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Research Article

The Demographic Characteristics of Pulmonary Tuberculosis Patients in Western Sudan During the Conflict of 2023-2024

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Abstract

Background: Pulmonary tuberculosis (PTB) was a global health burden in low-income and fragile developing countries with poor health systems districted by war, such as Sudan. The purpose of this study was to look at the demographic characteristics of patients with pulmonary tuberculosis, such as gender, age, material status, education, occupation, and treatment delays. Methodology: We conducted a retrospective descriptive. The study included about 533 patients with pulmonary tuberculosis. The data gathering was done in August 2024. A data collection sheet was produced, and all pertinent information was acquired. Results: The results showed that 76% of 533 pulmonary tuberculosis patients were males and 24% were females, with the primary age groups being 26-35 years old (27.5%) and 18-25 years old (22%). More than 51% were from metropolitan regions, with a primary education, and 29% worked as gold miners, followed by free workers. Conclusion: PTB represents the Sudan's biggest health problem, impacted the productive and working-age population, as well as the destitute community, causing significant financial, security, and environmental issues. Direct support for the TB control program has raised community awareness regarding early detection and treatment of PTB.

Keywords

Tuberculosis, Pulmonary, Mycobacterium Tuberculosis, Sudan

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1. Introduction

Tuberculosis is a significant global health issue that affects both healthcare systems and communities due to several reasons, including psychological, physical, and economic aspects. According to WHO estimates from 2022, approximately 1.3 million individuals succumbed to tuberculosis. Tuberculosis is ranked as the second biggest cause of death among all infectious diseases [1]. In 2022, the global incidence of new tuberculosis cases reached 10.6 million, including 5.8 million males, 3.5 million females, and 1.3 million children [2]. Mycobacterium tuberculosis (MTB) induces pulmonary tuberculosis through the aerosolization of bacteria during patient coughing. The World Health Organization's End TB Strategy seeks to reduce worldwide TB incidence and death by 90% and 95%, respectively, by 2035. Over the past 25 years, Sudan has been afflicted by a conflict that has significantly impacted the healthcare system and overall health services, resulting in a humanitarian crisis. Currently, 7.8 million individuals are experiencing severe health issues related to both mental and physical well-being, alongside 1.6 million internally displaced persons and 1.1 million refugees, all amidst a severely diminished economic output. The WHO and the Sudan Health Observatory under the federal ministry of health identify malaria as the predominant communicable disease, followed by tuberculosis, pneumonia, and diarrheal disorders [3]. In Sudan, tuberculosis is the primary cause of death, accounting for 1% of total fatalities among patients admitted to healthcare facilities [4]. The primary aim of the study is to evaluate the burden of tuberculosis in Sudan during the 2023 conflict, specifically to ascertain the demographic characteristics of patients with pulmonary tuberculosis. To ascertain the predominant challenges associated with the war that impact the illness burden in the country.

2. Material and Methods

This retrospective descriptive study was performed in the respiratory department of El-Obeid Teaching Hospital in North Kordofan State, Sudan. The study encompassed more than 533 patients diagnosed with pulmonary tuberculosis, including complete coverage files. The data gathering was conducted in August 2024. A data collection sheet was developed, and all pertinent data was compiled. Statistical analysis: Data sets were imported into the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, version 25), and results were generated from them.

3. Results

This study examined 533 individuals with pulmonary tuberculosis ranging in age from two years to 90 years, with a mean age of 37.1 ±17.44 and a mean STD of 37.1 ±17.44. 76% of the patients were male, 34% were female, and the majority (27.5%) were between the ages of 26 and 35. About 51.9% of the patients live in metropolitan areas, with 59% married. See Table 1 and Figure 1 below.

Table 1. The study was distributed demographically based on age, residence, and marital status.

Variable	Males n=405	Females n=128	Total n=533
Age			
≤ 18years	22	18	40
18-25	90	29	119
26-35	124	23	147
36-45	73	21	94
46-60	49	17	66
≥ 60	47	20	67
Residence			
Urban	207	70	277
Rural	198	58	256
Marital status			
Single	169	33	202
Married	230	84	314
Divorce	2	2	4
Widow	4	9	13

Table 2. Shows the study's demographic distribution based on education and occupation.

