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Original Research Article

Ocular Manifestations in Patients with Tuberculosis: A Cross-Sectional Study from a Tertiary Care Centre in South Gujarat

Omkar S. Soni[1], Mital Patel[2], Manali Shah[3], Krishan Kumar[4], Darshan Jashvantbhai Thacker[5]

[1]DNB Resident, GMERS Medical College and Hospital, Valsad, Gujarat, India
[2]Assistant Professor, GMERS Medical College and Hospital, Valsad, Gujarat, India
[3]Senior Resident, GMERS Medical College and Hospital, Valsad, Gujarat, India
[4]DNB Resident, GMERS Medical College and Hospital, Valsad, Gujarat, India
[5]DNB Resident, GMERS Medical College and Hospital, Valsad, Gujarat, India

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Corresponding author: Dr. Darshan Jashvantbhai Thacker
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Abstract

Background: Tuberculosis remains a major public health problem in developing countries, with pulmonary being most common and extrapulmonary involvement contributing significantly to morbidity. Ocular tuberculosis, though often underdiagnosed, can lead to visual impairment if not detected and treated early. Understanding the pattern and determinants of ocular involvement is essential for timely intervention.

Objectives: To evaluate the prevalence and pattern of ocular manifestations in patients with tuberculosis, assess associated visual impairment, and determine the relationship between disease duration and ocular involvement.

Materials and Methods: This cross-sectional study was conducted at a tertiary care centre in South Gujarat from April 2023 to October 2024. A total of 167 patients with tuberculosis were included. All patients underwent a detailed ophthalmic examination, including visual acuity assessment, slit-lamp biomicroscopy, and fundus evaluation. Data were analyzed using SPSS version 20. Associations between categorical variables were assessed using the chi-square test, with a p value <0.05 considered statistically significant.

Results: Ocular manifestations were observed in 33 patients (19.8%). Posterior segment involvement was more common than anterior segment involvement, with choroiditis (36.4%) being the most frequent manifestation, followed by retinitis (21.2%) and retinal vasculitis (15.2%). Visual impairment was present in 42.4% of patients with ocular tuberculosis. No significant association was found between gender and ocular involvement or visual impairment. A statistically significant association was noted between longer duration of tuberculosis and the presence of ocular manifestations ($p = 0.042$).

Conclusion: Ocular involvement was present in a substantial proportion of tuberculosis patients, particularly in those with prolonged disease duration. Posterior segment manifestations were the main contributors to visual impairment. Routine ophthalmic screening in tuberculosis patients, especially those with long-standing disease, may facilitate early diagnosis and help prevent irreversible visual loss.

Keywords: Ocular Manifestation, Tuberculosis, Choroiditis, Visual Impairment, Posterior Segment Involvement, Extrapulmonary Tuberculosis etc.

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Introduction

Tuberculosis (TB) remains one of the most prevalent infectious diseases worldwide and continues to be a major cause of morbidity and mortality [1]. India contributes a significant proportion of the global TB burden, accounting for nearly one-fourth of all reported cases [2]. Although pulmonary tuberculosis is the most common clinical presentation, extrapulmonary tuberculosis is increasingly recognized as an important contributor to disease-related complications [3,4]. Ocular involvement in tuberculosis, though relatively uncommon, is clinically significant due to its potential to cause visual impairment. Ocular tuberculosis may occur either as a primary manifestation or secondary to systemic disease through hematogenous spread [5]. It can involve any part of the eye and presents with varied manifestations such as uveitis, scleritis, keratitis, retinal vasculitis, choroiditis, and optic nerve involvement [6,7]. The clinical features are often nonspecific and may resemble other inflammatory or infectious ocular conditions,

which frequently results in delayed diagnosis [8]. Posterior segment involvement is particularly important as it is more likely to be associated with permanent visual loss. Choroidal lesions, retinal vasculitis, and optic neuropathy are well-recognized causes of visual impairment in ocular TB [9]. Fundus findings in these cases may closely mimic those seen in conditions such as sarcoidosis, syphilis, and Behçet's disease, making differentiation difficult without appropriate clinical correlation and investigations [10,11]. Early identification and timely initiation of anti-tubercular therapy are therefore essential to prevent irreversible ocular damage [12].

