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Associated Systemic Risk Factors and Neuro-imaging Findings of Unilateral Optic Disc Swelling in a Bangladeshi Population

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ABSTRACT

The presence of unilateral optic disc swelling (ODS) is linked to several illnesses, such as hypertension and diabetes mellitus. While the incidence of diabetes is increasing in Bangladesh, not much is known about its systemic links in the local population. This study aims to evaluate the relationships between systemic factors and unilateral optic disc swelling among people in Bangladesh. A cross-sectional observational study was done at the Neuro-Ophthalmology Department in Dhaka from March 2019 to July 2020, covering 105 patients with unilateral ODS. Eye health was evaluated clinically, visual functioning was measured, and brain scans were performed for diagnosis. Basic demographics, historical details, and results from blood tests (CBC, RBS, HbA1c, lipid profile, CRP) were all collected with the use of structured forms. The statistical analysis was done using SPSS version 26.0, and the level of significance was $p<0.05$. NAION was the leading cause (40.95%), with optic neuritis (25.71%) coming next, and Pseudo Foster Kennedy syndrome (12.38%). About half of the patients (52.38%) had hypertension, and about three-quarters of all patients (42.86%) had diabetes, with around one-quarter (26.67%) having both conditions. The laboratory results showed that 46 patients (43.81%) had high blood pressure and 45 (42.86%) had elevated random blood sugar, matching what was found in their clinical records. Twenty-seven-point six percent of the population experienced abnormal lipid results, and 20.95% had raised HbA1c. Nearly half of the patients (45.72%) were seen for serious blindness (approximately 2 ft of vision). A visual field problem called an inferior altitudinal scotoma was prevalent among people with NAION. Almost half of the patients (49.52%) were not receiving treatment for their long-term medical issues. In neuro imaging findings, optic nerve enhancement & thickening was found in 26 patients (24.76%). There is a strong connection between hypertension and diabetes on one hand and unilateral optic disc swelling on the other. Early identification of systemic diseases and treating them promptly might prevent patients from losing sight.

INTRODUCTION

Unilateral optic disc swelling is a condition that refers to the inflammation of the optic nerve head in one eye caused by different conditions or when axoplasm accumulates at the back of the eye, slowing anterograde flow and causing both the disc and the retinal nerves to become opaque (Hata, 2017; Stenoien, 1999). It is often referred to as papilledema or Optic Disc Edema (ODE) in a unilateral setting, occurs rarely, in just 4% of all IIH patients, and may be thought to be local eye disease, which can make IIH diagnosis difficult (El-Gendy, 2024). A Bangladeshi study found that Optic Disc Edema was present in 53.3% of eyes and 56.7% of patients (Morshed, 2024). Unilateral optic disc swelling may result from causes such as optic neuritis, anterior ischemic optic neuropathy (AION), non-arteritic anterior ischemic optic neuropathy (NAION), papilledema, and different eye diseases (Hata, 2017). In particular, NAION and optic neuritis are known to lead to optic disc swelling in people over 50 years of age all around the world (Raizada, 2022). In particular, NAION shows a clear association with vascular concerns such as systemic hypertension, diabetes mellitus, and dyslipidemia, which affect the microcirculation in the optic nerve head, resulting in damage to small vessels and leading to infarction and swelling of the disc (Singla, 2024). Besides NAION, in Bangladesh and many other low- and middle-income countries, more people are suffering from treatment-resistant conditions such as hypertension and diabetes (Uddin, 2022), increasing patient presentation in ophthalmic clinics. While there is an increase in systemic disorders linked to optic disc swelling, not many local studies have focused on this relationship among people from Bangladesh. People with unilateral ODS may suddenly and painlessly lose vision in one of their eyes (Salvetat, 2023). During ophthalmoscopy, the disease may be found as disc inflammation, elevation, and bleeding spots. However, these signs are not specific and should be interpreted along with the patient's age, general health status, and other lab results such as blood pressure, random blood sugar (RBS), and lipid levels. Ophthalmologists and general physicians must know how systemic risk factors affect unilateral ODS. Therefore, this study aims to analyze the number and pattern of key risk factors—hypertension and diabetes mellitus—

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in patients coming to our hospital with only one optic disc expanded. The main goal is to contribute meaningful epidemiological information and develop protocols for the timely diagnosis and overall care of individuals with optic disc swelling.

