RESEARCH ARTICLE

Epidemiological Characteristics of Presumed TB Uveitis in Baghdad 2024

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ABSTRACT

Introduction: Tuberculosis bacilli infect any tissue in the body, not only the lungs. Ocular tuberculosis includes tuberculosis of the eyelid skin, tuberculous dacryocystitis, tuberculous dacryocystitis and tuberculous osteomyelitis of bone around the orbit. Uveitis is the inflammation of the uveal tissues of the eye, which includes the iris, ciliary body, and choroid.

Objective: to describe the sociodemographic features of presumed TB uveitis in Baghdad and to measure the prevalence of presumed TB uveitis among all TB patients and among all extra-pulmonary TB patients reported in Baghdad during 2024.

Methods: This is a cross-sectional study conducted at the National Tuberculosis Institute in Baghdad, involving 118 patients with presumed TB uveitis, diagnosed based on clinical assessment alone or clinical assessment plus a positive TST/IGRA. We recorded the patients' Demographic features, occupational status, risk factors (diabetes, smoking), and a previous history of TB. Statistical analysis was performed using SPSS V27.

Results: Out of 118 presumed TB uveitis patients, the mean age was 45 years (SD = 14.9), ranging from 11 to 75 years. The most prevalent age group was 50-59 years, and the least prevalent age group was 21-29 years. About two-thirds of the patients were female. Most of the patients lived on the east side of Baghdad 65(55%), and 92% were new cases of TB uveitis, while the rest were relapses. In 45% of patients, the diagnosis was made by ophthalmologists as presumed ocular TB based solely on clinical features; in 40%, on clinical features with a positive IGRA; and in the remaining patients, on clinical features and TST positivity. Less than one-fifth of the patients were diabetic, and less than one-fifth of the patients were hypertensive. Half of the patients were unemployed, 10.2% were students, and the rest were government or self-employed.

Conclusion: TB uveitis is more common in the 50-59 age group and in females than in males. The diagnosis is not always reliant on IGRA or TST results, and relapse in TB uveitis is not an infrequent condition.

Key words: TB, Uveitis, IGRA, Tuberculin skin test, Iraq.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by bacilli called Mycobacterium tuberculosis. In 2023, approximately 11 million new TB cases and around 1.25 million deaths were reported.[1]

Classification of TB depends on the affected body site (site of TB). The eye can be affected with TB as ocular TB, TB of the eyelids, tuberculous dacryocystitis, tuberculous dacryocystitis and tuberculous osteomyelitis of the orbital bone. Ocular TB can be classified anatomically into anterior (conjunctivitis, episcleritis, scleritis, blepharoconjunctivitis, iridocyclitis, and keratitis) and posterior (chorioretinitis and choroiditis).[2] Uveitis is the inflammation of the uveal tissues of the

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eye, which includes the iris, ciliary body, and choroid. It is associated with visual morbidity, with almost one-third of affected patients experiencing visual impairment. Uveitis is considered the fifth or sixth leading cause of blindness in developed countries, accounting for 10–15% of blindness cases.[3,4]

Incidence of uveitis in the United States and Europe is estimated at 20–50 cases per 100,000 people annually, and with a prevalence ranging from 38 to 714 per 100,000.[5] TB infection is usually pulmonary but can also present outside the lung in extra-pulmonary forms, including ocular involvement. TB uveitis may occur with or without systemic manifestations and should be expected even in the absence of pulmonary TB.[6]

Globally, the prevalence of TB uveitis (TBU) in uveitis patients is estimated at 4.0%, with higher rates in countries with a high burden of TB (7.0%) compared to 3.0% in other countries with low prevalence rates.[7] Due to the challenges of definitive diagnosis resulting from the paucity of bacilli, TB uveitis is often misdiagnosed and is frequently recognised after significant delays.[8]

In Iraq, there is no precise figure for the burden of TB uveitis among TB patients. However, a study conducted at the main eye speciality hospital in Baghdad on 214 cases of uveitis diagnosed from January 2019 to June 2022 reported that infective uveitis accounted for 23% of cases, with toxoplasmosis and TB uveitis as the primary contributors.[9]

Diagnosis, treatment, and the optimal time for follow-up after anti-tubercular treatment (ATT) are still challenging in tubercular uveitis (TBU). However, starting ATT for uveitis patients with a positive interferon-gamma release assay (IGRA) and/or tuberculin skin test (TST) without a confirmed diagnosis of pulmonary or other extra-pulmonary TB is often problematic.[10]