The duration of tuberculosis has been shown to influence the occurrence and severity of ocular manifestations. Patients with long-standing disease, delayed diagnosis, or inadequate treatment are more likely to develop chronic inflammation and structural damage to ocular tissues [13]. Assessing the relationship between disease duration and ocular involvement may help in identifying patients at higher risk and in improving screening practices [14].

The present study was undertaken to evaluate the pattern of ocular manifestations in patients with tuberculosis attending a tertiary care hospital in South Gujarat, to assess the associated visual impairment, and to study the impact of disease duration on ocular involvement.

Materials and Methods

This cross-sectional study was conducted at GMERS Medical College and Hospital, Valsad, Gujarat, from April 2023 to October 2024 after obtaining approval from the Institutional Ethics Committee. Patients aged 18–65 years who provided written informed consent, including newly diagnosed tuberculosis patients and those already receiving anti-tubercular therapy, patients with extrapulmonary tuberculosis presenting with ocular complaints, and patients with multidrug-resistant or extensively drug-resistant tuberculosis, were included in the study. Patients with HIV infection, those receiving immunosuppressive drugs, pregnant patients, patients with systemic diseases other than tuberculosis such as syphilis, diabetes mellitus, hypertension, sarcoidosis, leprosy, leptospirosis, and brucellosis, and patients who were lost to follow-up or had relapse were excluded from the study. The sample size was calculated using the formula $n = [(1.96)^2 \times P(1 - P)] / d^2$, assuming a prevalence of 10%, a 5% type I error, and a 95% confidence interval, with d set at 5%, and patients were selected using convenience sampling. The calculated minimum sample size for the present study was 144 patients. However, during the study period, a total of 167 eligible patients fulfilling the inclusion criteria were enrolled to enhance statistical power and improve representativeness.

Detailed clinical history was obtained from each patient, followed by a comprehensive ophthalmic examination. Visual acuity and best-corrected visual acuity were recorded, and intraocular pressure was measured using a non-contact tonometer. Examination of the ocular adnexa and anterior segment was performed using slit-lamp biomicroscopy. Posterior segment evaluation was carried out using slit-lamp biomicroscopy with a +90 diopter lens and indirect ophthalmoscopy after dilatation of both eyes with 0.8% tropicamide and 5% phenylephrine eye drops. Chest X-ray findings were noted from the patient records. In cases with abnormal ocular findings, confirmation was obtained from the study guide and appropriate treatment was advised. Patient identity and examination findings, including ocular photographs, were kept confidential.

At the end of the study period, data were entered into Microsoft Excel and analyzed using SPSS software version 20. Categorical variables were expressed as frequency and percentage, and the chi-square test was used to assess associations between categorical variables. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 167 tuberculosis patients were evaluated in this cross-sectional study. Table 1 shows that, majority of participants were in the 21–40 years age group (55.1%), followed by those aged 41–60 years (34.7%). Patients aged ≤20 years constituted 7.2%, while only 3.0% were older than 60 years, indicating that tuberculosis predominantly affected individuals in the economically productive age group. A male predominance was observed, with 107 males (64.1%) and 60 females (35.9%), resulting in a male-to-female ratio of approximately 1.8:1. The age distribution between males and females did not show a statistically significant difference ($p = 0.736$) (Table 1). Most patients were diagnosed in the early phase of the disease, with 35.9% having a tuberculosis duration of less than 3 months and 38.9% between 3 and 6 months. Only 2.4% of patients had tuberculosis for more than 12 months. The distribution of disease duration was comparable between males and females, and the difference was not statistically significant ($p = 0.594$).

