Case Report

URF PUBLISHERS
connect with research world

Archives of Biotechnology and Pharmaceutical Research

https://urfpublishers.com/journal/biotech-pharma-research

Vol: 2 & Iss: 1

Optic Neuritis Triggered by Ethambutol: A Case for Caution in Tuberculosis Management

Priya Higgins[1], Girish Joseph[2]*, Neena Bhatti[2], Karan Maggon[3] and Dinesh Kumar Badyal[4]

[1]Student, Phase III Part 2, Christian Medical College & Hospital, Ludhiana, India

[2]Assistant Professor, Department of Pharmacology, Christian Medical College & Hospital, Ludhiana, India

[3]Intern, Pharma D, Christian Medical College & Hospital, Ludhiana, India

[4]Professor & Head, Department of Pharmacology, Christian Medical College & Hospital, Ludhiana, India

Citation: Higgins P, Joseph G, Bhatti N, et al. Optic Neuritis Triggered by Ethambutol: A Case for Caution in Tuberculosis Management. *Arch Biotech Pharma Res*, 2026;2(1):25-27.

Received: 20 January, 2026; **Accepted:** 27 January, 2026; **Published:** 29 January, 2026

***Corresponding author:** Girish Joseph, Assistant Professor, Department of Pharmacology, Christian Medical College & Hospital, Ludhiana, India

ABSTRACT

Tuberculosis (TB) remains a major public health concern in India, and ethambutol is a key component of first-line anti-tubercular therapy. Although generally well tolerated, ethambutol can cause rare but serious adverse effects such as optic neuritis, which may result in reversible or irreversible vision loss. We report a case of a 54-year-old female with presumed tubercular meningitis who developed optic neuritis after two months of ethambutol therapy. This case is collected from medicine department Christian Medical College Ludhiana under pharmacovigilance elective under the pharmacology department. The Naranjo Adverse Drug Reaction Probability Scale yielded a score of 5, indicating a probable link between ethambutol and the adverse event. Early recognition and prompt withdrawal of the offending drug are crucial to prevent long-term visual impairment. This case highlights the importance of regular ocular monitoring during ethambutol therapy and the need for heightened awareness among clinicians regarding its potential ocular toxicity, even when used within therapeutic doses.

Keywords: Optic neuritis, Ethambutol, Tuberculosis, Adverse drug reaction

1. Introduction

India being a developing nation, has a high rate of tuberculosis (TB). It is a serious worldwide health concern and a contagious disease. The causative agent for TB is mycobacterium tuberculosis[1]. A severe kind of extrapulmonary tubercular infection of the meninges is called tubercular meningitis (TBM). Usually, the illness manifests as subacute fever, headache, vomiting, altered mental status, and meningeal irritation symptoms. Non-specific symptoms and the low sensitivity of traditional diagnostic methods make early diagnosis difficult. The standard treatment for TB is an ATT (anti-tuberculosis treatment) regimen, which uses first-line Anti-TB medications such as Isoniazid, Ethambutol, Pyrazinamide, Rifampicin and Streptomycin[2]. Ethambutol is a first-line chemotherapeutic agent used along with isoniazid, rifampicin, and pyrazinamide, for pulmonary TB[3]. It is part of combined therapy to prevent development of drug resistance and improve treatment outcomes by supplementing the bactericidal actions of the other drugs[4].

Ethambutol is a bacteriostatic drug that inhibits the arabinogalactan biosynthesis. It attaches to protein EmbB to impede arabinose molecules polymerization into arabinogalactan, making the cell wall weaker so Mycobacterium tuberculosis could be vulnerable to damage and replication inhibition. It inhibits the growth of the bacteria rather than killing them directly, allowing the immune system to play its role in clearing the infection and also when it is used with other anti-TB drugs[4]. As Ethambutol can easily penetrate the CSF (Cerebro Spinal Fluid) there is enhanced efficacy of ethambutol in TBM to treat meningeal TB[5]. The common Adverse Drug Reactions (ADRs) associated with ethambutol are rash, pruritis, joint pain, optic neuritis, gastrointestinal (GI) upset, malaise, headache, dizziness, mental confusion, disorientation vision loss, and visual field defect[6]. A serious and uncommon adverse effect of ethambutol is optic neuritis, which is either dose or duration related and results in cecocentral scotomas in the visual field as well as gradual painless vision loss. Ethambutol-induced optic neuritis can result in loss of red-green colour discrimination, decreased visual acuity, and visual field defects[7]. According to the VigiAccess database, only 749 cases of optic neuritis have been reported out of a total of 47,000 documented adverse drug reactions with Ethambutol[8]. Since optic neuritis is a preventable ADR, increasing awareness is essential for early detection and effective management. Therefore, this case merits reporting.

2. Case Report

A 54-year-old female, known case of Diabetes Mellitus, presented to the emergency department with a history of low-grade fever for two months, along with generalized weakness, reduced appetite, and significant weight loss over the preceding 15-20 days. She also reported experiencing dizziness for two days prior to admission. Given the constitutional symptoms, an HRCT (High Resolution Computed Topography) chest was performed, which revealed multiple small pulmonary nodules. Based on clinical suspicion and radiological findings suggestive of a tubercular aetiology, she was empirically started on ATT on 1st November 2024, including tablet Levofloxacin, tablet Ethambutol, and injectable Streptomycin, considering a presumptive diagnosis of Tubercular Meningitis. After approximately two months of treatment, she began experiencing visual disturbances in the form of blurring of vision and pain around the eyes. Concerned about these symptoms, an ophthalmological evaluation was conducted. Detailed examination revealed findings consistent with optic nerve involvement. By 6th March 2025, a diagnosis of ethambutol-induced optic neuritis was confirmed. Ethambutol was subsequently discontinued, and appropriate management for optic neuritis was initiated. On withdrawal of the suspect product, the optic neuritis was recovering. Rest of the drugs were continued as per schedule.