The gold standard for diagnosing TB uveitis is the direct examination of the mycobacterium tuberculosis bacilli (MTB) in tissues or fluids of the eye; however, positive results are difficult to obtain by culture or smear from ocular samples due to the low yield of MTB and the small size of specimens. In paucibacillary disease, polymerase chain reaction (PCR) tests are expected to help detect MTB.[11]

Many studies have relied on IGRA or TST, and/or a polymerase chain reaction (PCR) test, in the presence of clinical features of uveitis. A high prevalence (44% to 48%) of TB with uveitis was reported if the diagnosis is based on a positive IGRA test.[12]

The treatment regimen of TB uveitis is exactly as systemic TB, which uses a combination of drugs including rifampicin, isoniazid, pyrazinamide and ethambutol for 2 months, then continues to use rifampicin and isoniazid for 4 months. It is possible to extend treatment for up to 9 months based on clinical response and outcomes, which may improve outcomes. However, the use of corticosteroids can sometimes increase the probability of treatment failure.[13] In patients with tuberculous uveitis (TBU), those who were treated with anti-tuberculosis therapy (ATT) with or without corticosteroids had a much lower chance of inflammation (recurrence) compared to those who did not receive ATT.[14]

Tubercular uveitis (TB-uveitis) remains highly confusing in the uveitis field, primarily because of its diverse clinical phenotypes. Moreover, it remains difficult to differentiate whether Mycobacterium tuberculosis (Mtb) is present in the ocular tissues, or whether an immune response without Mtb invasion in ocular tissues occurs, or whether it may even induce an anti-retinal autoimmune response. Gaps in the immunopathological knowledge of TB-uveitis delay diagnosis and appropriate management.[15]

Complications arising from uveitis may depend on the site of infection. The most common complication in general is cataract, retinal detachment, macular scars, and glaucoma, in addition to blindness. According to the site of uveitis, patients with panuveitis had the highest rate of ocular complications, followed by anterior uveitis.[16]

At the National TB Institute, TB uveitis has not been previously studied. This study was designed to describe the sociodemographic features of presumed TB uveitis in Baghdad and to measure the prevalence of presumed TB uveitis among all TB patients and among all extra-pulmonary TB patients reported in Baghdad during 2024.

METHODS

Study design and setting: This is a cross-sectional study that extracted data from patients' files at the National Tuberculosis Institute (NTI) for those diagnosed and treated for presumed TB uveitis during the period from January 1, 2024, to December 31, 2024. The National Tuberculosis Institute in Baghdad is the main referral centre for TB diagnosis, treatment, and follow-up, as well as the core body for TB surveillance. TB-related immunological tests, including IGRA or Tuberculin Skin Test (TST), and treatment for TB are available only at NTI in Baghdad and its counterpart institutions in the rest of the governorates. The TB institute received referred cases from Baghdad's governmental hospitals and private clinics.

Ethical consideration: This study utilised record-based data from the institutional patient registry at the National Tuberculosis Institute, covering the period from January 1, 2024, to December 31, 2024. The study protocol was reviewed and approved by the Scientific and Research Ethics Committee of the Public Health Directorate / Iraqi Ministry of Health, with approval number 1104 on April 27, 2025. Agreement from the institution's administration was obtained to use the data in this study.

Case definition: We included all cases registered as presumed TB uveitis at the NTI who were diagnosed and referred by ophthalmologists from governmental hospitals and private clinics in Baghdad to receive treatment. Ophthalmologists diagnosed the patient as TB uveitis based on

1. The patient who had clinical local features highly suggestive of TB uveitis with or without systemic features and a history of exposure to a patient with TB, regardless of their IGRA or TST positivity.[17]
2. Clinical features of TB uveitis, in addition to a Positive IGRA or TST test.
3. Exclusion of other infectious diseases like toxoplasmosis, herpes and syphilis and immunological uveitides like sarcoidosis, and Behçet's disease.

Positive tuberculin skin test: Tuberculin skin testing was performed using the Mantoux method with purified protein derivative, injected intradermally into the forearm, and read at 48–72 hours. A test was considered positive if induration measured ≥ 5 mm in children living with HIV or those with severe malnutrition, or ≥ 10 mm in all other children/adolescents.

