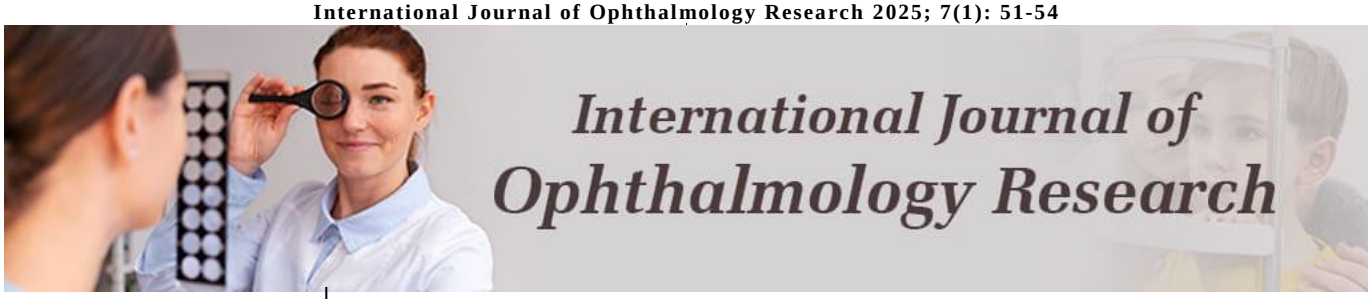


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# Etiological Spectrum of Unilateral Optic Disc Swelling: A Tertiary Center Experience

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**Abstract**
**Background*:*** Optic disc swelling, encompassing terms like disc edema and papillitis, signifies distention and elevation of the optic nerve head due to fluid accumulation. It can present unilaterally or bilaterally, often indicating underlying ocular, intracranial, or systemic pathologies that can lead to vision loss. While optic neuropathy and optic neuritis have been identified as prominent causes in studies from India and Nepal, there is a notable scarcity of recent research on unilateral optic disc swelling in Bangladesh. Understanding the specific clinical symptoms and etiological spectrum in this region is crucial for prompt diagnosis, efficient management, and preserving visual outcomes, particularly in rural settings.
**Objectives:** This study aimed to determine the visual outcomes and characterize the etiological spectrum of unilateral optic disc swelling among patients presenting to a tertiary care center in Bangladesh.
**Methodology:** A cross-sectional observational study was conducted at the Department of Neuro-ophthalmology, National Institute of Ophthalmology (NIO&H), Dhaka, from March 2019 to July 2020. A total of 105 eyes from 105 patients with unilateral disc swelling were enrolled using non-random purposive sampling, adhering to ethical guidelines. Patients with other ocular surface/intraocular diseases, recent ocular surgery/trauma, or unwillingness to participate were excluded. Detailed evaluations, including color vision, visual fields, eye movements, pupillary reactions, and relevant laboratory tests (CBC, RBS, fasting lipid profile, CRP, HbA1C), were performed. Diagnoses were established based on clinical, laboratory, and imaging findings. Data were analyzed using SPSS v26.0, with quantitative data presented as mean ±standard deviation and qualitative data as percentages.
**Results:** The mean age of the 105 patients was 45.9±14.84 years, with a male-to-female ratio of 1.23:1. The most frequent presenting symptom was sudden dimness of vision (78 patients). Sluggish pupils were observed in 83.81% of patients, and a relative afferent pupillary defect (RAPD) was present in 79.55%. At presentation, 45.72% of patients had severe visual impairment (Counting Fingers to Perception of Light). Non-Arteritic Anterior Ischemic Optic Neuropathy (NAION) was the most common etiology, accounting for 40.95% of cases, followed by optic neuritis (25.71%). Other causes included Pseudo Foster Kennedy Syndrome, infiltrative/compressive neuropathy, neuroretinitis, and central retinal vein occlusion.
**Conclusion:** This study highlights that NAION and optic neuritis are the predominant causes of unilateral optic disc swelling in a tertiary care setting in Bangladesh, aligning with global patterns. The high incidence of sudden vision loss and RAPD underscores the urgency of neuro-ophthalmic evaluation. Despite the limitations of a cross-sectional design and single-center data, these findings provide valuable regional insights, emphasizing the need for early diagnosis and intervention to optimize visual prognosis, particularly in resource-limited environments.