	Males N=405	Females n=128	Total N=533
Occupation			
Employee	15	4	19
Farmer	48	4	52
Gold miner worker	152	1	153
Health worker	3	0	3
Job less	24	94	118
Soldier	17	0	17
Student	11	21	32
Worker	135	4	139
Education			

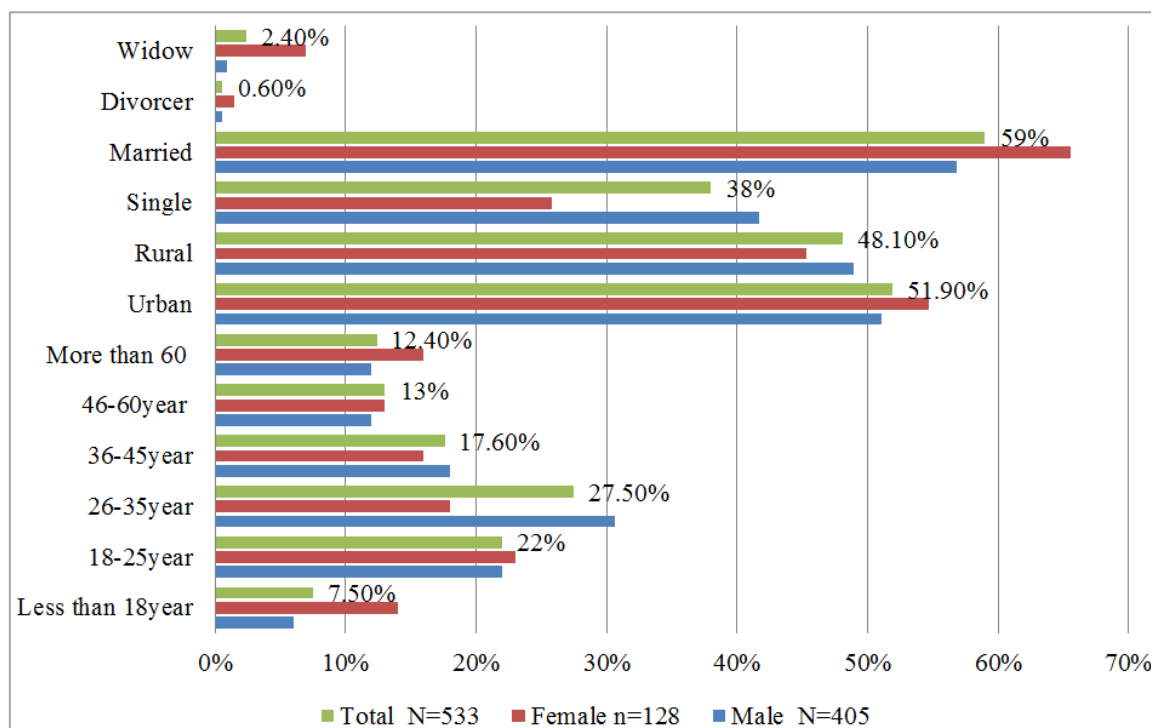|	Males N=405	Females n=128	Total N=533		Males N=405	Females n=128	Total N=533
Illiterate	100	46	146	Secondary	98	25	123
Primary	178	49	227	University	11	3	14
Intermediate	18	5	23				

Figure 1*. Shows the distribution of the study age groups based on the sex of the patients, marital status, and residence.*

