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Original Research Article

A clinical study of optic nerve involvement in patients with tuberculosis attending a tertiary health care center in North East

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ABSTRACT

Background: To screen for ocular finding of optic nerve involvement in patients with tuberculosis and documents these findings.
Methods: The hospital based observational study was carried out in a tertiary care hospital in Assam for the duration of July 2018 to June 2019 in 384 diagnosed cases of tuberculosis patients who fulfil the inclusion criteria during the study period.
Results: 11 cases with optic nerve involvement was found out of 384 tuberculosis patients. Most common presenting complain was blurring of vision. Unilateral involvement was maximum. Most common finding was disc oedema. Ocular TB cases was higher in extrapulmonary TB patients.
Conclusions: Diagnosis of ocular Tb is mainly presumptive, based on history, clinical examination, adjunctive diagnostic tests and response to anti tuberculous therapy. Amongst 384 TB cases ocular manifestations were found in 11 cases and therefore, we can conclude that ocular manifestations hold significance in extra pulmonary manifestations of TB. So, TB patients need to have routine ocular examination for the early diagnosis and timely management.

Keywords: Extra-pulmonar, Ocular, Optic nerve, North East, Tuberculosis

INTRODUCTION

Tuberculosis (TB), a multisystem infectious disease is caused by Mycobacterium tuberculosis (MTB). TB is the leading infectious cause of morbidity and mortality worldwide. Primarily involves the lung. Globally, 9.0-11.1 million people are estimated to be infected with M. tuberculosis in 2017.[1]

Extrapulmonary TB represented 14% of the 6.4 million incident cases that were notified in 2017.[1] Ocular tuberculosis is an extrapulmonary type.

The ocular system is affected in nearly 20% of extrapulmonary TB patients.[2,3] Ocular TB incidence ranges from 1.4-5.74% and in HIV patients, the incidence ranges from 2.8-11.4%.[4] In another study, the prevalence of ocular manifestation in pulmonary TB was 6.8% in Philippines.[5] In Saudi Arabia, ocular TB was found 10.5%.[6] Ocular TB causes visual impairment leading to blindness, there by reducing the quality of life and serious economic and social consequences.

Ocular Tuberculosis involves the eyelid, conjunctiva, cornea, sclera, iris, uvea, vitreous, retina, lacrimal apparatus, optic nerve.[5,7,8]

Papillitis, optic neuritis, optic nerve tubercle, compressive optic neuropathy, optic atropy, and papilloedema are the common manifestion of tuberculosis optic neuropathy.[5,7,8] Secondary ocular tuberculosis is the ocular involvement as a result of haematogenous spread from a distant site or direct invasion from adjacent areas

like skin, sinus or cranial cavity or as hypersensitivity response to distant infection. In recent years, there has been a renewed interest in TB stimulated by a rising incidence, the spread of the HIV pandemic and the emergence of multidrug-resistant strains.[9]

Cartridge-based nucleic acid amplification test (CBNAAT) is a recently introduced polymerase chain reaction (PCR) based method for detection of TB.

The CBNAAT helps in increase case detection in lesser time to diagnose pulmonary TB and extrapulmonary TB. The test has much better accuracy than sputum smear microscopy.[1,10]

Ocular TB is a complex clinical issue due to a wide spectrum of presentations and difficulty in diagnosis.[11]

The purpose of this study is to assess the ocular manifestation in diagnosed cases of tuberculosis to prevent ocular morbidity.

Guidelines for the diagnosis of intraocular Tuberculosis[9]

Clinical signs

Cellular reaction in the anterior chamber and or vitreous withor without posterior synechiae. Vitreous snowball opacities in the inferior vitreous. Perivascular cuffing of inflammatory exudates. Solitary or multiple choroidal granulomas with/without exudative retinal detachment. Optic disc granuloma with or without neuroretinitis. Subretinal abscess

Ocular investigations

Demonstration of AFB/culture of Mycobacterium tuberculosis (MTB) from the ocular fluids. Positive polymerase chain reaction from ocular fluids for IS6110 or other conserved sequences in MTB genome.

Systemic investigations

Positive Mantoux reaction. Evidence of healed or active tubercular lesion on radiographyof chest. Evidence of extrapulmonary tuberculosis diagnosed by demonstration of tubercular granuloma/AFB/culture of MTB.

Therapeutic test

A positive response to antitubercular therapy over a period of 4-6 weeks.