Table 1: Demographic characteristics and Duration of tuberculosis of study participants by gender (n = 167)

Variable	Category	Male (n = 107)	Female (n = 60)	Total (n)	p value
Age (years)	≤20	6 (3.6%)	6 (3.6%)	12	**0.736**
	21–40	61 (36.5%)	31 (18.6%)	92	
	41–60	37 (22.2%)	21 (12.6%)	58	
	>60	3 (1.8%)	2 (1.2%)	5	
Duration of TB	<3 months	39 (23.4%)	21 (12.6%)	60	**0.594**
	3–6 months	39 (23.4%)	26 (15.6%)	65	
	6–9 months	19 (11.4%)	10 (6.0%)	29	
	9–12 months	6 (3.6%)	3 (1.8%)	9	
	>12 months	4 (2.4%)	0 (0.0%)	4	

Figure 1 illustrates the prevalence of ocular manifestations among patients with tuberculosis included in the study. Of the total 167 patients, 33 patients (19.8%) exhibited ocular manifestations, while the remaining 134 patients (80.2%) had no ocular involvement.

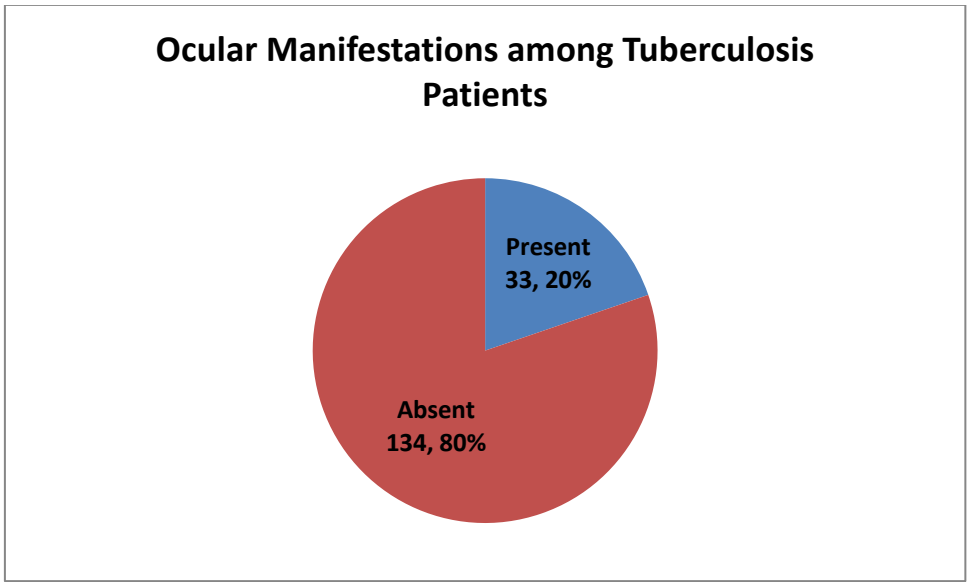

Figure 1: Prevalence of Ocular Manifestations among Tuberculosis Patients

Table 2 presents the gender-wise distribution of ocular manifestations among the 33 tuberculosis patients with ocular involvement. Of these, 20 patients were males and 13 were females.

Posterior segment involvement was more common than anterior segment involvement in both genders.

Among posterior segment lesions, choroiditis was the most frequent manifestation (36.4%), followed by retinitis (21.2%) and retinal vasculitis (15.2%). Retinitis and retinal vasculitis were observed predominantly in males. Anterior segment manifestations, including conjunctivitis, scleritis, and anterior uveitis, were less frequent and showed a slightly higher occurrence in females compared to males. Overall, although males showed a higher number of posterior segment manifestations, the difference in ocular manifestations between males and females was not statistically significant (p = 0.362).

Table 2: Gender-wise distribution of ocular manifestations in tuberculosis patients (n = 33)

Segment	Ocular manifestation	Male (n = 20)	Female (n = 13)	Total (n)	p value
Anterior	Conjunctivitis	1 (3.0%)	2 (6.1%)	3	**0.362**
	Scleritis	1 (3.0%)	2 (6.1%)	3	
	Anterior uveitis	1 (3.0%)	2 (6.1%)	3	
Posterior	Retinitis	6 (18.2%)	1 (3.0%)	7	
	Retinal Vasculitis	4 (12.1%)	1 (3.0%)	5	
	Choroiditis	7 (21.2%)	5 (15.2%)	12	

Table 3 depicts the visual impairment among tuberculosis patients.