**Keywords:** Unilateral optic disc swelling, NAION, optic neuritis, visual impairment, neuro-ophthalmology, relative afferent pupillary defect, Bangladesh

## Introduction
The term "optic disc swelling" is referred to as disc edema, papilledema, papillitis, choked disc, or elevated optic nerve, depending on the disease [1]. A swollen optic disc means the optic nerve has distended and raised the disc. Disc edema indicates that the swelling is in the axons, and the spaces around them are filled with fluid [2]. Optic disc swelling may develop unilaterally or bilaterally. It is part of the presentation of courses such as internal ocular diseases, intracranial abnormalities, and systemic issues that can lead to vision loss [3]. Optic

neuropathy was one of the top causes of unilateral disc edema in Bhopal, found in about 22% of the cases examined [4]. Recently, in North Karnataka, India, a report showed optic neuritis as the main reason for disc swelling, followed by papilloedema. Among the patients, 46.5% suffered from optic neuritis, 34.9% experienced papilloedema, 4.6% experienced neuroretinitis, 4.6% had VKH, 4.6% had diabetic papillopathy, 2.3% had AION, and 2.3% had hemi-retinal vein occlusion. Despite being less common in later research, only one patient in their study was diagnosed with NAION [5]. Among the 98 Nepalese patients diagnosed with disc edema in 2014, papilledema led to it in 35.7% of cases, papillitis in 28.6%, pseudo-papilledema in 18.4%, and ischemia in 17.3% of the cases [6]. Optic disc swelling with visual disturbances usually leads patients to visit neuro-ophthalmologists and, if the initial symptoms are severe, such as headache, vomiting, vision loss, or unconsciousness, also neurosurgeons or neurologists [7]. There has been no recent study published in Bangladesh about unilateral optic disc swelling. Hence, more specific details of the clinical symptoms are required to understand the process of the disease early on, which can lead to prompt action in treatment. It can help with giving a quick diagnosis, efficient care, and swiftly arranging for patients with unilateral disk swelling in rural areas of Bangladesh, promoting their good vision. This study aims to find out the visual outcomes and etiological spectrum of unilateral optic disc swelling in a tertiary care center of Bangladesh.

## Methodology

A cross-sectional observational study was carried out at the Department of Neuro-ophthalmology in the National Institute of Ophthalmology (NIO&H), Sher-E-Bangla Nagar in Dhaka, between 1st March 2019 and 31st July 2020. The enrollment of patients was done through non-random purposive sampling by considering all ethical aspects, totaling 105 eyes from 105 patients.

### Inclusion criteria

All patients with unilateral disc swelling, irrespective of age and sex, attended the neuro-ophthalmology outpatient department of NIO&H.

### Exclusion criteria

- Patient was suffering from other ocular surface or other intraocular diseases.
- Patient with a history of any ocular surgery or ocular trauma in the previous 6 months.
- Patients unwilling to participate as study subjects.
- Patients are already enrolled in other studies.

After obtaining informed consent from the patient, we performed a detailed evaluation. Besides the routine tests, color vision was assessed using Ishihara plates, visual field using confrontation and Humphrey instruments, eye movements were tested, and pupillary reactions were observed. CBC, RBS, fasting lipid profile for everyone, and CRP and HbA1C for some patients were run in the lab tests. Clinical, laboratory, and imaging findings were used to establish the diagnoses. The information was all entered into a well-organized data sheet and analyzed in SPSS v26.0. The mean and standard deviation were used for quantitative results, while qualitative data were reported as percentages.

