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Original article

# Clinical and epidemiological study in patients with pulmonary tuberculosis

*Estudio clínico y epidemiológico en pacientes con tuberculosis pulmonar*

Antonio Belaunde Clausell [1] https://orcid.org/0000-0002-5602-0188

Doniel Valdés Rodríguez [1] https://orcid.org/0009-0006-3314-2920

Liseivis Aymara Navarro Machado [1] https://orcid.org/0009-0004-1369-5339

Joalberto Delgado Prieto [2] http://orcid.org./0000-0002-8135-2942

Ernesto Aleaga Castro [3] https://orcid.org/0000-0002-1702-3810

[1]"Dr. Carlos J. Finlay" Central Military Hospital. Havana, Cuba.

[2] "Dr. Luis Diaz Soto" Central Military Hospital. Havana, Cuba.

[3] Teaching Polyclinic "Ramon Gonzalez Choir". Havana, Cuba.

*Corresponding author. Email: hfinlay32@infomed.sld.cu

**SUMMARY**

**Introduction:** Tuberculosis is one of the oldest and most lethal infectious diseases affecting humans.

**Objective:** To describe the clinical and epidemiological characteristics of patients with pulmonary tuberculosis.

**Methods:** Observational, descriptive, cross-sectional study, carried out at the Internal



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Medicine Department of the "Dr. Carlos J. Finlay" Hospital, from January 2022 to July 2023. The sample consisted of 17 patients. The variables analyzed were: age, sex, hospital stay, skin color, education level, smoking habit, alcoholism, body mass index, personal pathological history, symptoms, complementary studies, radiographic pattern, diagnostic method and mortality.

**Results:** Patients were predominantly in the 40-59 age group (47, 05 %) and male (94, 1 %), 41, 2 % were white, 58, 8 % had a ninth grade education level, 41, 2 % reported having had previous contact with a patient who tested positive for tuberculosis. Cough (82, 4 %) and fever (76, 6 %) predominated. 58, 8 % presented anemia. The most frequent radiographic pattern was non-localized pneumonic consolidation in vertices (58, 8 %). In 70, 6 % the diagnosis was made by direct examination of sputum and subsequent culture in specific medium. 17, 6 % died during hospitalization.

**Conclusions:** The clinical and epidemiological characteristics described in this research are similar to those reported in the consulted literature. A shift towards earlier ages was observed. The disease presents morbidity and mortality that must be considered.

**Keywords:** communicable diseases, pulmonary tuberculosis; tuberculin symptoms; mortality.

## RESUMEN

**Introducción:** La tuberculosis es una de las enfermedades infecto-contagiosas más letales y antiguas que afectan al ser humano.

**Objetivos:** Describir las características clínicas y epidemiológicas de pacientes con tuberculosis pulmonar.

**Métodos:** Estudio observacional, descriptivo, de corte transversal,



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desarrollado en la de Medicina Interna del Hospital "Dr. Carlos J. Finlay", en el periodo de enero de 2022 a julio de 2023. La muestra quedó conformada por 17 pacientes. Se analizaron las variables: edad, sexo, estadía hospitalaria, color de piel, nivel de escolaridad, hábito de fumar, alcoholismo, índice de masa corporal, antecedentes patológicos personales, síntomas, estudios complementarios, patrón radiográfico, método diagnóstico y mortalidad.

**Resultados:** Predominaron los pacientes del grupo etáreo 40-59 años (47,05 %) y masculinos (94,1 %). El 41,2 % fue de piel blanca. El 58,8 % tuvo un nivel de escolaridad de noveno grado. El 41,2 % reportó haber tenido contacto previo con paciente positivo de tuberculosis. Predominó la tos (82,4 %) y la fiebre (76,6 %). El 58,8 % presentó anemia. El patrón radiográfico más frecuente fue la consolidación neumónica no localizada en vértices (58,8 %). En el 70,6 % el diagnóstico se realizó mediante el examen directo del esputo y posterior cultivo en medio específico. El 17,6 % falleció durante el ingreso hospitalario.