Normal visual acuity (≥6/18) was observed in 19 patients (57.6%), comprising 10 males (30.3%) and 9 females (27.3%). Some degree of visual

impairment was present in 14 patients (42.4%). Moderate visual impairment was noted in 10 patients (30.3%), while severe visual impairment was observed in 3 patients (9.1%). Blindness (<3/60) was documented in one male patient (3.0%). Although visual impairment was numerically more frequent among males, the difference in visual acuity between males and females was not statistically significant.

Table 3: Visual impairment among ocular tuberculosis patients by gender (n = 33)

Visual acuity category	Male (n = 20)	Female (n = 13)	Total (n)	p value
Normal (≥6/18)	10 (30.3%)	9 (27.3%)	19	**0.955**
Moderate impairment (<6/18–6/60)	7 (21.2%)	3 (9.1%)	10	
Severe impairment (<6/60–3/60)	2 (6.1%)	1 (3.0%)	3	
Blind (<3/60)	1 (3.0%)	0 (0.0%)	1	

Table 4 shows the association between the duration of tuberculosis and the pattern of ocular manifestations among the 33 patients with ocular manifestation. Ocular involvement increased progressively with longer disease duration, with total ocular manifestations rising from 6 cases (10.0%) in patients with tuberculosis of less than 3 months' duration to 2 cases (50.0%) in those with disease duration exceeding 12 months. Anterior segment manifestations, including conjunctivitis and scleritis, were predominantly observed in the early stages of tuberculosis (<6 months) and were absent in patients with longer disease duration. 3 cases of anterior uveitis were recorded across the duration. In contrast, posterior segment manifestations showed a clear association with prolonged disease duration. Retinitis was more frequently observed in patients with tuberculosis lasting 6–9 months, while retinal vasculitis was predominantly seen in patients with disease duration of 9 months or more. Choroiditis was the most common posterior segment manifestation and was observed across all duration categories, with higher frequencies in patients with tuberculosis of 3–9 months' duration. Overall, the association between duration of tuberculosis and ocular manifestations was statistically significant (p = 0.042), indicating that chronicity of tuberculosis increases the risk and severity of ocular involvement.

Table 4: Duration of tuberculosis and ocular manifestations among patients with ocular TB (n = 33)

Segment	Ocular Manifestation	<3 months	3–6 months	6–9 months	9–12 months	>12 months	p value
Anterior	Conjunctivitis	1 (3.0%)	2 (6.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**0.042**
	Scleritis	2 (6.1%)	1 (3.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
	Anterior uveitis	0 (0.0%)	0 (0.0%)	3 (9.1%)	0 (0.0%)	0 (0.0%)	
Posterior	Retinitis	1 (3.0%)	2 (6.1%)	3 (9.1%)	1 (3.0%)	0 (0.0%)	
	Retinal vasculitis	0 (0.0%)	0 (0.0%)	1 (3.0%)	2 (6.1%)	2 (6.1%)	
	Choroiditis	2 (6.1%)	5 (15.2%)	4 (12.1%)	1 (3.0%)	0 (0.0%)	
Total ocular manifestations		6 (10.0%)	10 (15.4%)	11 (37.9%)	4 (44.4%)	2 (50.0%)	

Discussion

Tuberculosis continues to pose a major public health challenge in developing countries, and its extrapulmonary manifestations contribute significantly to disease-related morbidity. Ocular tuberculosis, though relatively uncommon, is an important clinical entity because of its potential to cause irreversible visual impairment. The present cross-sectional study evaluated the prevalence, pattern, and visual impairment of ocular manifestations among tuberculosis patients attending a tertiary care centre in South Gujarat.

