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Clinical Profile of Ocular Tuberculosis among the patients attending a Tertiary Care Hospital.

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Abstract
Aim: *The aim of this study was to characterize clinical profile of ocular tuberculosis in individuals attending out patient department in McGann District teaching hospital Shimoga.*
Material and Methods: *This study involved a cross sectional analysis of ocular tuberculosis cases that presented to Ophthalmology Department at our tertiary healthcare facility during June 2023 to May 2024.*
Results: *A total of 30 individuals with presumed ocular tuberculosis participated in the study conducted over a period of one year. Most common ocular presentation was posterior uveitis seen in 33.3% , followed by panuveitis in 26.6% , anterior uveitis in 20%, intermediate uveitis in 16% and scleritis in 3.3%. Bilateral ocular involvement, typically asymmetrical was observed in 56.6% of cases. Evidence of systemic tuberculosis was present in 36.6% cases.*
Conclusion: *Ocular Tuberculosis poses diagnostic challenge due to its varied clinical presentation. Recognizing the typical and atypical manifestations of ocular TB and appropriate investigations are needed to confirm the diagnosis. In endemic country like India, early recognition and treatment of Ocular TB will help to reduce ocular morbidity and improve patient's quality of life .*
Keywords: *Ocular Tuberculosis, Extrapulmanory TB, Intraocular Tuberculosis, Tuberculo-uveitis.*

I. Introduction

According to the World Health Organization's report on Global Tuberculosis 2023, it was reported a total of 10.8 million people developed tuberculosis during the year 2022. More than 2/3rd of these cases were accounted by 8 countries, with India contributing 27%.[1]

Tuberculosis is a chronic granulomatous infection caused by an acid fast bacilli, Mycobacterium tuberculosis. Tuberculosis predominantly involves lungs, but it may also involve extrapulmonary organs like lymph nodes, eye, pleura, bones etc.[2] Ocular Tuberculosis constitutes one of the extrapulmonary manifestations of tuberculosis. It is most commonly observed in individuals with a history of clinically healed pulmonary tuberculosis or an old extrapulmonary tuberculosis.

Ocular TB remains a significant diagnostic and therapeutic challenge, attributed to its heterogenous clinical presentations, the involvement of various ocular tissue, absence of standardized diagnostic criteria, reliable gold standard tests and lack of global consensus on management protocols.[3,4] In a developing country such as India, where TB is endemic, timely diagnosis and intervention are essential for effective disease management and for preventing or minimizing visual deterioration. Hence ocular TB is treated using a multidisciplinary approach. This study highlights the various clinical presentation of Ocular tuberculosis.

Aims and objectives:
1. To analyze the clinical profile of ocular tuberculosis in patients presenting to tertiary care hospital.
2. To determine the common presentation of ocular TB in the population.

II. Materials And Methods

All cases of uveitis which fulfilled the diagnostic criteria of presumed ocular tuberculosis based on COTS- 1 study, who presented to the Department of Ophthalmology in McGann District Teaching Hospital, Shimoga over a period of 1 year (June 2023 to May 2024) were included in the study. We also included all cases referred from peripheral health centers for ATT. Hence this study included total of 30 presumed Ocular TB cases.