**Conclusiones:** Las características clínicas y epidemiológicas descritas en esta investigación son similares a las reportadas en la literatura consultada. Se observó desplazamiento hacia edades más tempranas. La enfermedad presenta una morbilidad y mortalidad que deben ser consideradas.

**Palabras clave:** enfermedades transmisibles, tuberculosis pulmonar; síntomas tuberculínicos; mortalidad.

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# INTRODUCTION

Tuberculosis (TB) is one of the oldest and most lethal infectious diseases affecting humans. TB remains a major health problemin low and middle-income countries. The oldest evidence of human TB infection was found in mummies dating back to the Egyptian predynastic period (3500-2650 BC).ac). A quarter of the world's population is infected with the TB bacillus. [1]

From an epidemiological point of view, the distribution between countries is different. It is estimated that about 80 % of the population in some Asian and African countries are positive in tuberculin tests, while in the United States, between 5 and 10 % are positive. [2]

In Cuba, the prevalence of TB is low, as a direct consequence of the socioeconomic changes that have taken place in the country in recent decades and the strengthening of its National Health System. [3] This perspective will require new approaches in the reorientation of the program, with adjustments to its objectives, based on the epidemiological and socioeconomic characteristics of each territory. [4]

The World Health Organization (WHO) has expressed concern about the impact of COVID-19 on the fight against TB worldwide, especially in countries with the highest burden of the disease and limited economic resources. [5]

The Pedro Kourí Institute of Tropical Medicine (IPK) issued an alert to the Cuban Ministry of Public Health, the National Epidemiology Directorate and the management of the TB Control Program regarding: a decrease in the number of clinical samples sent (compared to pre-pandemic years) by health units in the province of Havana, and also from the western provinces that send sputum for rapid diagnosis of TB by real-time PCR (Xpert MTB/RIF test) of people from the main vulnerable groups of the disease, as well as the reduction in the number of Mycobacterium tuberculosis isolates sent for monitoring resistance to anti-tuberculosis drugs. [6]



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The diagnosis of this disease is based on the key of always maintaining a high index of suspicion. The objective of this research is to describe the clinical and epidemiological characteristics of patients with pulmonary TB.

# METHODS

## Study design and temporal and spatial context

Descriptive, observational, cross-sectional study, carried out at the "Dr. Carlos J. Finlay" Hospital, from January 2022 to July 2023.

## Subjects

A case series was studied consisting of 17 patients over 18 years of age, with previous admission to internal medicine wards and TB diagnosis during their hospital stay. Those with insufficient data in the clinical history were excluded.

## Variables

- Age: divided into groups (18-39, 40-59 and 60-79).
- Sex.
- Skin color: white, mixed race, black.
- Hospital stay: measured in days of hospitalization.
- Education level: no education, primary, secondary, pre-university and university.
- Toxic habits: smoking (yes, no) and alcoholism (yes, no).
- Body mass index: underweight, normal weight, overweight and obese.
- Personal medical history: high blood pressure (HBP), type 2 diabetes mellitus (type 2 DM), chronic obstructive pulmonary disease (COPD), bronchial asthma, heart failure, Human Immunodeficiency Virus (HIV), previous pulmonary TB.



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- Epidemiological background: contact with TB patient, history of prison, health worker, low income and overcrowding.
- Symptoms of the disease: cough, expectoration, fever, anorexia, weight loss, sweating, diarrhea, hemoptysis, disorientation, dyspnea, chest pain.
- Time of symptom onset: days since the beginning of symptoms.
- Laboratory test abnormalities: anemia (<12 g/L), leukocytosis (>10x 109/L), thrombocytosis (>300 x109/L), erythrocyte sedimentation rate greater than 100 mm/h, hypocholesterolemia (<3,8 mmol/L), hypotriglyceridemia (<0,35 mmol/L), hypoalbuminemia (<35 g/L).
- Radiographic pattern: without alterations, pneumonic consolidation of the apex, pulmonary cavitation, pneumonic consolidation not localized in the apex, miliary pattern and pleural effusion.
- Diagnostic method: direct study and culture, technique of GeneXpert.
- Min-hospital mortality.