The Naranjo Adverse Drug Reaction Probability Scale yielded a score of 5, suggesting a probable link between ethambutol and the observed adverse event. This scale is a validated, structured tool used to assess the likelihood that a specific drug caused an adverse reaction. It consists of 10 questions, each assigned a score of -1, 0, +1, or +2 based on the answers: “Yes,” “No,” or “Do not know.” The total score helps categorize the causality as: definite (≥9), probable (5-8), possible (1-4), or doubtful (≤0). Overall scores can range from -4 to +13, reflecting the strength of the evidence supporting drug-related causation[9].

3. Discussion

World Health Organization (WHO) defines adverse ADR as “a response to a medication that is noxious and unintended and occurs at doses normally used in man[10].” ADRs put a lot of stress on healthcare systems since they lead to more hospital stays, longer hospital stays, and higher treatment expenses. They also put a load on healthcare resources by requiring more tests, monitoring, and treatments to deal with drug-related harm that could have been avoided[11]. Optic neuritis is defined as an inflammation of the optic nerve[12]. The probability of ethambutol induced optic neuritis is higher with greater doses and longer use of ethambutol. The occurrence is less than 1% of patients receiving a daily dose of 15 mg/kg, 15% of patients taking 50 mg/kg daily and 5% of patients receiving 25 mg/kg daily[7].

Though suggestions have been proposed, the exact mechanism by which ethambutol induces optic neuritis is unknown. Ethambutol and its metabolites have the ability to chelate zinc, which disrupts retinal homeostasis, according to one such notion. Optic neuritis caused by ethambutol is reversible after discontinuation of medication, however recovery is time-consuming[7]. Even after discontinuing ethambutol, some patients’ colour vision does not improve. Although there is currently little evidence, corticosteroids such as oral prednisone, zinc, and vitamin B complexes are occasionally used as part of management. Early detection during treatment requires careful ocular surveillance. In some circumstances, desensitisation procedures including a gradual reintroduction of ethambutol have been investigated in an effort to minimise ocular damage while maintaining anti-tubercular efficacy[13].

Considering how common ethambutol is used to treat TB worldwide, documenting occurrences of optic neuritis will help to strike a balance between minimising vision-threatening side effects and providing effective TB treatment, thereby preserving patient quality of life[5]. ADRs are known to not only add to the overall disease burden but also significantly impair a patient’s quality of life. Therefore, this case warrants documentation and reporting[14].

4. Conclusion

Ethambutol-induced optic neuritis, though uncommon, is a serious and potentially reversible adverse drug reaction that requires early recognition and intervention. Regular ophthalmic monitoring during ethambutol therapy is essential, especially in high-risk patients. Timely discontinuation of the drug can prevent permanent visual impairment. This case underscores the need for vigilance among healthcare providers to ensure patient safety while maintaining the efficacy of anti-tubercular treatment.

5. References

1. Pauline E, Joseph G, Kaur P, et al. Hiding in Plain Sight: Revisiting a Case of Antitubercular Drug Induced Chromaturia. J Asian Multicult Res Med Health Sci Study, 2024;5: 1-4.

2. Ghimire B, Thapaliya I, Yadav J, et.al. Diagnostic challenges in tuberculous meningitis: a case report with negative genexpert result. Ann Med Surg, 2023;85: 5731-5735.

3. Chaudhuri AD. Recent changes in technical and operational guidelines for tuberculosis control programme in India - 2016: A paradigm shift in tuberculosis control. J Assoc Chest Physicians, 2017;5: 1-9.

4. Lee N, Patel P, Nguyen H. Ethambutol. In: StatPearls. Treasure Island (FL): StatPearls Publishing, 2024.

5. Sheng WY, Wu SQ, Su LY, et al. Ethambutol-induced optic neuropathy with rare bilateral asymmetry onset: a case report. World J Clin Cases, 2022;10: 663.

6. Balhara A, Ladumor MK, Nankar RP, et.al. Exploration of the plausible mechanism of ethambutol induced ocular toxicity by using proteomics informed physiologically based pharmacokinetic (PBPK) modelling. Pharm Res, 2022;39: 677-689.

7. Patel J, Patel C, Shah A, et al. Ethambutol-Induced Optic Neuritis and Vision Loss: A Case Report. Cureus, 2024;16.

8. VigiAccess. World Health Organisation; 2015.

9. Naranjo CA, Busto U, Sellers EM, et al. A method for estimating the probability of adverse drug reactions. Clin Pharmacol Ther, 1981;30: 239-245.

10. Abhilasha P, Bhatti N, Joseph G, et al. Sodium Valproate-Induced Hyperammonemia: A Case Series in a Tertiary Care Hospital. Cureus. 2024;16.

11. Siddhu CK, Joseph G, Bhatti N, et al. Paracetamol induced facial puffiness: An uncommon case report. Natl J Pharmacol Ther. 2023;1(3):170-2.

12. Kraker JA, Chen JJ. An update on optic neuritis. J Neurol, 2023;270: 5113-5126.

13. Dahiya M, Rathi M, Dua M, et al. Ethambutol-induced optic neuropathy: a remerging ocular emergency needing strict vigilance and screening. Indian J Clin Exp Ophthalmol, 2025;11: 545-548.

14. Kaur J, Joseph G, Kaur P, et al. Ichthammol-induced maculopapular rash and itching in a paediatric patient. NJPT, 2024;2: 162-164.