Classification of intraocular tuberculosis

Confirmed IOTB (both 1and 2)

At least one clinical sign suggestive of IOTB. Microbiological confirmation of Mycobacterium tuberculosis (MTB) from ocular fluids/tissues

Probable IOTB (1, 2, and 3 together)

At least one clinical sign suggestive of IOTB (and other etiologies excluded). Evidence of chest x-ray consistent with TB infection or clinical evidence of extraocular TB or microbiological confirmation from sputum or extraocular sites.

At least one of the following:

Documented exposure to TB. Immunological evidence TB infection

Possible IOTB (1, 2, and 3 together) (or 1 and 4)

At least one clinical sign suggestive of IOTB (and other etiologies excluded). Chest x-ray not consistent with TB infection and no clinical evidence of extraocular TB. At least one of the following:

Documented exposure to TB. Immunological evidence TB infection

The aim of the study was to optic nerve involvement in patients with Tuberculosis.

The objective of the study was to screen for the ocular findings of optic nerve involvement in patients with Tuberculosis and document these findings.

METHODS

Study design

A hospital based observational study was done in the department of Ophthalmology in Assam Medical College and Hospital, Dibrugarh.

During July 2018 to June 2019. 384 diagnosed cases of tuberculosis patients who fulfil the inclusion and exclusion criteria during the study period

Inclusion criteria

All diagnosed cases of tuberculosis (pulmonary tuberculosis and extra pulmonary tuberculosis). Patients age more than 18 years.

Exclusion criteria

Diagnosed cases of other granulomatous diseases. Diagnosed cases of other systemic diseases. Traumatic causes

Method of data collection

In this study 384 diagnosed cases of tuberculosis patients underwent ophthalmic evaluation. Detailed history was obtained from each patient. A detailed medical history

was taken with special emphasis on the following points; Age and sex of the patient, duration of tuberculosis, A detailed history regarding the symptoms and recurrence, personal history, whether there is family history of the disease. History of other disease conditions like hypertension, diabetes, rheumatoid arthritis or any other autoimmune disorders like systemic lupus erythematosus, graft versus host disease, and any immunosuppressive disorders. Drug history- (a) Whether the patient is on antitubercular drug alone or along with steroid (b) Duration of the drug intake (c) Previous history of any forms of tuberculosis treated or untreated with antitubercular therapy.

Patients than underwent a detailed systemic and ocular examination including recording of Pupillary reaction, best corrected visual acuity, colour vision, contrast sensitivity, binocular single vision, field of vision, intra ocular pressure, slit lamp examination of anterior segment and fundus examination (by direct and indirect ophthalmoscope, slit lamp examination by 90 D). Corneal sensation of the eye was examined with a wisp of cotton.

Examination of the eye and adnexa was done and recorded with diffuse light and with the help of slit lamp biomicroscopy.

Conjunctiva

Looked for any dryness, redness and congestion. Presence of any localized, elevated, pinkish grey nodules with soft necrotic center with marked injection on the surrounding conjunctival vessels.

Cornea

Looked for any dryness, erosions, keratitis, large keratic precipitates (mutton fat KP's), any deep or superficial vascularisation, any ulcer, opacities etc.

Staining of the cornea

No anaesthesia was used. A dry Fluorescein strip was used and the cornea was examined under low slit lamp magnification using blue cobalt filter.

Anterior chamber

Any abnormality in the anterior chamber for example aqueous flare, cells, pigment dispersion, hypopyon, or any abnormal content were noted.

Iris

Any synechiae (large broad based posterior), neovascularisation, atrophic patches, any nodules (koeppe's and bussaca's) were noted.

Pupillary reaction

Direct and consensual light reflex, sluggish reaction, relative afferent pupillary reaction, size and shape of the pupil were noted.

Lens

Any opacity, iris pigmentation on anterior capsule was noted

Vitritis

Any Vitritis, haemorrhages were noted.

Applanation tonometry

The intraocular pressure was recorded in each eye separately with help of applanation tonometer.

Examination of the fundus

Detailed fundus examination (under mydriasis) was done under Direct and Indirect ophthalmoscopy and Slit biomicroscopy with +90D.

Fundus looked for any retinal vasculitis with or without choroiditis, and serpiginous-like choroiditis, choroidal tubercles, choroidal tuberculoma, subretinal abscesses, optic disc colour, optic disc margin, optic disc haemorrhage, disc oedema, retinal haemorrhage, retinal exudates.