## Procedures and processing

For statistical analysis, descriptive statistics were applied by calculating absolute and relative frequencies. For each variable, it was verified that there were no extreme, inconsistent or missing values.Analyses were performed using IBM SPSS Statistics version 23.

## Bioethical aspects

This work was carried out under the principles established in the Declaration of Helsinki. [7] Individual patient data were kept confidential and used only for research purposes.

The research was approved by the Scientific Council and the Research Ethics Committee of the institution.



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# RESULTS

Table 1 shows that patients were predominantly aged between 40-59 years (47. 05 %) and male (94. 1 %). The average age was 45, 1 years. The average hospital stay was 14. 1 days and in 52. 9 % of cases it was longer than 10 days.

**Table 1.** Sample distribution by age and sex

| Age groups | Sex | | | | Total | |
|---|---|---|---|---|---|---|
| | Male | | Female | | | |
| 18-39 | **n** | **%** | **n** | **%** | n | % |
| 40-59 | 7 | 41.2 | 1 | 5.9 | 6 | 35.2 |
| 60-79 | 6 | 35.3 | - | - | 7 | 47.05 |
| 18-39 | 3 | 17.6 | - | - | 3 | 17.6 |
| Total | 16 | 94.1 | 1 | 5.9 | 17 | 100 |

41. 2 % [CI: 17.6-64,1] were white, 58. 8 % (CI: 35.3-82.4) had a ninth grade education level, 64. 7 % (CI: 41.2-82.4) of the patients were smokers; 70.6 % (CI: 47.1-94.1) suffered from alcoholism and 64.7 % (CI: 41.2-88.2) were underweight.

There was a low prevalence of chronic diseases. Bronchial asthma was most frequently found (17.6 %; CI: 0.3-35.3); the presence of previous TB was confirmed in 11.8 % (CI: 0.2-29.4) of patients and 5.9 % (CI: 0.1-17.6) patients suffered from HIV (Table 2).

41.2 % (CI: 17.6-64.7) reported having had contact with a TB positive patient, 17.6 % (CI: 0.1-35.3) had been in prison, and 11.8 % (CI: 0.1-29.4) were health workers.



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**Table 2.** Sample distribution according to personal background

| Disease | n | Prevalence (%) | Confidence interval (95%) | |
|---|---|---|---|---|
| | | | Lower Limit | Upper Limit |
| HTA | 1 | 5.9 | 0.1 | 17.6 |
| DM type 2 | 1 | 5.9 | 0.1 | 17.6 |
| COPD | 1 | 5.9 | 0.1 | 17.6 |
| Asthma | 3 | 17.6 | 0.3 | 35.3 |
| Heart Failure | 1 | 5.9 | 0.1 | 17.6 |
| HIV | 1 | 5.9 | 0.1 | 17.6 |
| Previous TB | 2 | 11.8 | 0.2 | 29.4 |

*The same patient may have more than one chronic disease.

Legend: HTA (high blood pressure), DM (diabetes mellitus), COPD (chronic obstructive pulmonary disease), HIV (human immunodeficiency virus), TB (tuberculosis).

The most frequent symptom was cough (82.4 %; CI: 64.7-99.2), followed by fever (76.6 %; CI: 52.9-94.1) and anorexia and weight loss with equal frequency (64.7 %; CI: 41.2-88.2) (Table 3).

On average, patients attended the health services of the "Dr. Carlos J Finlay" hospital or another center (with subsequent referral to the referred center), 111.2 days after the onset of symptoms. Reactivation was observed in 17.6 % (CI: 0.3-35.3) patients.



