

Ethambutol-Induced Ocular Toxicity: A Case ReportRitesh Patel¹, Nishant Bhansali²¹2nd Year Resident, Department of Pharmacology, Shri M. P. Shah Government Medical College, Jamnagar, Gujarat, India²Assistant Professor, Department of Pharmacology, Shri M. P. Shah Government Medical College, Jamnagar, Gujarat, India

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Abstract:**Introduction:** Ocular toxicity refers to adverse effects on the eye caused by drugs, chemicals, or environmental factors, potentially leading to visual impairment. Ethambutol, a first-line antitubercular drug, is known to cause optic neuropathy, affecting visual acuity and colour discrimination.**Aim & Objectives:** To report a case of Ethambutol-induced ocular toxicity in a tuberculosis patient and highlight the need for early detection and monitoring of adverse drug reactions (ADRs).**Methods:** A 59-year-old male with pulmonary tuberculosis presented with decreased vision after three months of Anti-Tubercular Therapy (ATT). Due to nausea and abdominal discomfort, he discontinued ATT, which was later reintroduced in a modified regimen. His medical history included chronic alcohol and masala consumption. Clinical evaluation and patient history suggested Ethambutol-induced optic neuropathy.**Results:** The patient exhibited symptoms of impaired visual acuity and night blindness, which are characteristic of Ethambutol-induced optic neuropathy. Upon discontinuation of Ethambutol and appropriate management, the patient showed gradual recovery.**Summary & Conclusion:** Ethambutol, though essential in tuberculosis treatment, can lead to serious ocular toxicity. Regular ophthalmic monitoring is crucial for early detection and prevention of irreversible vision loss. Caution is advised in high-risk patients, including those with pre-existing optic conditions.**Keywords:** Ethambutol, Ocular Toxicity, Optic Neuropathy, Tuberculosis, Adverse Drug Reaction.**DOI:** 10.25258/ijpqa.17.5.5

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Introduction

Ethambutol is an important first-line drug in the treatment of tuberculosis and is commonly used in combination regimens to prevent the emergence of drug resistance [1,3]. It exerts its antimycobacterial effect by inhibiting arabinosyl transferase, thereby interfering with cell wall synthesis of *Mycobacterium tuberculosis* [1,2].

Despite its efficacy, ethambutol is associated with ocular toxicity, particularly optic neuropathy, which may result in significant visual impairment if not recognized early [5,6]. The toxicity is typically dose- and duration-dependent and is more commonly observed in elderly patients and those with renal dysfunction [1,3].

Clinically, ethambutol-induced optic neuropathy presents with decreased visual acuity, central or cecentral scotoma, and impaired colour vision, especially red-green discrimination [5,10]. Early diagnosis and prompt discontinuation of the drug are crucial, as visual changes are often reversible in the initial stages [9,11].

This case report aims to highlight the occurrence of ethambutol-induced ocular toxicity and emphasize the importance of regular ophthalmological monitoring during therapy.

Aim and Objectives

Aim: To describe a case of ethambutol-induced ocular toxicity in a patient undergoing anti-tubercular therapy.

Objectives

- To document the clinical presentation and progression of visual symptoms
- To evaluate the association between ethambutol use and optic neuropathy
- To assess causality using a standardized adverse drug reaction scale
- To emphasize the importance of early detection and preventive monitoring strategies

Methods

This study is a descriptive case report conducted in a tertiary care teaching hospital.

Clinical evaluation included assessment of visual symptoms and neurological involvement suggestive of optic nerve dysfunction. The temporal relationship between drug exposure and onset of symptoms was carefully analysed.

The suspected adverse drug reaction was evaluated using the Naranjo Adverse Drug Reaction Probability Scale to determine the likelihood of causality.

Case Presentation: A 59-year-old male patient, diagnosed with pulmonary tuberculosis, was admitted to the respiratory medicine department on 21 December 2024. He presented with complaints of gradual diminution of vision, predominantly affecting night vision, for the past 12 days.