In the present study, ocular manifestations were observed in 19.8% of tuberculosis patients. This prevalence is comparable to findings reported by Bansal and Gupta and other authors, who have documented ocular involvement in approximately 10–20% of patients with systemic tuberculosis.[15,16] Variations in prevalence across studies may be related to differences in diagnostic criteria, inclusion of extrapulmonary cases, duration of disease, and referral patterns.[6,12] The demographic profile of the study population showed a predominance of patients in the 21–40 years age group, with a male preponderance. Similar age and gender distributions have been reported in Indian studies by Bansal et al., Singh et al. and Sharma et al., reflecting higher exposure risk and healthcare-seeking behavior among males in the economically productive age group.[9,11,17] However, no statistically significant association was observed between gender and ocular involvement in the present study, indicating that disease-related factors play a more important role than demographic variables. Posterior segment involvement was the most common pattern of ocular tuberculosis in the present study, with choroiditis being the predominant manifestation, followed by retinitis and retinal vasculitis. These

findings are consistent with observations by Gupta, Bansal et al., and Kumar et al., who identified posterior uveitis and choroidal lesions as the most frequent presentations of ocular tuberculosis.[5,9,18] The predilection for choroidal involvement has been attributed to hematogenous dissemination of Mycobacterium tuberculosis, as explained by Helm & Holland and Rao NA, owing to the rich vascular supply of the choroid.[6,19]

Anterior segment manifestations such as conjunctivitis, scleritis, and anterior uveitis were less frequent and were predominantly seen in the early stages of tuberculosis. Similar observations were reported by Biswas et al. and Tugal-Tutkun, who noted that anterior segment involvement is usually less severe and less vision-threatening than posterior segment disease.[7,20] The absence of anterior uveitis in patients with longer disease duration in the present study further supports this observation.

Visual impairment was documented in 42.4% of patients with ocular tuberculosis, with moderate to severe impairment occurring mainly in those with posterior segment involvement.

This finding is in agreement with studies by Singh et al., Shakarchi and Gupta, who emphasized posterior uveitis, retinal vasculitis, and choroiditis as major contributors to visual morbidity in ocular tuberculosis.[11,12,21] Although visual impairment was numerically higher among males, the difference was not statistically significant, consistent with reports by Kumar et al. and Agrawal et al.[18,22]

An important finding of the present study was the statistically significant association between duration of tuberculosis and ocular manifestations.

Patients with longer disease duration demonstrated a higher prevalence of posterior segment involvement, particularly retinal vasculitis and retinitis. Santos et al. and Cordero-Coma and Calleja have suggested that prolonged antigenic stimulation, delayed diagnosis, and chronic inflammation contribute to progressive ocular tissue damage in long-standing tuberculosis.[13,23] Similar associations between disease chronicity and ocular involvement have also been reported by Agrawal et al. and Shakarchi.[14,24]

The progressive increase in ocular manifestations with longer disease duration underscores the importance of early diagnosis and timely initiation of anti-tubercular therapy.

A study by Bodaghi et al. has shown that delayed treatment adversely affects visual prognosis and increases the risk of irreversible visual loss.[25] Routine ophthalmic screening, especially in patients with prolonged or inadequately treated tuberculosis, has been advocated by Singh et al. and Agrawal et al. to facilitate early detection and improve visual outcomes.[26,27]

Conclusions

Ocular manifestations were identified in a considerable proportion of patients with tuberculosis, with posterior segment involvement being the most common and clinically significant finding. Choroiditis, retinitis, and retinal vasculitis accounted for most cases of visual impairment. Although gender did not influence ocular involvement or visual outcomes, longer disease duration was significantly associated with increased ocular manifestations and visual morbidity. These findings emphasize the need for early diagnosis and timely initiation of anti-tubercular therapy. Routine ophthalmic evaluation, particularly in patients with prolonged or inadequately treated tuberculosis, may aid in early detection and help prevent irreversible visual loss.