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**Table 3.** Sample distribution according to symptoms

| Symptoms | n | Prevalence (%) | Confidence interval (95%) | |
|---|---|---|---|---|
| | | | Lower Limit | Upper Limit |
| Cough | 14 | 82.4 | 64.7 | 99.2 |
| Expectoration | 8 | 47.1 | 23.5 | 70.6 |
| Fever | 13 | 76.6 | 52.9 | 94.1 |
| Sweating | 7 | 41.2 | 17.6 | 64.7 |
| Anorexia | 11 | 64.7 | 41.2 | 88.2 |
| Weight loss | 11 | 64.7 | 41.2 | 88.2 |
| Dyspnoea | 8 | 47.1 | 23.5 | 70.6 |
| Diarrhea | 1 | 5.9 | 0.1 | 17.6 |
| Chest Pain | 2 | 11.8 | 0.2 | 29.4 |
| Disorientation | 2 | 11.8 | 0.2 | 29.4 |
| Hemoptysis | 2 | 11.8 | 0.2 | 29.4 |

*The same patient may have more than one symptom

58.8 % (CI: 35.3-82.4) of cases had anemia; while 9 (52.9 %; CI: 29.4-76.5) individuals had erythrocyte sedimentation rate greater than 100 mm/h, hypocholesterolemia and hypoalbuminemia (Table 4).



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**Table 4.** Sample distribution according to alterations in the complementary

| Complementary | n | Prevalence (%) | Confidence interval (95 %) | |
|---|---|---|---|---|
| | | | Lower Limit | Upper Limit |
| Anemia | 10 | 58.8 | 35.3 | 82.4 |
| Leukocytosis | 8 | 47.1 | 23.5 | 70.6 |
| Leukopenia | 2 | 11.8 | 0.2 | 29.4 |
| Thrombocytosis | 7 | 41.2 | 17.6 | 64.7 |
| Erythrocyte sedimentation rate > 100 mm/h | 9 | 52.9 | 29.4 | 76.5 |
| Hypocholesterolemia | 9 | 52.9 | 29.4 | 76.5 |
| Hypotriglyceridemia | 5 | 29.5 | 11.4 | 52.9 |
| Hypoalbuminemia | 9 | 52.9 | 29.4 | 76.5 |

*The same patient may have more than one altered complement

The most frequent radiographic pattern was non-localized pneumonic consolidation at the vertices (58.8 %; CI: 35.3-82.4), followed by pneumonic consolidation at the vertices (29.5 %; CI: 11.4-52.9) (Table 5).



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**Table 5.** Sample distribution according to alterations in chest X-ray

| Chest X-ray | n | Prevalence (%) | Confidence interval (95%) | |
|---|---|---|---|---|
| | | | Lower Limit | Upper Limit |
| Consolidation at vertex | 5 | 29.5 | 11.4 | 52.9 |
| Pulmonary cavitation | 3 | 17.6 | 0.3 | 35.3 |
| Non-localized consolidation at vertex | 10 | 58.8 | 35.3 | 82.4 |
| Miliary pattern | 3 | 17.6 | 0.3 | 35.3 |
| Pleural effusion | 2 | 11.8 | 0.2 | 29.4 |

*The same patient may have more than one abnormality on the chest X-ray.

In 70.6 % (CI: 47.1-88.2) patients the diagnosis was made by direct examination of sputum and subsequent culture in specific medium; in 17.6 % (CI: 0.3-35.3) patients it was made by the technique of Gene Xpertand 11.8 % (CI: 0.2-29.4) were considered BK negative. 17.6 % (CI: 0.3-35. 3) died during hospitalization.

# DISCUSSION

The population presented epidemiological characteristics similar to those reported in other investigations. [8, 9, 10] There was a predominance of males, with a low educational level, smokers, a history of alcoholism and low body weight. The diagnosis in increasingly younger people was



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striking. These results are corroborated in other studies, [11, 12] and are related to conditions associated with the male gender: drug, alcohol and tobacco use.

The most prevalent comorbidities were low weight, bronchial asthma and a history of previous TB. Results similar to those obtained by*Villamarin Rojas*and others. [10] Low weight and malnutrition are, according to some authors, [13, 14] the most frequent comorbidities in these patients.