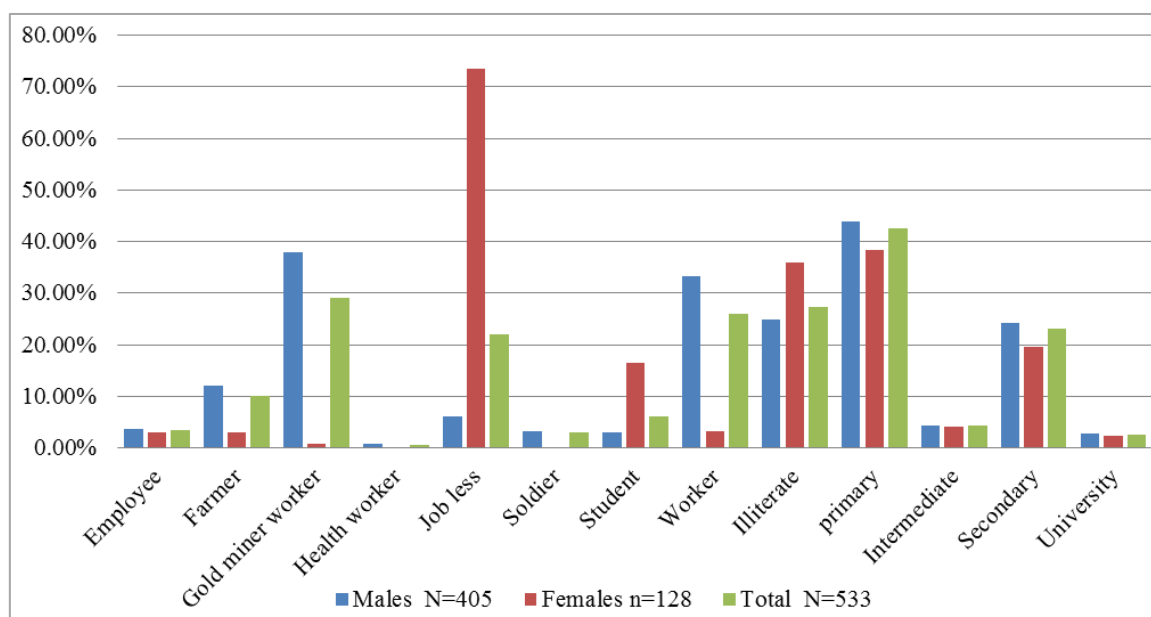***Figure 2****. Displays the frequency of studies on pulmonary tuberculosis in relation to occupation and education.*

Table 2 and Figure 2 show the study population's distribution by degree of education and employment. The majority of the patients (42.5%) were primary educated, with 27.4% being illiterate. Furthermore, the study subjects were divided into eight groups based on their occupation: 29% are gold miners, 22% are unemployed, and 73.4% of the unemployed are women. See Table 2 and Figure 2.

Table 3. Shows the study's demographic distribution based on the length of symptoms before treatment and the reasons for treatment delay.

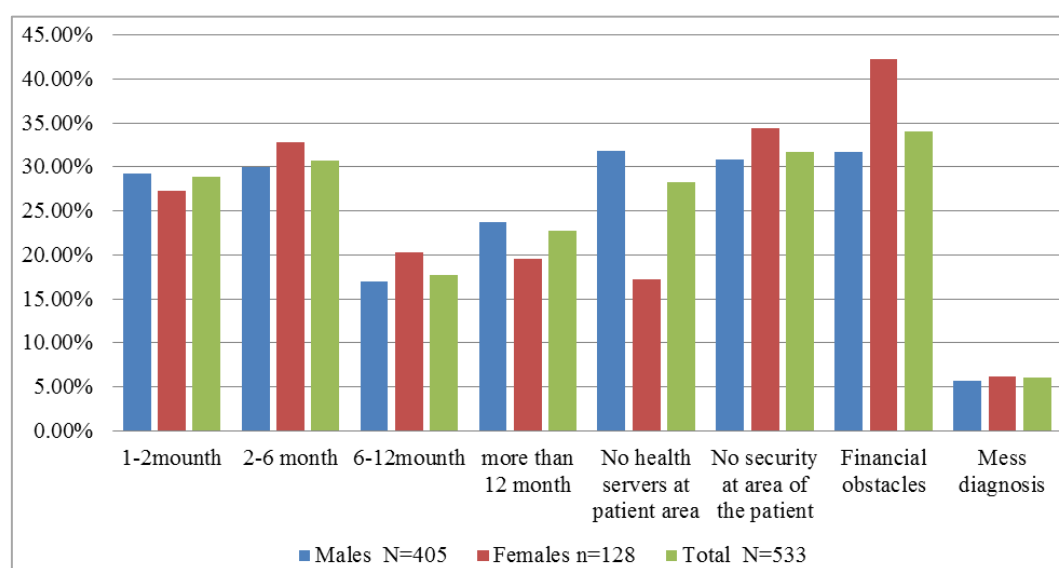|	Males N=405	Females n=128	Total N=533
Duration of symptom before starting treatment			
1-2mounth	119	35	154
2-6 month	122	42	164
6-12mounth	68	26	94
more than 12 months	96	25	121
Causes of delay testament			
No health servers in patient area	129	22	151
No security at area of the patient	125	44	169
Financial obstacles	128	54	182
Mess diagnosis	23	8	31

Figure 3. Represents the study's distribution based on the length of symptoms and the delay in patient management.

