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Common comorbidities among tuberculosis patients in Western Sudan during the Sudan armed conflict.

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Abstract:

Background: Tuberculosis continues to be the primary cause of death from infectious diseases globally. In low- and middle-income countries, TB significantly contributes to morbidity and mortality, particularly among patients with comorbidities such as HIV infection, diabetes mellitus, smoking, depression, chronic obstructive pulmonary disease, and pulmonary TB. HIV co-infection elevates the risk of progression to developed tuberculosis (TB) disease. This study evaluated comorbidity in tuberculosis among patients attending El-Obeid Teaching Hospital during the armed conflict from 2023 to 2024. Methodology: This descriptive retrospective study took place in the respiratory department of El-Obeid Teaching Hospital in North Kordofan State, Sudan. The study examined 751 patients diagnosed with tuberculosis, alongside detailed coverage files from the early years of the Sudan war. We collected the data in August 2024. We developed a thorough data collection sheet and methodically organized all pertinent data. Results: Of the 751 patients, 692 received a tuberculosis (TB) diagnosis without any comorbidities, making up 92% of the cohort. The remaining 59 patients, accounting for 8%, had TB with comorbidities: 40% with diabetes mellitus (DM), 29% with HIV, 15% with hypertension (HIN), and 7%, 6%, and 3% with chronic kidney disease (CKD), bronchial asthma, and cardiac disease, respectively. The majority of patients were over 60 years old, comprising 37% of the cohort. The majority of the patients were unemployed, and their tuberculosis treatment outcomes were complete. Conclusion: Tuberculosis (TB) with comorbidity is more prevalent in diabetic patients than in those with HIV. We recommend regular screening for chronic comorbid diseases to improve treatment outcomes and minimize complications. Additionally, promoting outpatient care is essential for improving TB management, and further surveillance is necessary to fully understand the extent of the issue.

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Keywords: Tuberculosis, comorbidity, El-Obeid Teaching Hospital, Sudan

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Introduction

Tuberculosis, an infectious bacterial disease caused by Mycobacterium tuberculosis (MTB), is transmitted between humans through the respiratory route and most commonly affects the lungs but can affect any tissue. It burdens healthcare systems and communities worldwide. TB, the world's worst infectious disease killer, affects low-income, malnourished, overcrowded, and immunosuppressant populations. Over 10 million new cases are reported each year. The infected person can remain latent for years and later cause sickness. Co-infection with HIV/AIDS or other immune-compromising disorders increases disease progression.

The WHO expects 1.3 million people died from tuberculosis in 2022, making it the second leading infectious disease killer. HIV/AIDS co-infection makes TB a major health issue [1]. Certain comorbid conditions may elevate the risk of developing pulmonary tuberculosis (PTB). In 2021, pulmonary tuberculosis (PTB) was globally reported to account for nearly 50% of all new tuberculosis (TB) cases. Prior to the COVID-19 pandemic, tuberculosis remained a significant global health challenge, particularly impacting low-income countries with vulnerable and under-resourced health systems. The presence of comorbidities, whether communicable or non-communicable diseases, heightens the risk of mortality, relapse, and recurrence in patients with tuberculosis. The COVID-19 pandemic had a detrimental impact, leading to a global decline in the diagnoses of TB cases, with the number falling from 7.1 million in 2019 to 5.8 million in 2020 for newly diagnosed cases [2]. The natural history of tuberculosis Diabetes may elevate the risk of tuberculosis (TB). Approximately 25% of the global population is affected by latent TB infection (LTBI), with an estimated 5% of these individuals likely to develop active TB disease during their lifetime, and about 50% of those progressing within 1–2 years post-infection. Diabetes Mellitus significantly elevates the risk of developing Tuberculosis (TB) disease, increasing it by approximately threefold. Additionally, it doubles the risk of mortality during TB treatment and contributes to adverse treatment outcomes worldwide. The prevalence of diabetes mellitus was around 425 million individuals in 2017, with projections suggesting an increase to 629 million by 2045 [3].