The prisoner populations and the health personnel were reported as the main epidemiological data. Similar results are found in the research of M éndez F et al. [14] The literature summarizes the main factors that influence the prison population, among which are: the rapid spread of the bacillus, the delay in diagnosis, due to lack of assistance to the prisoner, the deprivation of the right to health, the abandonment of treatment, overcrowding, poor conditions, poorly ventilated cells, lack of sunlight, poor nutrition and a high rate of HIV infection. [14]

TB and HIV are related in terms of the prognosis of their evolution, either in the case of developing TB in a patient with HIV or as an indicator of HIV. The association of both diseases is exponentially enhanced. [15] In this research the population of patients with HIV was low, as in the study by Mora C et al. [16]

The presence of heart failure in this type of patient darkens the prognosis and is associated with early mortality, since this condition is associated with comorbidity measured through the Charlson index, male sex and DM. [17, 18]

Cough, fever and general symptoms were the most frequent, results similar to those found in the research of Rodriguez Rivera [19] in relation to the findings of the alterations of the complementary foods; they are consistent with other research. [19, 20] Hypocholesterolemia and



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hypoalbuminemia should be interpreted as manifestations of malnutrition. Leukopenia may be an indicator of disseminated TB. [19]

The study by Valdés Díaz et al. [21] found that cough, with a prevalence of 76 %, is the most frequent symptom followed by fever with 40 %. Results very similar to those of this research.

In the patient with TB there are multiple radiographic models. According to Domínguez del Valle et al., [22] the pulmonary lymph node patterns, pleural TB, miliary TB and tracheobronchial TB can be described. According to*Painted Baiza*and others, [23] the patterns of post-primary TB are: consolidation, cavitation, centrolobular nodules and pleural effusion.Other lesions described in chest radiographs are: fibrosis, nodular lesions, reticular images, bronchiectasis and emphysematous pattern. [24] In this study multiple radiological patterns were found and consolidation lesions not located in the vertices predominated. This result is similar to that described by Rodriguez Rivera. [19]

The triad for the microbiological diagnosis of TB is based on bacilloscopy, culture in specific media and molecular biology studies. [25] Bacilloscopy is the most commonly used diagnostic method for TB, perhaps due to the limited resources available in countries where this disease is most prevalent. [26] GeneXpert determination in the diagnosis of TB is accurate, given its high sensitivity and specificity in relation to traditional sputum and culture studies. [27]

Medina and others, [28] report a lethality of 11, 4 %, which was found in this study. Among the factors associated with lethality, these authors describe: hypoalbuminemia (OR:7.38), thrombocytopenia (OR:15.56) and septic shock (OR:86.35).

According to the Cuban Statistical Yearbook of Health, TB ranked 35th in 2023 as a cause of death in both sexes, with 50 deaths from that cause. [29]



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## CONCLUSIONS

The clinical and epidemiological characteristics described in this research are similar to those reported in the consulted literature. A shift towards earlier ages was observed. The disease presents morbidity and mortality that must be considered.

## REFERENCIAS BIBLIOGRÁFICAS

1. Echemendía Castillo JC, García Pérez RP, Castillo Estenoz M. Una mirada actualizada sobre la tuberculosis. Revista Médica Electrónica de Ciego de Ávila [Internet]. 2023 [acceso: 15/07/2024]; 29: e3601. Disponible en: https://revmediciego.sld.cu/index.php/mediciego/article/view/3601/3934

2. Barreto Argilagos G, Rodríguez Torrens HC. Dos zoonosis ancestrales reemergen y se complementan. Camagüey. Rev. Prod. Anim [Internet]. 2019 [acceso: 15/07/2024]; 31(1):55-57. Disponible en: scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2224-79202019000100055

3. Araujo Inastrilla CR. Incidencia de la Tuberculosis en Cuba. Rev Colum Med [Internet]. 2022 [acceso: 15/07/2024]; 1(1):e3. Disponible en: https://revcolumnamedica.sld.cu/index.php/columnamedica/article/view/3

4. Gómez Murcia P. Evaluación de los indicadores epidemiológicos del programa de la tuberculosis. Matanzas. Años 2002- 2006. Rev Med Electrón [Internet]. 2009 [acceso: 15/07/2024]; 31 (2). Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1684-18242009000200004

http://revcimeq.sld.cu/index.php/imq
revinmedquir@infomed.sld.cu

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5. World Health Organization. Information Note. Tuberculosis and COVID-19. COVID-19: Considerations for tuberculosis (TB) care [Internet]. 2020 [acceso: 15/07/2024]. Disponible en: https://www.who.int/tb/COVID_19considerations_tuberculosis_services.pdf