Exclusion Criteria-
a. Cases with other cause of uveitis were excluded.
b. Non compliant patients were excluded from the study.
Approval was obtained from Institution ethics committee. Informed consent was obtained from every patients.
All participants demographic information was recorded. History regarding duration of symptoms, laterality, relevant past and family history, contact history and treatment history was recorded .
A comprehensive eye examination with Visual acuity measurement using Snellen's chart, measurement of IOP by Noncontact tonometry and Applanation tonometry when required, detailed Anterior Segment evaluation with slit lamp biomicroscopy and posterior segment evaluation with Indirect ophthalmoscope were done. Uveitis was categorized anatomically as per Standardization of uveitis nomenclature (SUN) workshop.
Ocular investigations included optical coherence tomography (OCT) and B-scan. OCT is noninvasive investigation used for evaluation of retinal lesions in Ocular TB. B-scan is a two dimension noninvasive investigation used for evaluation of vitreous and retinal pathologies.
For all cases suspicious of ocular TB, baseline investigations which included CBC, RBS, ESR, CRP, ICTC, VDRL, Mantoux test, chest X-ray/ HRCT were done with or without interferon gamma assay (QuntiFERON gold assay) and CBNAAT.
Chest X-ray PA view / chest HRCT was done as suggested by Pulmonologist for evaluation of pulmonary tuberculosis.
Interferon gamma release assay includes QuantiFERON gold assay and T - spot test . These detect release of interferon-gamma from activated T-lymphocytes when exposed to the tubercular antigen.[3]
Diagnostic criteria for presumed Ocular tuberculosis was based on COTS -1 study, the 4 criteria used were as follows, where the patient must fulfill both Criteria 1 and Criteria 2, as well as at least one of the following: Criteria 3 or Criteria 4.[5]
1. Clinical signs suggestive of uveitis caused by tuberculosis, which includes :
a) Anterior Uveitis may present in either a granulomatous or nongranulomatous form. Clinical features can include nodules on the iris and granulomatous inflammation involving the ciliary body.
b) Intermediate Uveitis can also be either granulomatous or nongranulomatous in nature. It typically involves inflammatory exudates in the pars plana region and may be associated with vitreous opacities known as "snowballs," although these may not always be present.
c) Posterior uveitis and panuveitis may involve deeper ocular structures and can be associated with various lesions, such as subretinal abscesses, serpiginous-pattern choroiditis, choroidal granulomas, and choroidal tubercles.
d) Optic neuritis, neuroretinitis, retinal vasculitis (RV), retinitis, endogenous endophthalmitis and panophthalmitis.
2. All the other uveitic entities were excluded depending upon clinical manifestations of disease .
3. Investigations that detect the presence of Mycobacterium tuberculosis or its genetic material .
a) Identification of Mycobacterium tuberculosis in ocular fluid through detection of acid-fast bacilli by microscopy or via culture techniques.
b) Positive polymerase chain reaction (PCR) results from ocular fluid targeting IS6110 or other specific mycobacterial genomic sequences.
c) Confirmed diagnosis of active extrapulmonary tuberculosis through microscopic examination or culture of specimens obtained from the involved tissue.
4. Corroborative Investigations-
a) Mantoux test result - positive.
b) QuantiFERON TB Gold

C) Chest radiographic findings indicating either active or previously treated tuberculosis.[5]
Physician and Pulmonologist opinion was taken for systemic association of tuberculosis.
The statistical analysis for the collected data was done. Variables were expressed in frequencies and represented in Tables and Pie charts.

III. RESULTS

30 cases diagnosed as presumed ocular tuberculosis were enrolled in our study over a one-year period. The average age of patients diagnosed with ocular TB was 42.1 years. Males were 40% (12 patients) and females were 60% (18 patients) .Bilateral involvement was seen in 56.6% of patients (17 patients) and unilateral in 43.3% of patients (13 cases) .Table 1 demonstrates demographic details.
Among patients with ocular tuberculosis, 36.6%(11 cases) had evidence of systemic tuberculosis. and rest 63.4% cases had Ocular TB as the sole manifestation. Among 11 cases with systemic tuberculosis 6 patients were diagnosed with pulmory tuberculosis, 2 patients were know case of Tb meningitis on ATT, 2 cases were

cervical tuberculous lymphadenitis and 1 case of spinal tuberculosis were noted, 2 patients gave contact history of pulmonary tuberculosis.

The mean duration of symptoms were 4 months 15 days. 43 percent (13 patients) of the patients presented with the primary complaint of diminution of vision, 23% of patients (7 patients) presented with painful red eye, 20% of patients (6 patients) presented with pain as primary symptom, and 13% of patients (4 patients) presented with floaters.