MATERIALS AND METHODS

To assess the systemic risk factors with unilateral optic disc swelling among the Bangladeshi population, we used a cross-sectional observational study in the Neuro-ophthalmology department of the National Institute of Ophthalmology in Dhaka. The period from patient enrolment to data analysis lasts from 1st March, 2019, to 31st July, 2020, with all ethical considerations. During the entire study period, 105 patients were enrolled by the researchers using particular study-defined inclusion and exclusion criteria.

Inclusion Criteria

- There is no age limit for this study.
- Patients diagnosed with unilateral optic disc swelling.
- Must be a Bangladeshi by birth to eliminate genetic factors.
- Patients were ready to provide signed informed consent.

Exclusion Criteria

- Patients with traumatic eye injury.
- Patients with uveitis or keratitis, or a disease condition on the surface tissues of the eyes.
- Lack of informed consent.

Demographic information, suggestions of what the participants presented, medical history, and all the medications each one received have been captured using a structured form following informed consent. Standard ophthalmologic examinations were given to everyone. In the laboratory, complete blood count (CBC), random blood sugar (RBS), HbA1c, a fasting lipid profile, and C-reactive protein (CRP) tests were used to check for overall connections. All information from the study was transported into SPSS version 26 and analyzed by using basic statistics. The categorical variables were reported as the number of cases and their percentages, and continuous variables were shown as the mean with their standard deviations. A test result with a p-value lower than 0.05 was significant at a 95% confidence level.

RESULTS AND DISCUSSION

The study was carried out with 58 male and 47 female patients. The male-to-female ratio recorded for this study was 1:23:1, and the mean age of the enrolled patients was 45.9±14.84 years.

Table 1: Distribution of Study Subjects by History of Systemic Diseases (N=105)

Systemic Disease	Frequency (n)	Percentage (%)
Hypertension	55	52.38%
Diabetes Mellitus	45	42.86%
Dyslipidemia	5	4.76%
Both HTN & DM	28	26.67%
No Systemic Illness	22	20.95%

Table 1 shows that about half of the patients had hypertension and approximately 43% had diabetes mellitus, suggesting that a lot of them were at increased risk of vascular health problems. About a quarter of the sample showed both conditions concurrently. According to these findings, having systemic disorders is strongly related to unilateral swelling of the optic disc.

Clinical measurements in Table 2 highlight that about

Table 2: Laboratory Parameters of the Study Subjects (N=105)

Laboratory Findings	Abnormal (n)	Percentage (%)
High Blood Pressure	46	43.81%
Elevated Random Blood Sugar	45	42.86%
HbA1c	22	20.95%
Abnormal Lipid Profile	29	27.62%

44% of subjects had high BP and RBS, which was very close to what was reported in their medical histories. Around 21% of patients reported persistent DM, and 27% of the participants were found to have elevated lipid levels (dyslipidemia). The study results strengthen the idea that small blood vessel abnormalities may underlie the development of optic disc swelling.

According to Table 1, about half the participants said they were not on regular medication for high blood pressure or diabetes, indicating that many such patients may have gone undetected or off-track with their treatment. The majority of those using medications were found to be taking anti-hypertensives (31.43%) or OHAs (22.86%), which highlighted that several patients knew they were at risk of cardiovascular problems.