6. Díaz Rodríguez R, Lemus Molina D, Martínez Romero MR. La tuberculosis en Cuba en tiempos de COVID-19: ¿retroceso en su plan de eliminación? Revista Cubana de Medicina Tropical [Internet]. 2020 [acceso: 15/07/2024]; 72(3): e585. Disponible en: https://revmedtropical.sld.cu/index.php/medtropical/article/view/585/485

7. Asociación Médica Mundial AMM. Declaración de Helsinki de la AMM - Principios éticos para las investigaciones médicas en seres humanos. 64ª Asamblea General; 2013 octubre. Fortaleza, Brasil: Asociación Médica Mundial (AMM); 2013. [acceso: 12/07/2024]. Disponible en: https://www.wma.net/es/policies-post/declaracion-de-helsinki-de-la-amm-principios-eticos-para-las-investigaciones-medicas-en-seres-humanos/

8. Ramírez Vélez JL, Ortiz Mera DL, Lucas Parrales EN. Prevalencia y prevención de la tuberculosis pulmonar en poblaciones Latinoamericanas. MQR Investigar [Internet]. 2023 [acceso: 15/07/2024]; 7(3): 2144-2157. Disponible en: https://www.investigarmqr.com/ojs/index.php/mqr/article/view/560

9. Gutiérrez Jara A. Prevalencia Epidemiológica de las personas con Tuberculosis pulmonar y Extra pulmonar atendidos en el Puesto de Salud Collanac - Pachacamac 2017-2020. (Tesis). Lima: Universidad César Vallejo. 2020 [acceso: 15/07/2024]. Disponible en: https://repositorio.ucv.edu.pe/handle/20.500.12692/62360

10. Villamarín Rojas DD, Lizcano Soto CA, Sánchez Frank JV, García Suarez ÁE. Prevalencia de la Tuberculosis en los pacientes mayores de 18 años en el Hospital Universitario Erasmo Meoz Cúcuta Departamento Norte Santander, Colombia durante el período 2018-2021. (Tesis de



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Especialidad). Bogotá: Universidad de Santander. 2022 [acceso: 15/07/2024]. Disponible en: https://repositorio.udes.edu.co/handle/001/8698

11. Miranda López JJ, Ochoa Soto R. Desigualdades de género y las redes de apoyo social en pacientes con tuberculosis. Revista Cubana de Higiene y Epidemiología [Internet]. 2023 [acceso: 15/07/2024]; 60:e1277. Disponible en: https://revepidemiologia.sld.cu/index.php/hie/article/view/1277

12. Ferrán Torres RM, Fernández Vasconcelos E, Sandoval Torres Ml, Makanda Nsingui M, Fortuna Ososen I, Victoriano Da Costa A, et al. Algunas desigualdades sociodemográficas de la tuberculosis entre las regiones geográficas de Cuba. Revista Cubana de Medicina Tropical [Internet]. 2022 [acceso: 15/07/2024]; 74(3): e886. Disponible en: https://revmedtropical.sld.cu/index.php/medtropical/article/view/886

13. Paz Castillo LC, Corzo Véliz PD. Prevlaencia de tuberculosis pulmonar en el adulto mayor, reportados al programa nacional de tuberculosis, durante el periodo de julio a diciembre, 2019 en la ciudad de Guatemala. (Tesis de Especialidad). Ciudad de Guatemala: Universidad Galileo. 2019 [acceso: 15/07/2024]. Disponible en: biblioteca.galileo.edu/tesario/handle/123456789/1193

14. Méndez F, Ramos O, Netto F, Henrique M, Mazão Lima G, de Morais Lima L, et al. Prevalencia de la tuberculosis en Mato Grosso Do Sul Brasil entre 2010 y 2018. Revista de Salud Pública [Internet]. 2022 [acceso: 15/07/2024]; 25(1):104-112. Disponible en: https://revistas.unc.edu.ar/index.php/RSD/article/view/29365