Chronic kidney disease (CKD) is linked to a heightened risk of tuberculosis (TB) diagnosis in the UK. Additionally, individuals with end-stage kidney disease exhibit an elevated risk of developing active tuberculosis [4]. The global burden of tuberculosis and cardiovascular disease (CVD) is substantial. The rates of cardiovascular disease are escalating swiftly in low- and middle-income nations [5]. The literature on the increased cardiovascular disease (CVD) risk in tuberculosis (TB) patients is limited globally. Additional retrospective and prospective studies are required [6]. Sudan is a large, fragile developing nation characterized by a diverse population, elevated poverty levels, a history of civil conflict, low health expenditure, and inadequate access to healthcare [7]. Asthma and pulmonary tuberculosis (PTB) are distinct disease entities with differing pathogenesis. The association between asthma and tuberculosis is

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uncommon but may present specific challenges in patient management. Chronic respiratory disease (CRD) contributes significantly to morbidity and mortality [8].

Materials and Methods:

This retrospective descriptive study was performed in the respiratory department of El-Obeid Teaching Hospital in North Kordofan State, Sudan. Examine a cohort of 751 patients diagnosed with tuberculosis, alongside detailed coverage files from the initial years of the Sudan war. Data collection occurred in August 2024. A data collection sheet was developed, and all pertinent data was systematically gathered.

Statistical analysis:

The data sets utilized the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, version 25), from which we later derived results.

Results:

A total of 751 TB patients were seen at our hospital's TBCU, with 692 patients having tuberculosis (TB) without comorbidity (92%) and 59 having TB with comorbidity (8%). Patients with comorbidities were divided into two groups: males (59%) and females (41%). The patients' ages ranged from 1 to 90 years, with an average age of more than 60 years (37%). Among the 59 patients, 24 (41%) were diabetic patients with tuberculosis, 17 (29%) were TB with HIV, 9 (7%) were hypertensive patients with tuberculosis, 3 (6%) were asthmatic with tuberculosis, and 2 (3.5%) were TB with cardiac disease and chronic kidney disease, respectively. As illustrated in Figure 1.