## Result

**Table 1:** Demographic distribution of patients, age (N=105)

| Age Group (years) | Frequency | Percentage |
|---|---|---|
| ≤20 Yrs. | 10 | 9.52% |
| 21-30 Yrs. | 14 | 13.33% |
| 31-40 Yrs. | 14 | 13.33% |
| 41-50 Yrs. | 22 | 20.95% |
| 51-60 Yrs. | 35 | 33.33% |
| >60 Yrs. | 10 | 9.52% |
| Total | 105 | 100% |
| Mean age ± SD | 45.9±14.84 | |

Table 1 illustrates the age distribution of the subjects, where 3 subjects were between 10-20 years old, 14 subjects were between 20-30 years, 19 subjects were between 30-40 years, 16 subjects were between 40-50 years, 35 subjects were between 50-60 years, 10 subjects were between 60-70 years and the rest were 70 years old or more. The mean age for patients was calculated as 45.9±14.84 years.

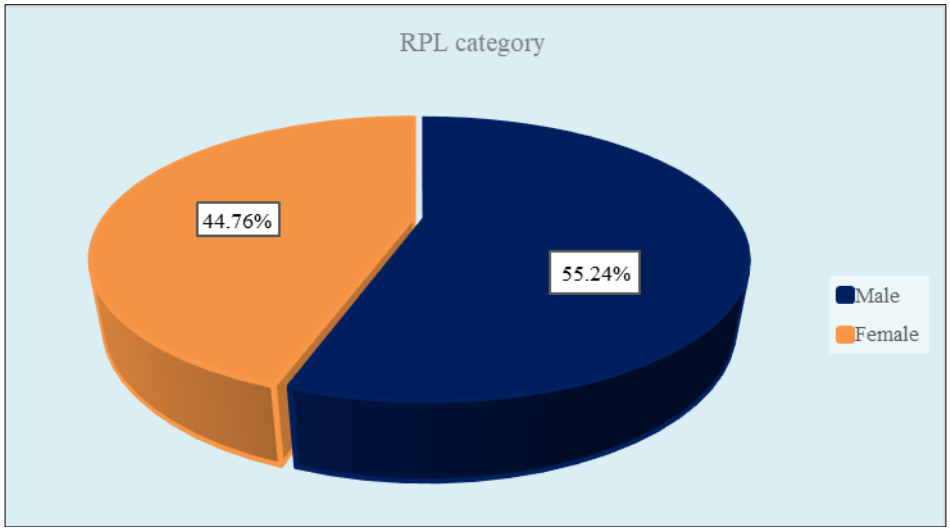


**Fig 1:** Pie chart showed demographic distribution of patients, sex (N=10)

Figure 01 indicated that the study group consisted of 105 patients, and by gender, 47 were female (44.76%) and 58 were male (55.24%). The male-dominant study shows a male-female ratio of 1.23:1.

**Table 2:** Etiological Distribution of Unilateral Optic Disc Swelling (N=105)

| Etiology | Frequency (n) | Percentage (%) |
|---|---|---|
| NAION | 43 | 40.95% |
| Optic Neuritis | 27 | 25.71% |
| Pseudo Foster Kennedy Syndrome | 13 | 12.38% |
| Infiltrative/Compressive Neuropathy | 5 | 4.76% |
| Neuroretinitis | 5 | 4.76% |
| CRVO | 4 | 3.80% |
| Pseudo Disc Swelling | 2 | 1.90% |
| Compressive Optic Neuropathy | 1 | 0.95% |

Table 2 showcases that NAION was the most common cause seen in 40.95% of cases, and optic neuritis was next. It supports the high rates of hypertension and diabetes that were seen in the group they studied.