References

1. World Health Organization. Global Tuberculosis Report 2023. Geneva: World Health Organization. 2023.
2. Ministry of Health and Family Welfare. National Strategic Plan for Tuberculosis Elimination 2020–2025. New Delhi: Government of India; 2020.
3. Dannenberg AM Jr. Pathogenesis of pulmonary tuberculosis. Am Rev Respir Dis. 2015;91(4):508–511.
4. Varma D, Anand S, Reddy AR, et al. Tuberculosis: an under-diagnosed aetiological agent in uveitis. Eye (Lond). 2006;20(9):1068–1073.
5. Gupta A, Sharma A, Bansal R, Sharma K. Classification of intraocular tuberculosis. Ocul Immunol Inflamm. 2015;23(1):7–13.
6. Helm CJ, Holland GN. Ocular tuberculosis. Surv Ophthalmol. 1993;38(3):229–256.
7. Biswas J, Babu K, Gopal L, et al. Indications and yield of diagnostic vitreous biopsy in the evaluation of posterior uveitis. Ophthalmology. 2006;113(5):1086–1091.
8. Rosenbaum JT, Bodaghi B, Couto C, et al. Endogenous uveitis: an overview. Am J Med Sci. 2008;335(3):243–249.
9. Bansal R, Gupta A, Gupta V, et al. Tubercular uveitis: a prospective study in India. Eye (Lond). 2008;22(4):475–479.
10. Bodaghi B, LeHoang P. Ocular tuberculosis. Curr Opin Ophthalmol. 2000;11(6):443–448.
11. Singh R, Gupta V, Gupta A. Pattern of ocular manifestations in tubercular uveitis. Am J Ophthalmol. 2004;138(2):253–256.
12. Shakarchi FI. Ocular tuberculosis: current perspectives. Clin Ophthalmol. 2015; 9:2223–2227.

13. Santos BA, Muccioli C, Belfort R Jr. Ocular tuberculosis: a review. Arq Bras Oftalmol. 2007;70(4):617–623.
14. Agrawal R, Gunasekeran DV, Grant R, et al. Clinical features and outcomes of patients with tubercular uveitis treated with antitubercular therapy in Singapore. Sci Rep. 2020;10(1): 20724.
15. Bansal R, Gupta A. Ocular tuberculosis: Clinical features and diagnosis. J Ophthalmic Inflamm Infect. 2012;2(3):109–118.
16. Ang M, Hedayatfar A, Wong W, Chee SP. Duration of anti-tubercular therapy in uveitis associated with latent tuberculosis. Am J Ophthalmol. 2012;153(5):942–948.
17. Sharma SK, Mohan A. Tuberculosis: From an incurable scourge to a curable disease. J Assoc Physicians India. 2013;61(4):11–12.
18. Kumar A, Gupta V, Sharma A. Pattern of ocular tuberculosis in a tertiary eye care center. Int Ophthalmol. 2016;36(5):673–679.
19. Rao NA. Mechanisms of inflammatory response in ocular tuberculosis. Ocul Immunol Inflamm. 2010;18(2):85–93.
20. Tugal-Tutkun I. Tubercular uveitis. Middle East Afr J Ophthalmol. 2009;16(4):181–187.
21. Gupta V, Gupta A. Management of tubercular posterior uveitis. Indian J Ophthalmol. 2010;58(1):3–8.
22. Agrawal R, Gupta B, Gonzalez-Lopez JJ, et al. The role of anti-tubercular therapy in uveitis. Surv Ophthalmol. 2015;60(2):70–85.
23. Cordero-Coma M, Calleja S. Ocular tuberculosis: Clinical spectrum and diagnosis. Eye. 2015;29(6):759–766.
24. Shakarchi FI. Ocular tuberculosis: Current perspectives. Clin Ophthalmol. 2015; 9:2223–2227.
25. Bodaghi B, Rozenberg F, Cassoux N, et al. Chronic ocular tuberculosis and visual prognosis. Ophthalmology. 2001;108(10):190 9–1916.
26. Singh R, Gupta V, Gupta A. Diagnostic challenges in ocular tuberculosis. Ocul Immunol Inflamm. 2013;21(3):213–220.
27. Agrawal R, Gunasekeran DV, Grant R, et al. Clinical outcomes of ocular tuberculosis. Sci Rep. 2020;10(1):20724.