The patient had been initiated on standard anti-tubercular therapy (ATT) on 18 August 2024. However, after approximately three months of treatment, he discontinued therapy due to adverse gastrointestinal symptoms, including nausea and abdominal discomfort.

His past history was significant for chronic alcohol consumption and long-term use of smokeless tobacco (masala chewing) for the past 10 years. There was no history of diabetes mellitus or hypertension.

Following admission, a modified (split) ATT regimen was initiated. The patient was started on levofloxacin 500 mg once daily and amikacin 500 mg once daily. Subsequently, on 6 January 2025, low-dose rifampicin (300 mg) was introduced into the regimen.

Based on the temporal relationship between drug exposure and onset of visual symptoms, a diagnosis of suspected ethambutol-induced ocular toxicity was considered.

Clinical Findings

On clinical evaluation, the patient exhibited:

- Bilateral diminution of visual acuity
- Difficulty in night vision (nyctalopia)
- Symptoms suggestive of optic nerve dysfunction

Colour vision testing and visual field examination would typically reveal central or cecentral scotoma and red-green colour defects, consistent with ethambutol toxicity.

Based on clinical presentation and temporal association with drug therapy, a diagnosis of ethambutol-induced optic neuropathy was considered.

Management and Outcome

Ethambutol was immediately discontinued from the treatment regimen. The patient was managed with an alternative anti-tubercular regimen consisting of second-line agents, including:

- Levofloxacin
- Amikacin
- Low-dose rifampicin (introduced later)

Supportive care and close clinical monitoring were provided.

Over the course of follow-up, the patient demonstrated gradual improvement in visual symptoms, indicating partial recovery from the adverse drug reaction.

Causality Assessment

Table 1: Naranjo Adverse Drug Reaction Probability Scale

Question	Response	Score
Previous conclusive reports on this reaction	Yes	+1
Event appeared after drug was administered	Yes	+2
Improvement after drug discontinuation (dechallenge)	Yes	+1
Reappearance on re-administration	Not done	0
Alternative causes for reaction	No	+2
Reaction with placebo	Not applicable	0
Drug levels detected in toxic range	Not done	0
Dose-response relationship	Not clear	0
Previous exposure to drug	No	0
Objective evidence (clinical findings)	Yes	+1

Total Score: 7, Interpretation: A score of 5–8 indicates a “Probable” adverse drug reaction.

Discussion

Ethambutol-induced optic neuropathy is a well-recognized adverse drug reaction affecting the optic nerve, primarily due to its toxic effects on retinal ganglion cells and optic nerve fibers [8,11]. The

proposed mechanism involves chelation of essential metal ions such as zinc and copper, leading to mitochondrial dysfunction and impaired axonal transport [1,8].

The incidence of ocular toxicity is closely related to dosage and duration of therapy. At recommended doses (15 mg/kg/day), the risk is relatively low but increases significantly with higher doses or prolonged use [1,9]. Studies have shown that toxicity may develop within a few months of therapy, as observed in the present case [10,12].

Several risk factors predispose patients to ethambutol toxicity, including advanced age, renal impairment, nutritional deficiencies, and pre-existing ocular conditions [3,5]. In this case, the patient's age and possible nutritional compromise due to chronic alcohol use may have contributed to increased susceptibility.

Clinically, patients typically present with bilateral, painless, progressive loss of vision, along with dyschromatopsia and central scotomas [5,6]. These findings are consistent with optic neuropathy and should prompt immediate evaluation and drug withdrawal.

The cornerstone of management is early recognition and prompt discontinuation of ethambutol, which often leads to gradual recovery of vision [9,11]. However, delayed diagnosis may result in irreversible optic nerve damage [12].

Therefore, baseline and periodic ophthalmological examinations—including visual acuity and colour vision testing—are strongly recommended for all patients receiving ethambutol [3,7].

Conclusion

Ethambutol remains a cornerstone drug in tuberculosis management; however, its potential to cause optic neuropathy necessitates vigilance. This case underscores the importance of:

- Early recognition of visual symptoms
- Prompt discontinuation of the offending drug

- Regular ophthalmological screening

Appropriate monitoring can prevent irreversible visual impairment and improve patient outcomes.

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