15. Mendoza Ticona A, Iglesias Quilca D. Tuberculosis en pacientes con VIH/SIDA. Acta Médica Peruana [Internet]. 2008 [acceso: 15/07/2024]; 25(4):247-254. Disponible en: www.scielo.org.pe/scielo.php?pid=S1728-59172008000400012&script=sci_abstract



**Bajo licencia Creative Commons**

2024; 16: e896

16. Mora C, Bastidas Goyes AR, Patiño J, David Vera J, Beltrán A, Mutis C, et al. Prevalencia de tuberculosis latente determinada mediante la prueba de derivado proteico purificado (PPD) en una población de pacientes adultos con artritis reumatoide llevados a terapia biotecnológica. Rev Colomb Reumatol [Internet]. 2021 [acceso: 15/07/2024]; 28(3): 178–18. Disponible en: https://www.elsevier.es/en-revista-revista-colombiana-reumatologia-374-articulo-prevalencia-tuberculosis-latente-determinada-mediante-S0121812320301511

17. Castillo Miranda J, Belaunde Clausell A, Aleaga Castro E. Mortalidad precoz en pacientes con insuficiencia cardiaca egresados de un Servicio de Medicina Interna. Rev Cuban Cardiol. 2020 [acceso: 15/07/2024]; 26(2): [aprox. 5 p.]. Disponible en:https://revcardiologia.sld.cu/index.php/revcardiologia/article/view/943

18. Belaunde Clausell A, Castillo Miranda J, Aleaga Castro E, Piloto Cruz A. Readmisión precoz en pacientescon insuficiencia cardíaca. Arch. Hosp. Univ. "Gen. Calixto García". 2021 [acceso: 15/07/2024]; 9(1):20-29. Disponible en: http://www.revcalixto.sld.cu/index.php/ahcg/article/view/598

19. Rodríguez Rivera L. Tuberculosis Diseminada. Estudio de 17 casos y revisión de la Literatura. Revista cubana de medicina [Internet]. 1967 [acceso: 15/07/2024]; 8(6):513-557. Disponible en: https://revmedicina.sld.cu/index.php/med/article/view/895

20. Marín Méndez M, Rodríguez Julián AR, Minier Pouyou L. Factores determinantes relacionados con la incidencia de la tuberculosis en un municipio de Santiago de cuba. MEDISAN [Internet]. 2019 [acceso: 15/07/2024]; 23(5):847. Disponible en: https://medisan.sld.cu/index.php/san/article/view/2569

21. Valdés Díaz S, García Silvera E, Rosas Valladares C, Cayon Escobar IG, Valladares Baena A, Crespo Díaz TT. Patrones radiológicos y diagnóstico definitivo de enfermos presuntivos de



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tuberculosis pulmonar con baciloscopia negativa. REV CUBANA MED TROP [Internet]. 2011 [acceso: 15/07/2024]; 63 (2): 130-4. Disponible en: scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0375-07602011000200004

22. Dom nguez Del Valle FJ, Fern ndez B, P rez De las Casas M, Mar n B, Bermejo C. Cl nica y radiolog a de la tuberculosis tor cica. An. Sist. Sanit. Navar [Internet]. 2007 [acceso: 15/07/2024]; 30 (2): 33-48. Disponible en: scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1137-66272007000400004

23. Baiza Pintado MF, Beletanga Yungaicela IA, Carri n Yupa ME, Villa Clavijo CG. Estudio de sensibilidad del diagn stico por radiograf a y tomograf a computarizada en tuberculosis pulmonar pos primaria. Pol. Con [Internet]. 2022 [acceso: 15/07/2024]; 8(8): 391-407. Disponible en: https://polodelconocimiento.com/ojs/index.php/es/article/download/5852/14610

24. Marcelo Ruiz HA. Hallazgos radiogr ficos en pacientes diagnosticados con tuberculosis pulmonar en el Hospital Mar a Auxiliadora, 2020. (Tesis de Especialidad). Huancayo: Universidad peruana los andes. 2022 [acceso: 15/07/2024]. Disponible en: https://repositorio.upla.edu.pe/handle/20.500.12848/4177