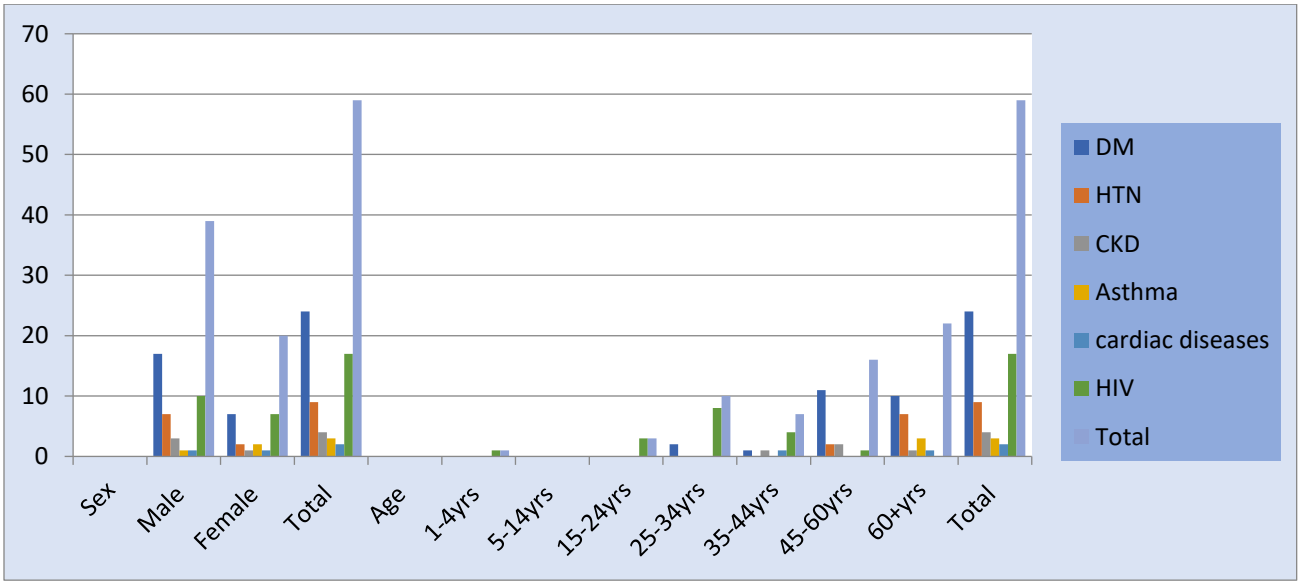

Figure 1: Description of patients by TB cases and comorbidity according to gender and age group.

Of the 59 TB cases with co-morbidity, 18 (32%) were unemployed, whereas 15 (26%) were laborers, 11 (19%) were farmers, 6 (10%) were employees, 4 (7%) were gold miners, 3 (5%) were soldiers, and 1 (1%) were students. As illustrated in Figure 2.

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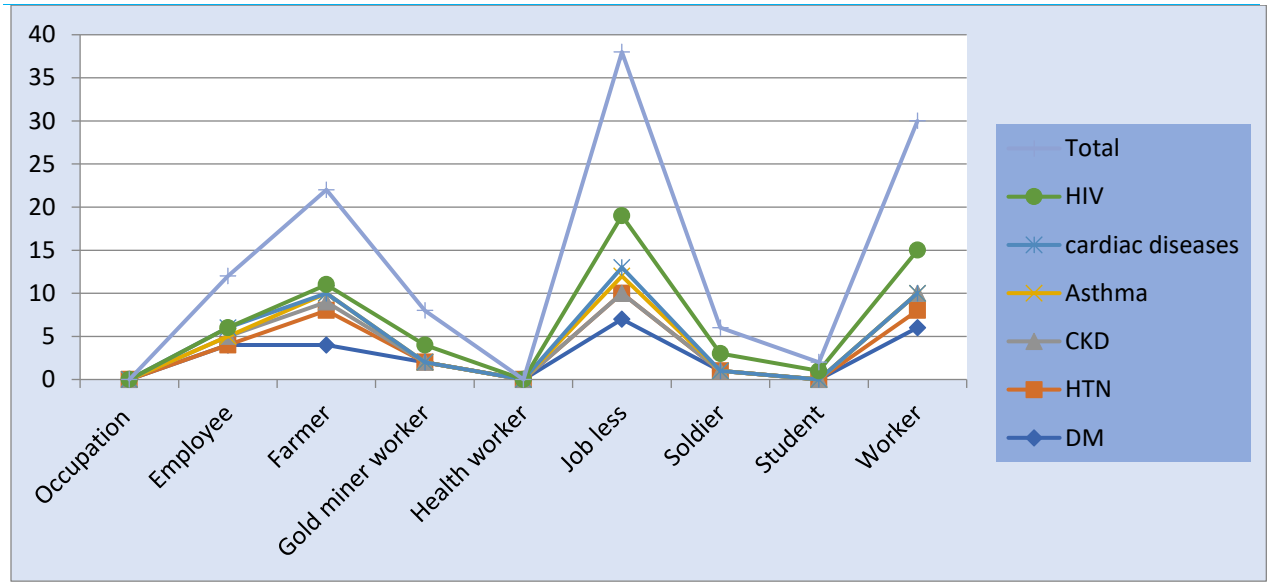

Figure 2: Description of patients with tuberculosis and co-morbidities by occupation.

In terms of treatment outcomes, approximately 30 out of 59 (51%) completed the treatment; 13 (22%) died, 7 (12%) were cured, and 4 (7%) On medication, three (5%) defaulted, and two (3%) were transferred out, as shown in Figure 3.