AnteriorAnterior segment imaging, Fundus photography, Fundus Fluorescein Angiography (FFA), B-scan ultrasonography, Optical Coherence Tomography (OCT) of the macula were done in selected cases. Patients presented with either scleritis or uveitis were investigated to exclude autoimmune diseases and other common infectious aetiology including sarcoidosis, toxoplasmosis and syphilis. They underwent a series of routine laboratory blood tests - peripheral blood count, calcium, sodium, potassium, chloride, liver enzymes, urea and creatinine, erythrocyte sedimentation rate (ESR), C-reactive protein, glucose, serum angiotensin converting enzyme, rheumatoid factor, antinuclear antibody, anti-double-stranded deoxyribonucleic-acid (anti-dsDNA), complements (C3/C4) and toxoplasma serology test. Demonstration of MTB DNA by cartridge based nucleic acid amplification test (CBNAAT) from ocular fluid. They were screened for human immunodeficiency virus (HIV) and syphilis. Patients presented with optic atropy and papilloedema were investigated to exclude other causes for which, Computed Tomography scan of the brain and orbit was done.

RESULTS

Table 1 shows, optic nerve involvement in Tuberculosis patients.

Table 1: Optic nerve involvement in tuberculosis patients.

Ocular involvement	No. of patients	Percentage
Present	11	2.86
Absent	373	97.13
Total	384	100

11 (2.86 %) patients out of the 384 patients presented with ocular manifestations and 373 (97.13%) patients had no ocular manifestations.

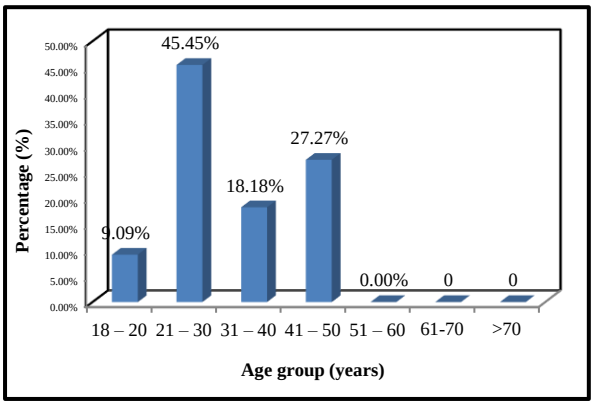

Figure 1: Age group wise distribution of optic nerve involvement in TB patient.

Figure 1 shows the age distribution of patients from 18 years onwards. The patients were grouped into 7 groups. The first group included 18- 20 years, thereafter each group had 10 years of age interval and the last group included all the patients above 70 years. In this study the maximum number of ocular findings (45.45%) in tuberculosis patients were found in the age group of 21-30 years followed by age group of 41-50 (27.27%). Other between 31-40 (18.18%) and 18-20 (9.09%).

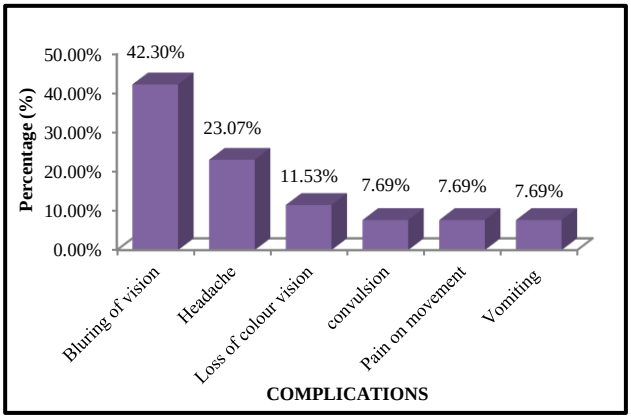

Figure 2: Presenting complaints.

Figure 2 shows, 42.30% patients had blurring vision, 23.07% patients had headache, 11.53% patients had complaints of loss of colour vision, 7.69% patients had complaints of convulsion, 7.69% patients had complaints of pain on movement and 7.69% patients had complains vomiting.

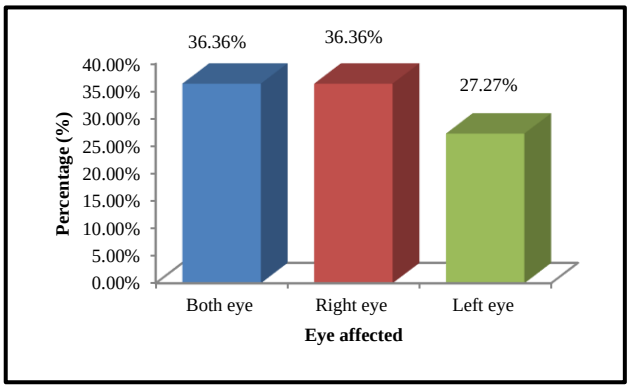

Figure 3: Laterality in patients with ocular manifestations of tuberculosis.

Figure 3 shows laterality in patients with ocular manifestations of tuberculosis with bilateral involvement were 36.36%, followed by right eye involvement 36.36% and cases with left eye involvement 27.27%.

