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Original Research Article

Etiological Profile of Optic Neuropathy in a Tertiary Care Hospital in Northeast India

Shreejeet Kumar[1], Munindra Goswami[2], Marami Das[3], Papori Borah[4], Anirban Mahanta[5]

[1]Senior Resident, Department of Neurology, GMCH, Guwahati, India
[2]Professor & Head, Department of Neurology, GMCH, Guwahati, India
[3]Professor, Department of Neurology, GMCH, Guwahati, India
[4,5]Associate Professor, Department of Neurology, GMCH, Guwahati, India

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Corresponding author: Dr. Munindra Goswami
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Abstract

Background: Optic neuropathy represents a heterogeneous group of disorders characterised by structural and functional impairment of the optic nerve, leading to visual morbidity. Identification of its etiological determinants is crucial for early diagnosis and therapeutic decision-making, particularly in resource-limited settings of Northeast India.

Objectives: To delineate the etiological distribution, clinical characteristics, and diagnostic profiles of patients presenting with optic neuropathy in a tertiary care centre.

Methods: A retrospective observational study was conducted over one year (June 2024–May 2025) in the Department of Neurology, GMCH, and Guwahati. Clinical records, MRI findings, fundoscopy, VEP characteristics, and laboratory data of confirmed cases of optic neuropathy were analysed.

Results: Sixty-six patients fulfilled inclusion criteria. Females constituted 71% of cases. The predominant age group was 21–40 years (57%). Bilateral involvement occurred in 66%. NMOSD and idiopathic optic neuritis were the leading etiologies (28% each), followed by multiple sclerosis (18%) and ADEM (9%). Less frequent causes included benign intracranial hypertension (4.5%), ischemic optic neuropathy (3%), tuberculosis-related optic neuropathy (1.5%), and toxic optic neuropathy (1.5%). VEP commonly demonstrated prolonged P100 latency, while MRI revealed optic nerve enhancement in most inflammatory and demyelinating cases.

Conclusion: NMOSD and idiopathic optic neuritis are major contributors to optic neuropathy in young females in Northeast India. Combined electrophysiological and imaging evaluation is essential for accurate etiological classification and timely management.

Keywords: Optic Neuropathy, NMOSD, Idiopathic Optic Neuritis, Visual Evoked Potentials, Multiple Sclerosis, MRI Orbit.

Introduction

Optic neuropathy includes a spectrum of disorders that impair the integrity of the optic nerve, resulting in reduced visual acuity, field defects, and colour desaturation. Etiologies vary widely from inflammatory and demyelinating diseases to infections, toxic exposures, and ischemic insults. [1-3] In the Indian subcontinent, idiopathic optic neuritis, and immune-mediated optic neuropathies such as NMOSD and MS form significant proportions of cases. Accurate diagnosis requires integration of clinical features, MRI of orbits/brain, cerebrospinal fluid analysis, and electrophysiological assessment, particularly visual evoked potentials (VEP). [4-7] Given the paucity of regional data, this study aims to assess the etiological distribution and diagnostic trends in optic neuropathy in Northeast India.

Materials and Methods

Study Design: Retrospective observational study.

Study Period: June 2024 to May 2025.

Study Setting: Department of Neurology, Gauhati Medical College and Hospital (GMCH), Guwahati, India.

Inclusion Criteria

- Patients presenting with visual impairment attributable to optic nerve pathology
- Admission to neurology ward or ICU.

Exclusion Criteria

- Visual loss due to ocular causes (cataract, glaucoma)
- Visual loss due to cortical causes (occipital stroke)

Data Collection

Clinical records, neuroimaging, VEP analysis, fundoscopy findings, and laboratory investigations were reviewed. Data were tabulated and evaluated for demographic distribution, clinical presentations, etiologies, and diagnostic characteristics.

Results

Demographic Profile

- Total patients: 66
- Females: 71% (n = 47)
- Males: 29% (n = 19)
- Predominant age group: 21–40 years (57%)

Clinical Characteristics

- Bilateral optic nerve involvement: 66% (n = 44)
- Painful eye movements: 83% (n = 55)
- Symptom predominance was observed in inflammatory and demyelinating etiologies.

Etiological Distribution

Table 1: Etiological spectrum of optic neuropathy, highlighting the predominance of NMOSD and idiopathic optic neuritis in the study population. (n=66)

Etiology	Percentage	Number
NMOSD	28%	19
Idiopathic Optic Neuritis	28%	19
Multiple Sclerosis	18%	12
ADEM	9%	6
MOGAD	4.5%	3
Benign Intracranial Hypertension	4.5%	3
Ischemic Optic Neuropathy	3%	2
Tubercular Optic Neuropathy	1.5%	1
Toxic Optic Neuropathy	1.5%	1

VEP Findings

Table 2: Visual Evoked potential parameters across different etiologies of optic neuropathy.

Diagnosis	Mean P100 (L)	Mean P100 (R)	Mean amplitude (L)	Mean amplitude (R)
NMOSD	111	113	3.24	2.91
Idiopathic optic neuritis	106	113.9	3.02	3.16
MS	122	124.1	3.02	2.39
MOGAD	119	124	4.65	3.35
IIH	121	128.3	6.74	5
Tubercular	102	108	1.4	2.9
Toxic	100	102	0.9	0'9
AAION	95	98	0.6	1.5
NAION	98	99	0.8	0.9

- Prolonged P100 latency was the most consistent abnormality
- Reduced amplitude was observed in cases with axonal damage

Fundoscopic Findings

- Disc edema of variable severity
- Mild swelling in MS
- Retinal inflammation and splinter haemorrhages in MOG-related optic neuritis

MRI Findings

- Optic nerve enhancement in demyelinating etiologies
- Additional white matter lesions in MS and ADEM
- Signs of raised ICP in benign intracranial hypertension

Discussion

Most of the patients were in between 21-40 years (57%, 38). Out of 66 patients, 66 % (44) had bilateral involvement.

Eye pain or pain on eye movement was in 83% (55).

The common etiologies of optic neuropathy were Neuromyelitis optica spectrum disorders (28%, 19), idiopathic optic neuritis (28%, 19), multiple sclerosis (18%), Acute disseminated encephalomyelitis (9%), benign intracranial hypertension (4.5%), ischemic optic neuropathy

(3%), and tuberculosis related optic neuropathy (1.5%) and toxic neuropathy (1.5%).

Conclusion

Optic neuropathy in Northeast India predominantly affects young females, with NMOSD and idiopathic optic neuritis emerging as the leading causes.

Incorporation of electrophysiology and MRI greatly enhances diagnostic accuracy.

Early etiological identification is essential for initiating disease-modifying therapies in MS and NMOSD and for preventing irreversible visual impairment.

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