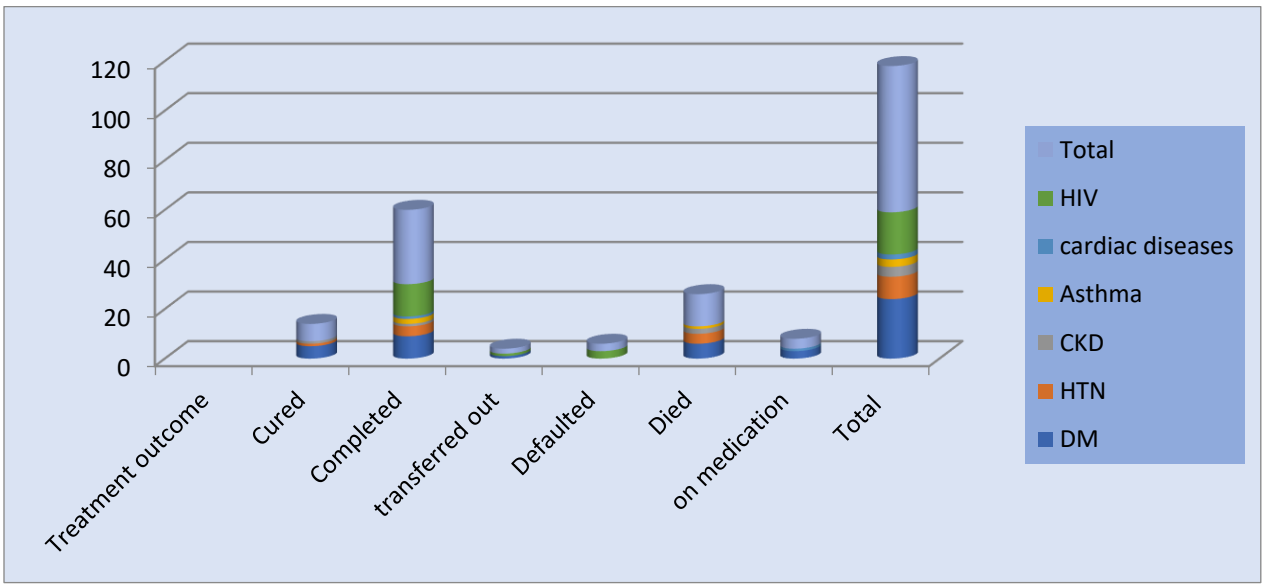

Figure 3: Description of individuals with tuberculosis cases and co-morbidities based on treatment outcome

Discussion:

In 2021, pulmonary tuberculosis (PTB) was recognized as a significant global health issue, characterized by elevated morbidity and mortality rates. Certain comorbidities associated with immunocompromised states and chronic diseases contribute to the development of pulmonary tuberculosis