Table 3: Distribution of Patients by Drug History (N=105)

Drug History	Frequency (n)	Percentage (%)
Antihypertensive Drugs	33	31.43%
Oral Hypoglycemic Agents (OHA)	24	22.86%
Insulin	7	6.67%
Antiplatelet/Anticoagulant Drugs	5	4.76%
Lipid-lowering Agents (Statins)	4	3.81%
No Regular Medication	52	49.52%

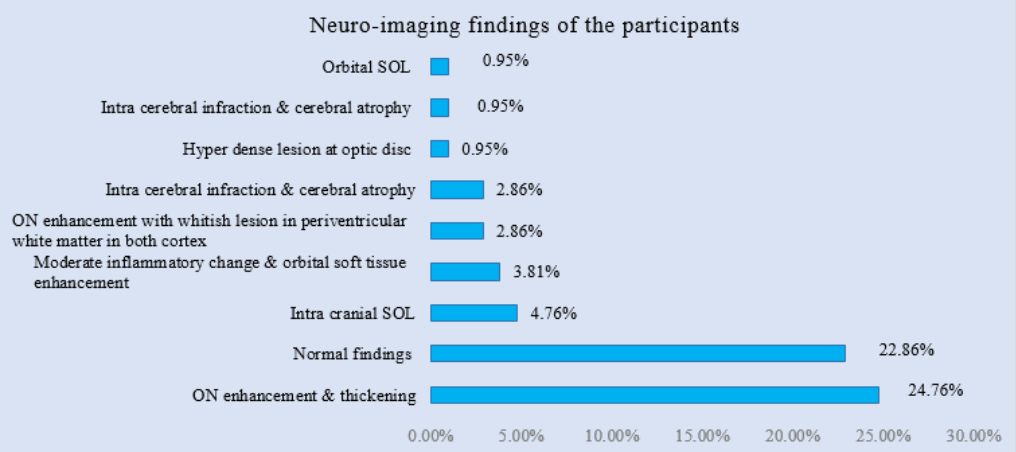

Figure 1: Bar chart showed distribution of Neuro-imaging findings of the study subjects (N=105)

Figure 01 shows the neuroimaging findings of the study subjects. Among 105 study subjects, neuroimaging was done on 68 patients, whose fundus findings were suggestive of having intraocular and intracranial lesions. Of them optic nerve enhancement & thickening was found in 26 patients (24.76%), intracranial space occupying lesion was present in 5 patients (4.76%), and, moderate inflammatory change & orbital soft tissue enhancement was found in 4 patients (3.81%) and optic nerve enhancement with whitish lesion in periventricular white matter in both cortex and intra cerebral infraction & cerebral atrophy were found in 3 patients each (2.86%). Intra-cerebral infarction & cerebral atrophy, and orbital space-occupying lesion were found in 1 patient each (0.95%). No significant abnormality was detected in 24 patients (22.86%) on neuro-imaging

Discussion

Unilateral Optic Disc Swelling (ODS) is a serious neurological condition. The primary objective of this study was to assess how systemic risk factors relate to unilateral disc swelling amongst the Bangladeshi population. During the study, there were 105 cases (58 male, 47 female) selected with 45.9±14.84 years mean age of with a clinical presentation of unilateral disc swelling. Diagnosis in this study was based on considering the presenting complaint, observing patients' symptoms, laboratory examinations, and scans. In 43 patients (40.95%), the condition was NAAION, 28 (25.71%) were noted for optic neuritis, 13 (12.38%)cases were of Foster Kennedy syndrome, while 1 (0.94%) had CRVO and others like infiltrative optic neuropathy, neuroretinitis, Foster Kennedy syndrome, Pseudo disc swelling happened. NAION is the leading cause of optic disc swelling in the optic nerve and loss of vision in people aged over 50 (Hayreh, 2009), as reflected in this study. Youssef *et al.* (2018) also agreed to this finding by stating that showed that the main cause of unilateral disc swelling was non arteritic anterior ischemic optic neuropathy (NAION) at 72%, with traumatic optic neuropathy, optic neuritis, disc swelling related to an orbital mass, disc swelling related to a brain mass and disc swelling with thyroid ophthalmopathy or cilio retinal artery occlusion comprising 6% each and different other connections in each group (Ahmed Mohammed Youssef, 2018). The current study revealed that the best-corrected visual acuity of the majority (45.72%) of subjects at the time of presentation was not within CF 2 feet-PL, while only 4.76% had their vision within the 6/6 to 6/12 range. A significant decrease in vision is often noticed in inflammatory and ischemic optic neuropathy. The vast majority of the patients were diagnosed with NAION, and in these cases, vision reduction occurs early in the disease. A 2017 observational study also replicates the similar result of vision loss by optic disc edema (Anuradha, 2017). According to the results, 41.90% of the participants displayed a visual field defect during the confrontation test. Humphrey visual analysis was carried out in 44 patients with visual field defects on confrontation to identify the type of defect. Most of the patients (14 out of 44) had an inferior altitudinal field defect, which matches the results found by Jung *et al.* (2011). Other visual defects observed in the present

