaving the COVID ward, all patients continued to receive their antifimic treatment against pulmonary tuberculosis and, in special cases, received COVID-19 treatment. The antifimic treatment could have been started inside or outside the room. Therefore, the fact of having contracted COVID-19 infection did not affect the follow-up and evolution in terms of treatment of patients with pulmonary tuberculosis.

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CONFLICTS OF INTEREST

No conflicts of interest are declared.

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