Positive IGRA test: A positive Interferon-Gamma Release Assay (IGRA), such as the QuantiFERON-TB Gold Plus, is defined by a TB antigen (TB1 or TB2) minus Nil value of ≥ 0.35 IU/mL, and ≥ 25% of the Nil value, according to the manufacturer's criteria and WHO recommendations. This result indicates Mycobacterium tuberculosis infection, but does not differentiate between latent and active TB disease.[18]

Sampling techniques: The sampling in this study was comprehensive, i.e., we included all patients diagnosed with presumed TB uveitis during the targeted study period.

Data Source: Patient files at National Tuberculosis Institute

Definitions of variables used in this study: New Case of TB: Patients who are newly diagnosed with either pulmonary or extra-pulmonary TB, bacteriologically confirmed or clinically diagnosed, and have not received prior TB treatment or have been using therapy for <1 month.

Relapse Case: A patient previously declared successfully treated (cured or treatment completed) for TB, who is now diagnosed with a recurrent episode of TB, either bacteriologically

confirmed or clinically diagnosed.

Lost to Follow-Up: A TB patient who did not start treatment or whose treatment was interrupted for two consecutive months (≥60 days) or more. These patients are previously registered but failed to complete treatment due to dropout, migration, or discontinuation. [19]

Data Collection: The collected information on the studied patients included sociodemographic characteristics, occupational status, immunological test results, and a history of diabetes and smoking.

Data Analysis: The data were first entered into an Excel file and then transferred to Statistical Package for the Social Sciences (SPSS) version 27 for analysis. Continuous variables are presented as means with their standard deviations, and discrete variables are presented as numbers with their frequency distribution. Prevalence measurement: We relied on the 2024 annual statistical report to estimate the total number of tuberculosis cases and extra-pulmonary cases in Baghdad. We measured the total number of cases of presumed tuberculous uveitis in Baghdad during the study year and, therefore, the prevalence of TB uveitis among the total TB patients in Baghdad.

RESULTS

Of the 118 patients in the institute registry reviewed, the youngest was 11 years old and the oldest was 75 years old, with a mean age of 45±14.9 years. For sex distribution, 44 (37.3%) of patients with TB uveitis were male, and 74 (62.7%) were female. The most prevalent age group was those from (50 -59) years, then those from (40-49) years, and the least affected age group by TB uveitis was those from (21-29) years.

Most patients were unemployed (59, 50%), while 42 (33%) were employed in government or self-employment. Additionally, 12 (10.2%) were students. Most of the patients were distributed on the east side of Baghdad (65, 55%). Out of 118 patients included in the study, 18 (15.3%) were diabetic, and 20(16.9%) of them were smokers. See Table 1.

Table 1 | Socio-demographic Characteristics of patients

		Male No.	Female No.	Total no.(%)
Age groups (years)	Less than 21	4	7	11(9.3%)
	21-29	2	5	7(5.9%)
	30-39	8	14	22(18.6%)
	40-49	12	15	27(22.9%)
	50-59	13	20	33(28%)
	60 and more	5	13	18(15.3)
Occupation	Self-employee	24	0	24(20.3%)
	Governmental employee	12	4	16(13.6%)
	Unemployed	0	59	59(50%)
	Student	4	8	12(10.2%)
	Retired	4	3	7(5.9%)
Baghdad district	Rusafa	21	44	65(55%)
	Karkh	23	30	53(45%)
Diabetic	Yes	9	9	18(15.3%)
	No	35	65	100(84.7%)
Smoking	Yes	16	4	20(16.9%)
	No	28	70	98(83.1%)
	Total	**44 (37.3%)**	**74 (62.7%)**	**118**

According to the Iraqi Annual Statistical Report 2024, [20] the total number of notified tuberculosis cases in Baghdad was 2,089, and the total number of extra-pulmonary tuberculosis cases was 1,105. According to that, the prevalence of TB uveitis (118 cases) among total tuberculosis patients in Baghdad was 5.6%, and among extra-pulmonary tuberculosis cases, 10.6% , see Table 2.

Table 3 shows that 109 (92%) were new cases of TB uveitis, 8 (6.8%) were relapses, and 1 (0.8%) was lost to follow-up. Table 4 shows that 54 (45%) were diagnosed by ophthalmologists as presumed TB uveitis based on clinical features, 48 (40%) were diagnosed based on clinical features and a positive IGRA test, and 16 of 118 (13.6%) were diagnosed based on clinical features and TST positivity.