study included enlarged blind spot, superior altitudinal field defect, paracentral scotoma, centrocecal scotoma, arcuate scotoma, and generalized depression, as reported by other studies (Shah, 2017; Jung, 2011). This research found that 52.38 % of individuals had a background of hypertension, 42.86 % had diabetes, and 4.76 % had dyslipidemia, which agrees with what was found in several researchers (Anuradha, 2017; Jung, 2011). In our study, more than half were found to have hypertension, more than half had DM, more than half had hyperlipidemia and abnormal values were found for blood pressure in 46, for random blood sugar in 45, HbA1c in 22 and lipids in 29 patients as shown by Jung (2011). In previous studies, Hata M. *et al.,* 2017 indicated that vasculopathic risk factors were present in 57% of AION patients. Each of these findings supports the results from our research (Hata, 2017). Research on drug history in the study found that a total of 31.43% of patients took antihypertensive drugs, 22.86% used oral hypoglycemic agents, and 6.67% received insulin treatment. A large share of patients taking part in the study (49.52%) did not regularly use any medications, despite having hypertension (52.38%) and diabetes mellitus (42.86%). It is possible that patients are not being diagnosed, are not aware of their diseases, or are not following their treatment correctly for chronic conditions. Among the current cohort, statins were prescribed for only 3.81% of people, even though 4.76% had dyslipidemia, which matches results from previous research by Solanki *et al.* (2019) in Bhopal, India, showing that lipid abnormalities were commonly ignored even when they played a role in ischemic optic neuropathies (Solanki, 2019). In 2018, a report showed that although systemic diseases were common, patients did not receive proper care, which resulted in many acute eye complications (Ijeri & Jyoti, 2018). In this study, findings of the neuroimaging of 68 patients showed that the majority of the patients, about 24.76%, had optic nerve enhancement & thickening intracranial space-occupying lesion was present in 4.76% cases, and 22.86% had normal imaging findings. However, the study of Solanki *et al.* (2016) reported that one-third of the patients with optic disc edema had non-space-occupying lesions (Solanki, 2019). The dissimilarity might be since their study was conducted in a multidisciplinary hospital and many of their study subjects were referred from the department of neurosurgery, where most of the patients were clinically diagnosed as intracranial space-occupying lesions. This finding is consistent with the study conducted by Jung *et al.* (2011). The research shows that Bangladesh and nearby areas face the same problems in access to healthcare and health-seeking patterns, showing that this is a shared issue in South Asia.

Limitation

Since this was a single-center and cross-sectional study, the findings may not apply to the whole population. Only a small number of patients were included, so information on long-term changes in vision and treatment effects is not available. In some cases, conditions affecting the body may have gone unreported because there were no clear diagnoses or patients did not realize.

CONCLUSION

This research found a clear connection between vascular issues, like hypertension and diabetes in Bangladeshi participants, and unilateral swelling of the optic disc. In the majority of cases, NAION caused the disease, resulting in severe loss of vision and specific types of visual field defects for many patients. Clinical history and laboratory findings supported each other, suggesting that microvascular problems led to optic nerve head ischemia. Almost half of the people studied did not take regular medicine for their ongoing health issues. Early identification and combined patient care help avoid unnecessary vision loss in these individuals.