## DISCUSSION

The current study offers useful information about the optic disc changes and conditions associated with unilateral optic disc swelling in Bangladesh. Of the participants, 58 were men and 47 were women, for a male-to-female ratio of 1.23:1 and an average age of 45.9±14.84 years. It is compatible with a study in North Karnataka, India, by Ijeri & Jyoti *et al.*, 2018[5], describing an abundance of male optic disc swelling patients as well [5]. This study revealed that sudden dimness of vision affected the most patients (78), and gradual loss of sight, eye aches, and headache were seen in fewer, ranging from 23 to 10 patients. These results are in agreement with a 2018 Nepalese study's findings, in which patients went to the doctor because of visual problems [6].

In total, 83.81% of our patients had sluggish pupils, and 79.55% presented with a relative afferent pupillary defect (RAPD). As Corbett JJ *et al*., 2003 [2] noted, RAPD is one of the main signs of involvement in the optic nerve [2]. The range of eye movements was normal in most patients, unlike a 2007 study, where almost half showed reduced eye movements [1]. During presentation, 45.72% of patients experienced severe visual impairment (CF 2ft-PL) and 21.43% were able to see well (6/6-6/18). Similar to other studies, severe visual loss is often found in optic neuritis and ischemic optic neuropathies [5]. NAAION was found in 43 patients (40.95%), optic neuritis in 28 (25.71%), Foster Kennedy syndrome in 13 (12.38%), CRVO in 1 (0.94%), and also cases of infiltrative optic neuropathy, neuroretinitis, Foster Kennedy syndrome, and pseudo disc swelling. NAION is the main reason for optic disc swelling and vision loss in those aged over 50, as demonstrated in the study [8]. Youssef AM *et al.*, 2018 [9], also noted that nail showed that the most common cause of unilateral disc swelling was NAION, with traumatic optic neuropathy, optic neuritis, disc swelling with an orbital mass, disc swelling with a brain mass and disc swelling in thyroid ophthalmopathy or cilio retinal artery occlusion all comprising 6% of cases [9]. The study focused on understanding how unilateral optic disc swelling affects vision and what the underlying causes are in a center in Bangladesh, filling an important gap found in local research. Due to the many possible reasons, including inflammatory, blood vessel, and compression problems, it is important to diagnose these conditions promptly to preserve vision [10]. The findings from this study coincide with global studies, including those by Petzold A. *et al.*, 2021[11], showing that eye swelling often results in optic neuritis and ischemia [11]. Besides, the large number of sudden vision loss and RAPD cases points to the significance of immediate neuro-ophthalmic care, as it makes a difference in the outlook [12]. Relating clinical findings to causes in this work supports the use of appropriate management in limited settings, following the recommendations by d *et al.*, 2018 for guidelines adapted to low-resource regions [13]. Overall, the analysis enhances international databases and supports plans to strengthen

diagnostics and visual forecasting in the country's healthcare system.

**Limitation**

The study was limited by its cross-sectional approach, preventing any long-term observation for changes in vision or the spread of the disease. The use of only one tertiary care center could affect the results, since cases usually involve highly selected patients.

**Conclusion**

In analyzing optic disc swelling in Bangladesh, this study shows similarities with patterns found in other parts of the world. Since sudden loss of sight and an abnormal red reflex are the main indicators, quick review by a neuro-ophthalmologist is necessary. Despite certain drawbacks, the outcomes help to improve diagnostic methods in places with limited resources. Future investigations ought to monitor patients for a long period and use advanced imaging to improve findings about the causes. Hence, this study provides regional information and places value on early steps to achieve the best vision.

**Abbreviation**

**NIO&H** - National Institute of Ophthalmology & Hospital
**RAPD** - Relative Afferent Pupillary Defect
**HVFA** - Humphrey Visual Field Analyzer
**CF** - Counting Fingers
**PL** - Perception of Light
**NPL** - No Perception of Light
**SPSS** - Statistical Package for the Social Sciences
**AION** - Anterior Ischemic Optic Neuropathy
**NAION** - Non-Arteritic Anterior Ischemic Optic Neuropathy
**SD** - Standard Deviation

**Conflict of Interest**

The authors certify that their work is unbiased since they have no relationships that could impact the study or results.

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