DISCUSSION

TB uveitis represents a complex clinical problem due to its broad spectrum. Ocular inflammation can be unilateral or bilateral, and

Table 2 | Prevalence of TB uveitis among total TB patients and among extra-pulmonary TB patients in Baghdad 2024	
Prevalence of (118) TB uveitis cases among Total (2089) tuberculosis cases in Baghdad, 2024	**5.6%**
Prevalence of (118) TB uveitis cases among total (1105) extra-pulmonary tuberculosis cases in Baghdad, 2024	**10.6%**

Table 3 | Type of TB		
	Frequency	**Percent**
New	109	92.4
Relapse	8	6.8
Lost to follow up	1	0.8
Total	118	100.0

Table 4 | Method of diagnosis		
	Frequency	**Percent**
Clinical only	54	45.8
IGRA + Clinical	48	40.7
TST test+ Clinical	16	13.6
Total	118	100.0

can present as anterior, intermediate, posterior, or panuveitis.[21]

In our study, TB uveitis was more frequent in females (74, 62.7%), consistent with a 2022 prospective study in South Africa,[12] which also found TB uveitis was significantly more frequent in females. In India in 2024, a study conducted on children in northern India reported that 66% of ocular TB occurs in females. [22]

In our study, the ages of patients with TB uveitis ranged from 11 to 75 years, with a mean age of 45±14.9 years. The most frequent age group was 50-59 years. In the collaborative ocular tuberculosis study (COS-1), which involved more than 800 patients, the mean age was 40.5 years, with a range of 4 to 90 years; the 20-50 year age group was the most frequently involved.[23] Another study conducted in Italy in 2020, in which the age of TB uveitis ranged from 14 to 80 years, and the mean age was 48.8 years. The common age group was 30 -50 years.[24] The difference in the age distribution of TB uveitis between our study and the studies mentioned above can be attributed to differences in group categorisation and sociodemographic differences across societies.

More than 50% of the patients were unemployed, and approximately 55% of the affected cases were from Rusafa, east of Baghdad, the capital's most densely populated area. In general, tuberculosis is a disease associated with poverty and overcrowding. [25]

We found that 109(92.4%) were new cases and 8 (6.8%) were relapses. The relapsed cases in our series were fewer than those reported in a study conducted in the Netherlands in 2024, where relapsed ocular TB was 33%.[26]

Relapse is a measure of treatment success. A 2022 study reported a 100% response rate to ocular TB treatment with no relapses.[8] Therefore, the low relapse rate in our study may be attributed to proper treatment response and effective follow-up.

In our study, the ophthalmologists used multiple methods to support the diagnosis. Either a highly suggestive clinical decision in 54(45.8%) or according to clinical findings with positive IGRA test in 48 (40.7%) patients, or clinical findings with positive TST test in 16(13.6%). Many studies refer to the fact that the diagnosis of TB uveitis is challenging and the IGRA test is not better than TST in sensitivity, but it is more specific. It is more beneficial to use both tests in the diagnosis of TB uveitis. [27,28]

The prevalence of diabetes in TB uveitis in our study was 18 (15.3%), which is very close to the global prevalence of 15.4% and lower than the prevalence in South Asia (21%). The cause of this difference may be that South Asian countries are more densely populated and have higher poverty rates. In our study, the prevalence of smoking among patients with TB uveitis was 20 of 118 (16.9%). In the general population, the prevalence of smoking in Iraq is lower compared to Syria and Jordan. [29-31]

CONCLUSION

Two-thirds of the patients with TB uveitis were female, and most of the patients were new cases, meaning there were few relapsed

cases and a good response to treatment. The diagnosis of presumed TB uveitis in Baghdad is based on clinical assessment only or clinical assessment with a positive TST or IGRA test.

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Abbreviations list: Anti-tubercular treatment (ATT), Interferon-gamma release assay (IGRA), Mycobacterium tuberculosis bacilli (MTB), National Tuberculosis Institute (NTI), Ocular tuberculosis study (COS-1), Polymerase chain reaction (PCR), Statistical Package for the Social Sciences (SPSS), Tuberculin skin test (TST), Tuberculosis (TB), Tuberculous uveitis (TBU), World Health Organisation (WHO).

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