The presenting Visual Acuity in snellen's chart was less than 6/60 in 53.3% of cases (16 cases), 13.3% of cases(4 patients) had visual acuity between 6/36 to 6/60, 23.3% of cases (7 patients) had Visual acuity between 6/18 to 6/24 and 10% of cases (3 patients) had Visual acuity between 6/12 to 6/6.

Patients with acute history (less than 3months) had better presenting Visual acuity when compared with patients who had symptoms for more than 3 months.

The most common ocular presentation was posterior uveitis seen in 33.3% of patients (10 patients), followed by panuveitis seen in 26.6% (8 patients), intermediate uveitis seen in 16% of patients (5 patients), anterior uveitis in 20% of patients (6 patients), and scleritis in one patient(3.3%). Table 2 shows the type of uveitis. Among patients who had posterior and panuveitis, 10 patients presented with vasculitis, 3 patients presented with choroidal tuberculoma , one patient presented with serpiginous-like choroiditis who had completed ATT for pulmonary tuberculosis.

A Patient with anterior uveitis presented with mutton fat KP's(keratic precipitates) (figure 1), fine KP's (keratic precipitates) and broad based posterior synechiae (figure 1), festooned pupil (figure 2), anterior chamber reaction, hypopyon (figure 3) and iris nodules. Patients with intermediate uveitis presented with vitritis (figure 4) and snowbanking. Patients with posterior uveitis presented with vitritis, vasculitis, choroidal tubercles (figure 5 and 6) and serpiginous like choroiditis. Chart 1 shows the various clinical presentation of Ocular tuberculosis.

The Mantoux test was positive in 60% of cases (18 cases) and QuantiFERON gold test was positive in 26.6% of cases (8cases), Chest xray / HRCT showed feature suggestive of tuberculosis in 23.3% of cases (7 cases) .

IV. DISCUSSION

Tuberculosis remains as a single most cause for morbidity and mortality across the world, WHO declared tuberculosis to be global emergency. India is an endemic region for tuberculosis. It primarily involves the lungs, it may also involve extrapulmonary organs like lymph nodes, pleura, bones, eye etc.[2] Compare to pulmonary tuberculosis extra pulmonary tuberculosis is most common in pateints with TB with HIV.[6] Involvement of extrapulmanory organs in tuberculosis as increased in recent years in immunocompromised individuals. It's more than 50% in patients with AIDS.[6]

The range of clinical manifestations associated with ocular tuberculosis has broadened over time. It affects all the structures in eye. Ocular involvement in tuberculosis occurs because of hematogenous seeding of bacilli from the primary pulmonary focus or reactivated lung foci. It occurs because of infective or hypersensitivity response to Mycobacterium tuberculosis. It may manifest as anterior uveitis, intermediate uveitis, posterior uveitis and panuveitis. It may also cause scleritis, endophthalmitis and panophthalmitis, exudative retinal detachment, neuroretinitis, optic neuropathy.

In a study conducted by Rekha Rathnaiah, on Ocular Tuberculosis in a tertiary care center the most common presentation was retinal vasculitis with 60%.[7] In our study among patients with posterior uveitis, vasculitis involving predominantly veins was most frequently reported. 56.6% patients presented with bilateral involvement(asymmetrical).

Tuberculosis typically presents as granulomatous anterior uveitis, with or without iris nodules, iris or angle granuloma with mutton fat keratic precipitates, broad based posterior synechiae, festooned pupil, anterior chamber reaction, in severe cases hypopyon can be seen. Occasionally can also present as nongranulomatous anterior uveitis. [8,9]

Intermediate uveitis presents with blurring of vision with floaters associated with vitritis, snowball opacities, snow banking. Few patients present with anterior spillover uveitis with keratic precipitates and anterior chamber reaction. [8]