25. Pe a CM. Tuberculosis latente: diagn stico y tratamiento actual. Rev Chil Enferm Respir [Internet]. 2022 [acceso: 15/07/2024]; 38: 123-130. Disponible en: www.scielo.cl/scielo.php?script=sci_arttext&pid=S0717-73482022000200123

26. Guevara Miguel A. Diagn stico de tuberculosis pulmonar mediante baciloscopia y cultivo Ocawa Kudoh de pacientes atendidos en un hospital de salud p blica de Chimbote-2019. (Tesis de Especialidad). Chimbote: Universidad San Pedro. 2019 [acceso: 15/07/2024]. Disponible en: publicaciones.usanpedro.edu.pe/handle/20.500.129076/17879



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2024; 16: e896

27. Acosta Sánchez DR, Domínguez Sánchez L, López González J, Duarte Grandales S. GeneXpert como método de diagnóstico de la tuberculosis en Santiago de Cuba. MEDISAN [Internet]. 2022 [acceso: 15/07/2024]; 26(2):255. Disponible en: https://medisan.sld.cu/index.php/san/article/view/3406/0

28. Medina AC, Arancibia HF, Deza EC, Vallejo VP, Nakouzi SI, Peña, MC. Fatality rate and survival amongst discharged in patients with tuberculosis, Instituto Nacional del Tórax, Chile. Rev. Chil. Enferm. Respir [Internet]. 2016 [acceso: 15/07/2024]; 32(4): 217-223. Disponible en: www.scielo.cl/scielo.php?script=sci_arttext&pid=S0717-73482016000400002

29. Ministerio de Salud Pública. Dirección de Registros Médicos y Estadísticas de Salud 2023. Anuario Estadístico de Salud. [Internet]. 2024 [acceso: 15/07/2024]. Disponible en: https://files.sld.cu/dne/files/2024/09/Anuario-Esta%c3%adstico-de-Salud-2023-EDICION-2024-pdf

## Conflicts of interest

The authors report no conflicts of interest.

## Authors' contribution

*Conceptualization: Antonio Belaunde Clausell, Doniel Valdés Rodriguez, Joalberto Delgado Prieto, Aimara Navarro Machado High School.*

*Data curation: Antonio Belaunde Clausell, Doniel Valdés Rodriguez, Joalberto Delgado Prieto, Liseivis Aimara Navarro Machado, Ernesto Aleaga Castro.*

*Formal Analysis: Antonio Belaunde Clausell, Doniel Valdés Rodriguez, Joalberto Delgado Prieto, Aimara Navarro Machado High School, Ernesto Aleaga Castro.*



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*Investigation: Antonio Belaunde Clausell, Doniel Valdes Rodriguez, Joalberto Delgado Prieto, Aimara Navarro Machado High School, Ernesto Aleaga Castro.*

*Methodology: Antonio Belaunde Clausell, Doniel Valdés Rodríguez, Joalberto Delgado Prieto, Aimara Navarro Machado High School, Ernesto Aleaga Castro.*

*Project Management: Antonio Belaunde Clausell, Doniel Valdés Rodriguez, Joalberto Delgado Prieto.*

*Resources: Antonio Belaunde Clausell, Doniel Valdes Rodriguez, Liseivis Aimara Navarro Machado.*

*Supervision: Antonio Belaunde Clausell, Doniel Valdés Rodriguez, Ernesto Aleaga Castro.*

*Validation: Antonio Belaunde Clausell, Doniel Valdés Rodriguez, Liseivis Aimara Navarro Machado,Ernesto Aleaga Castro.*

*Display: Antonio Belaunde Clausell, Doniel Valdés Rodriguez, Liseivis Aimara Navarro Machado, Ernesto Aleaga Castro.*

*Drafting: Antonio Belaunde Clausell, Doniel Valdés Rodriguez, Liseivis Aimara Navarro Machado, Ernesto Aleaga Castro.*

http://revcimeq.sld.cu/index.php/imq
revinmedquir@infomed.sld.cu

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