The study focuses on the distribution of demographic data based on the length of symptoms prior to treatment and the reasons for treatment delay. 30.7% of patients seek medical advice between 2 and 6 months before beginning treatment. 42.2% of female patients arrived late to the health facility due to financial constraints, 28.3% of all patients received medical services late due to a lack of health servers in the patient area, and 31.7% had no security in the patient area during the Sudan war (see Table 3 and Figure 3).

4. Discussion

Tuberculosis is a worldwide health issue that affects both health systems and communities in low-income nations. Sudan, an impoverished and fragile developing nation with a deficient health system, has Eastern Sudan as an endemic region for TB and a conflict zone [5]. In Sudan, tuberculosis

accounted for 1% of total fatalities. This study examines the demographic characteristics of pulmonary tuberculosis patients during the initial year of the Sudan war. A total of 533 patients with pulmonary tuberculosis were enrolled, of which 405 (76%) were male and 128 (24%) were female. The primary age group affected by pulmonary tuberculosis was 26-35 years, comprising 27.5% of the patients, with 153 (29%) employed as gold miners, followed by 26% in other occupations. The core demographic load of PTB consisted of young, urban, married men with a rudimentary education engaged in gold mining occupations [6]. Identify potential obstacles, delays, and lost opportunities in the prevention and diagnosis of tuberculosis. In developed nations characterized by a low disease burden, a primary limitation is the delayed diagnosis of bacilliferous adults who are in contact with young children. This issue is prevalent among segments of the population experiencing socioeconomic vulnerability. In underdeveloped countries with a significant disease burden, the primary challenge is monitoring children who have been in contact with bacilliferous patients [7-9]. Undernutrition is a significant risk factor for tuberculosis (TB), associated with an estimated 2.2 million TB cases in 2022, as reported by the World Health Organization (WHO) Global Tuberculosis Report [10-13]. The study by Li SJ indicated that the incidence of pulmonary tuberculosis (PTB) is elevated among the elderly, with the burden of PTB increasingly affecting the elderly, males, rural populations, and clinically diagnosed individuals. The current study indicates that over 30% of patients experience a delay of 2 to 6 months from the onset of symptoms to the initiation of treatment [14]. It was reported that in a low-endemic country with an inadequate health system, there was a normal delay of several months in the identification and treatment of tuberculosis [15, 16]. During the initial years of the Sudan war, the study revealed that 34% of patients did not commence treatment promptly due to financial barriers, while 31.7% delayed treatment initiation due to a lack of security in their location when symptoms arose. In conclusion, pulmonary tuberculosis is a significant health issue in Sudan, impacting the economically active population and impoverished communities, exacerbated by financial, security, and environmental challenges. Provided direct support for the tuberculosis control program and enhanced community awareness regarding early detection and treatment of pulmonary tuberculosis.

Abbreviations

| PTB | Pulmonary Tuberculosis |
| TBCU | Tuberculosis Control Unit |

Acknowledgments

Ethical Consideration

Permission was obtained from authorities in El-Obeid Teaching Hospital to get access to the notified information.

Ethical Approval

We obtained written permission from the manager of El-Obeid teaching hospital and the study's proposal has been granted approval by the Human Research Ethics Committee at MRCC. Approval Number: HREC0014/PMRCC.9/24.

Author Contributions

Amal Khalil Yousif Mohammed: Conceptual, Administration, Data collection, Analysis, Final approval

Ahmed Mirghani Osman Ali: Data collection, Analysis, Final approval

Hussain Gadelkarim Ahmed: Conceptual, Consultation, Writing, critical revision, Final Approval

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Data Availability Statement

Data regarding this study available from the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

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