Abbreviation

ODS: Optic Disc Swelling
ODE: Optic Disk Edema
NAION: Non-Arteritic Anterior Ischemic Optic Neuropathy
AAION: Arteritic Anterior Ischemic Optic Neuropathy
BCVA: Best Corrected Visual Acuity
CRVO: Central Retinal Vein Occlusion

REFERENCES

Anuradha, T. R., & Venkatesh, S. (2017). Evaluation of the causes of optic disc oedema: An observational study. *Journal of Evidence Based Medicine and Healthcare, 4*(87), 5082–5085. https://doi.org/10.18410/jebmh/2017/1016

El-Gendy, R. S., & Soliman, A.-H.-S. (2024). Unilateral papilledema with bilateral optic nerve sheath distension: A case report. *Turkish Journal of Ophthalmology, 54*(4), 240–245. https://doi.org/10.4274/tjo.galenos.2024.87243

Hata, M., & Kawamura, M. (2017). Causes and prognosis of unilateral and bilateral optic disc swelling. *Neuro-Ophthalmology, 41*(4), 187–191. https://doi.org/10.1080/01658107.2017.1299766

Hayreh, S. S. (2009). Ischemic optic neuropathy. *Progress in Retinal and Eye Research, 28*(1), 34–62. https://doi.org/10.1016/j.preteyeres.2008.11.002

Ijeri, R., & Jyoti, R. (2018). Optic disc oedema: Presentation and causes at a tertiary centre in North Karnataka. *Delhi Journal of Ophthalmology, 29*(1), 31–34. https://doi.org/10.7869/djo.373

Jung, J. J., & Baek, S.-H. (2011). Analysis of the causes of optic disc swelling. *Korean Journal of Ophthalmology, 25*(1), 33–36. https://doi.org/10.3341/kjo.2011.25.1.33

Morshed, M. G., & Mostafa, D. (2024). Prevalence of ODD in young patients diagnosed with NAION in Bangladesh and its clinical significance. *Saudi Journal of Medical and Pharmaceutical Sciences, 10*(10), 726–730. https://doi.org/10.36348/sjmps.2024.v10i10.002

Raizada, K., & Mehta, E. (2022). Non-arteritic anterior

ischemic optic neuropathy. In *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK559045/

Salvetat, M. L., Parisi, F., & Zeppieri, M. (2023). Non-arteritic anterior ischemic optic neuropathy (NA-AION): A comprehensive overview. *Vision, 7*(4), 72. https://doi.org/10.3390/vision7040072

Shah, R. K., & Lohana, S. (2017). Ocular metastasis from breast carcinoma simulating anterior scleritis: A case report. *Journal of Medical Case Reports, 1*1(1), 1416. https://doi.org/10.1186/s13256-017-1416-y

Singla, K., & Agarwal, P. (2024). Optic ischemia. In *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK560577/

Solanki, R., & Sharma, N. (2019). Impact of mountainous topography on surface-layer parameters during weak mean-flow conditions. *Taiwan Journal of Ophthalmology, 9*(1), 1–7. https://doi.org/10.4103/tjo.tjo_58_20

Stenoien, D. L., & Brady, S. T. (1999). Slow axonal transport. In G. J. Siegel, B. W. Agranoff, R. W. Albers, S. K. Fisher, & M. D. Uhler (Eds.), *Basic neurochemistry: Molecular, cellular and medical aspects* (6th ed.). Lippincott-Raven. https://www.ncbi.nlm.nih.gov/books/NBK28254/

Uddin, K. N. (2022). Non-communicable diseases (NCDs). *BIRDEM Medical Journal, 12*(1), 1–5.

Youssef, A. M., & El-Aziz, E. A. (2018). Unilateral optic disc swelling: Demographic study, ocular and systemic association. *The Egyptian Journal of Hospital Medicine, 71*(6), 3364–3367. https://doi.org/10.12816/0047276