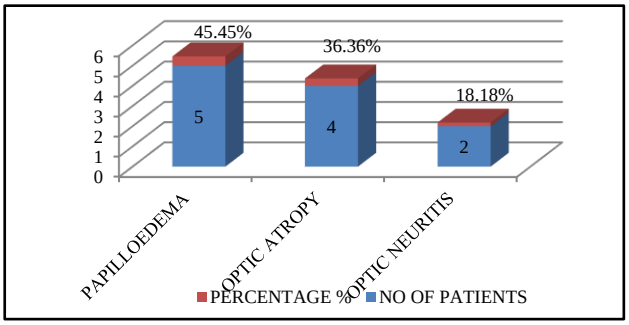

Figure 4: Distribution of optic nerve involvement among the TB patients.

Figure 4 shows distribution of various optic nerve involvement among the TB patients. Among 384 patients examined it was seen that papilloedema is the most common ocular manifestation occuring in 45.45% patients in the study population. It was followed by optic atrophy involvement which was present in 36.36% of patients, optic neuritis in 18.18% patients.

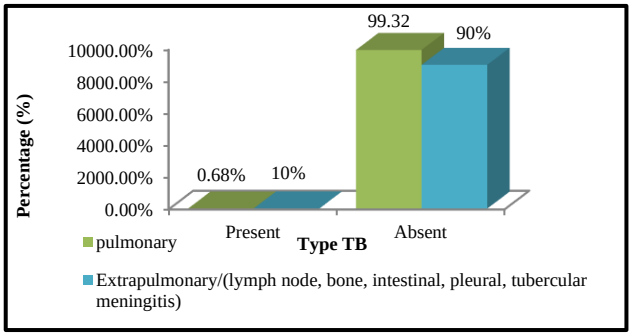

Figure 5: Risk distribution of ocular tuberculosis in pulmonary TB and extrapulmonary.

Figure 5 shows, ocular tuberculosis cases was higher in patients with extrapulmonary TB 10 (90%) out of 90 cases compared to patients with pulmonary TB 0.68% cases out of 294 cases.

DISCUSSION

In the United States, the percentage of ocular TB was 0.2% in 1987, reaching 0.6% in 1996 and then declining to 0.38% in 2014.[12]

Japan is another country in which the prevalence increased from 0.2% in 1997 to 6.9% in 2003 and then settled at 1.4% in 2016.[13]

In China there is an apparent decrease from 4% in 1986 to 0.7% in 2005.[14,15] There is also a rising trend in India increasing from 5.6% in 2000 to 10.13% in 2004.[16,17]

In our study we found 11 cases with optic nerve involvement in TB patients. In another study by Devis et al, they found 49 cases of tuberculous optic Neuropathy.[18] In our study we found more cases of papilloedema (5 cases). In our study most of patients with papilloedema were tubercular meningitis which is similar to case reported by Hanis Zuhaimy and Suengein Leow.[19]

In our study, there were 4 cases of tubercular optic atropy, which was similar to study conducted by Gupta P, which also had 2 tubercular optic atophy case.[20]

In our study, 2 cases of optic neuritis were detected. In another study in Malaysia by Shahidatul-Adha M et al with 1 case of tubercular optic neuritis were found.[21]

In our study we found that 10 cases (47.61%) had bilateral involvement. In study conducted by Agrawal R et al, most patients had bilateral involvement (58.8%).[22] In another study by Gupta P, 17 patients (42.5%) presented with bilateral eye involvement.[20]

In this study, the percentage of ocular tuberculosis was higher in patients with extra- pulmonary TB (9 ocular TB out of 90 extra pulmonary TB) compared to patients with pulmonary tuberculosis (2 ocular TB out of 294 pulmonary TB).

Most ophthalmologists treat ocular tuberculosis with a standard ATT regime of 9–12 months, depending on other systemic involvements. The use of steroids a with ATT has also been prescribed to control the inflammation especially in the acute phase, and it has been shown to be beneficial in reducing the damage due to immune hypersensitivity.

Another concern while treating the patients on anti-tubercular regimen is the medication induced optic neuropathy especially with the use of isoniazid and ethambutol.

CONCLUSION

Amongst 384 TB cases ocular manifestations were found in 11 cases and therefore, we can conclude that ocular manifestations hold significance in extra pulmonary manifestations of TB. Unlike for patients with diabetes and hypertension, there are no standard clinical guideline for routine eye screening in tuberculosis patients.

We suggest qualitative ocular screening in TB patients will eliminate the risk of preventable blindness.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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