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(PTB). Few studies have globally analyzed the comorbidities associated with PTB [9]. In low- and middle-income countries (LMIC), tuberculosis in patients with comorbidities is a primary cause of morbidity and mortality, particularly in conjunction with HIV infection, diabetes mellitus, smoking, depression, and chronic obstructive pulmonary disease (COPD). A study involving over 2 million individuals with active tuberculosis indicated a prevalence of diabetes mellitus (DM) among TB patients of 15.3%, with an estimated prevalence of 7.7% in Central and Latin America. Patients with tuberculosis (TB) and diabetes mellitus (DM) have a threefold increased risk of developing TB, along with an elevated risk of adverse outcomes, including relapse, treatment failure, and mortality. The number of diabetes mellitus patients with tuberculosis is projected to reach 366 million by 2030 [10]. This study investigates the comorbidity among tuberculosis patients in the respiratory department of El-Obeid Teaching Hospital in North Kordofan State, Sudan, during the period of armed conflict. The results of the current investigation indicated that 692 patients were tuberculosis (TB) patients without comorbidity (92%), while 59 patients had TB with comorbidity (8%). The patients with comorbidity were distributed as 59% males and 41% females. The patient age range spanned from 1 to 90 years, with a mean age exceeding 60 years (37%). Of the 59 patients, 24 (41%) had diabetes and tuberculosis, 17 (29%) had tuberculosis and HIV, 9 (7%) were hypertensive patients with tuberculosis, 3 (6%) had asthma and tuberculosis, and 2 (3.5%) had tuberculosis in conjunction with cardiac diseases and chronic kidney disease. The findings of this study revealed that 40% of the sample consisted of diabetic patients, with 71% being male and 29% female. The age group of 45-60 years exhibited a joblessness rate of 46%, while 29% were unemployed. Additionally, 36% successfully completed tuberculosis treatment. The study by Shi H indicates that patients with type 2 diabetes mellitus and pulmonary tuberculosis exhibit poorer glycemic control and an increased frequency of infections [11]. Hullalli R's study indicates that the prevalence of diabetes mellitus (DM) among tuberculosis (TB) patients is 23.7%, with significant associations noted in individuals over 46 years of age. The authors recommend mandatory routine screening for DM to enhance successful TB treatment outcomes [12]. The study results indicated that approximately 29% of the patients were diagnosed with PTB and HIV, comprising 59% male and 41% female, with the age group of 25-43 years representing 47% of the sample. 35% were unemployed, and 76% of the tuberculosis treatment outcomes were successful. Mwatenga reports a high prevalence of pulmonary tuberculosis and HIV co-infections among adult inmates with presumptive pulmonary tuberculosis in Kenya. The prevalence of tuberculosis among inmates with presumptive pulmonary tuberculosis was 10.2%, with a 95% confidence interval of 6.37-16.91% [13]. The mortality rate among TB/HIV co-infected patients in Ethiopia is high.[8] In this study, 15% of tuberculosis patients were found to be hypertensive. The Seegert AB study found no evidence to support an association between

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tuberculosis and hypertension [14]. In the current study, patients with chronic kidney disease (CKD) account for 7% of the comorbidity. Luczynski P conducted a study utilizing Cochrane databases for research published from 1970 to 2022, which estimated that the pooled risk of tuberculosis (TB) was 57% higher in individuals with chronic kidney disease (CKD) stages 3-5 compared to those without CKD [15]. In the present study, tuberculosis patients with cardiovascular disease represent 3% of the comorbidity. Marcu study reveals About 60% of patients with tuberculosis exhibit cardiovascular disease, with the most prevalent associated conditions being pericarditis, myocarditis, and coronary artery disease [16]. In our current study, the prevalence of chronic respiratory disease in patients with tuberculosis is approximately 6%. Osman investigated 136 patients with a history of sputum smear-positive pulmonary tuberculosis (PTB) at the TB clinic of Omdurman Teaching Hospital in Khartoum, Sudan. The study found a strong association between chronic respiratory symptoms, such as chronic cough (OR 6.67, 95% CI 2.98–14.90, P < 0.001), and chronic airflow obstruction (OR 12.4, 95% CI 1.56–98.40, P = 0.02) with a past history of PTB [17].

Conclusions:

Our findings indicate that tuberculosis (TB) comorbidity is more prevalent in diabetic patients compared to those with HIV. We recommend regular screening for chronic comorbid conditions to enhance treatment outcomes and minimize complications. Additionally, promoting outpatient care is essential for improving TB management, and further surveillance is necessary to fully understand the scope of the issue.

Ethics Approval:

The Human Research Ethics Committee at MRCC has approved the proposal. Approval Number: HREC0014/PMRCC.9/24.

Availability of Data and Materials:

The data that underpin the conclusions of this article are contained within the article itself, and any further inquiries may be directed to the corresponding author.

Conflict of interest:

The authors indicate that the study was carried out free from any commercial or financial relationships that might be seen as potential conflicts of interest.

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