Posterior uveitis presents as choroidal tuberculoma, serpiginous-like choroiditis, retinal vasculitis and subretinal abscess.[10] Choroidal tubercles are common clinical presentation of posterior uveitis.[11,12] It appears as small grayish white to yellow nodules with indistinct borders. They are usually found in posterior pole . They may be unilateral or bilateral. Occasionally tubercles grows into a solitary mass know as tuberculoma. Serpiginous-like choroiditis is a chronic inflammation of choroid and choriocapillaris, in recurrent cases it progresses to involve retina. It usually begin in the periphery and spreads centrifugally .The characteristic features of vasculitis are perivenous cuffing with infiltrates, vitritis/ vitreous infiltrates, neovascularization, retinal hemorrhages and neuroretinitis.[9,10]

V. CONCLUSION

Ocular Tuberculosis poses diagnostic challenge due to its varied clinical presentation. Ocular examination in suspected or proven TB should be a holistic approach early recognition of typical and atypical manifestations with appropriate investigations. This study helped us to identify the most common presenting clinical feature of Oular TB is posterior uuveitis. This study highlights the importance of multidisciplinary approach involving Ophthalmologist, Physician, Pulmonologist and Radiologists for early diagnosis and treatment of Ocular Tuberculosis. Thus it helps in early diagnosis, early initiation of ATT and decrease visual morbidity due to Ocular TB.

Data availability statement

The data supporting the findings of our study will be made available from the corresponding author upon reasonable request**.**

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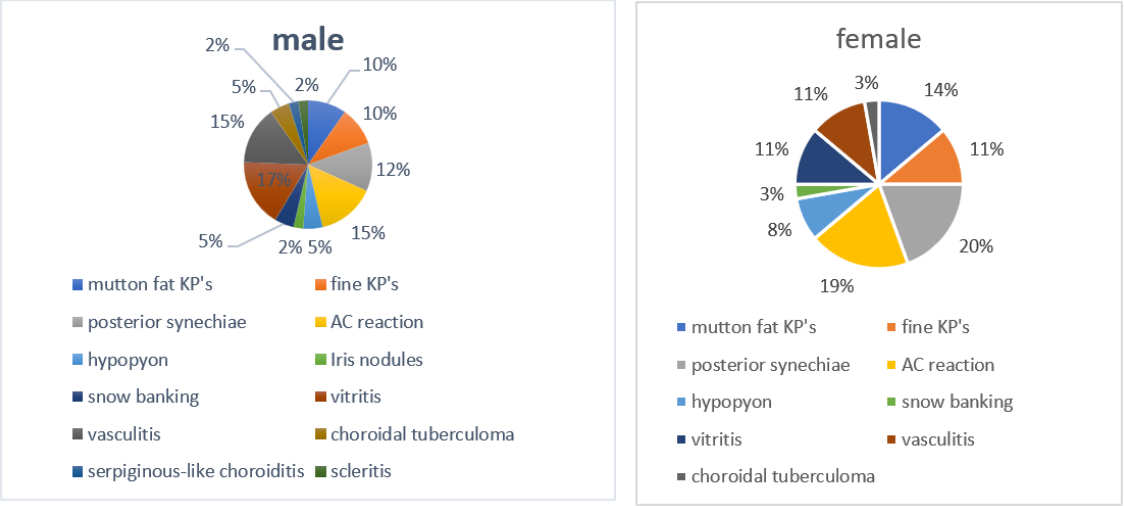
Table 1. Demographic details

Mean age of patients	42 years
Male	12 patients (40%)
Female	18 patients (60%)
Unilateral	13 cases
Bilateral	17 cases

Table 2: Types of Uveitis

Clinical feature	**Number of cases**
Posterior uveitis	10
Pan uveitis	8
Intermediate uveitis	5
Anterior uveitis	6
Total	**30**

Chart 1: Gender-wise clinical presentations of Ocular Tuberculosis



All images are original
Figure 1 : Mutton fat KP's and Festooned pupil
Figure 2: Posterior synechiae
Figure 3: Hypopyon
Figure 4: Vitritis
Figure 5 & 6: Choroidal tuberculoma

CONTRIBUTIONS
Declaration of interest- None
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