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RESEARCH ARTICLE
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CLINICO-EPIDEMIOLOGICAL CHARACTERISTICS OF BILATERAL OPTIC DISC EDEMA IN A TERTIARY CARE CENTRE.

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Abstract
Background: Optic disc edema (ODE) is one of the most common reasons for referral to a neuro-ophthalmologist. There are various causes that require vastly different workup. Thus, differentiating among each cause is important. Our goal was to determine the causes of bilateral optic disc edema and various clinical characteristics of consecutive patients with ODE presenting to tertiary care hospital.
Methods: A prospective, descriptive study was conducted at Government medical college, Srinagar in a time period of 1 year and cases of bilateral optic disc edema presenting to the Outpatient department from November 2022 to November 2023 were included in the study. Total 44 patients with bilateral optic disc edema were included in the study. The mean age of the patients was 27.46 ± 13.97 years with the majority being female.
Results: The most common cause of disc edema was Pappiledema (61.36%).IIH was the most frequent cause (40.90%) of disc Edema followed by papillitis (20.45%), pseudopapillitis (11.36%) and ischemia (4.5%). Among the eyes affected, 78.3% had BCVA 6/6-6/18, 36.6% had color vision defect and 31.4% had reducedcontrast sensitivity. The most common visual field defect was isolated enlarged blind spot (39.7 %).
Conclusion: Increased ICP followed by hypertensive retinopathy are the most common causes of bilateral disc edema. Clinical profile of patients with IIH was an overweight female of child- bearing age with headache. Visual field examinations are essential in management and follow-up. Conditions with disc edema mainly affect the age group 21-40 years with femalesaffected 3 times more than males.

Keywords: Optic disc edema, Pappiledema, Idiopathic intracranial hypertension

Introduction:

Optic nerve swelling refers to the abnormal appearance of the intraocular portion of the optic nerve (so-called optic disc) when the nerve is elevated and its borders are difficult to ascertain [1].
Although bilateral disc swelling is often encountered in routine clinical practice, there is a lack of understanding of the etiologies of this condition. [1,2,3]

Thus, understanding the most common cause and clinical and epidemiological profile of bilateral disc swelling is thought to be crucial to its subsequent diagnosis and treatment.
The optic nerve head may swell in response to almost any insult that affects it in the intraocular, intra orbital and sometimes in the intracanalicular compartments [3]
While the term "papilledema" is often used broadly to denote a swollen optic nerve head, the term "papilledema" should be reserved for optic disc swelling that is due to raised intracranial pressure [4].
Any entity that increases intracranial pressure may lead to papilledema. These include [4,5]:
1. Intracranial mass lesions (e.g., tumor, hematoma)
2. Increased cerebrospinal fluid (CSF) pro duction (e.g., choroid plexus papilloma) 3. Decreased CSF absorption (e.g., arachnoid granulation adhesions after bacterial meningitis)
4. Obstruction of venous outflow (e.g., venous sinus thrombosis, jugular vein compression, neck surgery)
5. Idiopathic intracranial hypertension (pseudotumor cerebri) 6. Malignant hypertension: severe systemic hypertension can cause a change in the optic nerve head that resembles papilledema. Thus, all patients with bilateral disc edema should have their blood pressure measured [6].
With this in mind, we conducted a Prospective descriptive study of bilateral disc swelling in patients at Government Medical college, Srinagar in Department of Ophthalmology in an attempt to identify the etiology.

Methods:
Over a duration of one year (from November 2022 to November 2023) we identified 44 patients who were confirmed cases of bilateral optic disc edema among patients reporting to the OPD or admitted in the IPD of the department of Ophthalmology in Government medical college Srinagar. We excluded patients who had optic disc edema in one eye only. This study population included 33 females and 11 males with an average age of 27.46 ± 13.97.
The final diagnosis was judged by ophthalmologic examinations (includinglight reflex of the pupil, visual acuity, visual field, colour vision and contrast sensitivity, fundus examination and OCT/RNFL) and intracranial examinations by magnetic resonance imaging (MRI), magnetic resonance venography (MRV), or computed tomography (CT), CSF examination and lumbar puncture and consultation with the Department of Neurology or Department of Neurosurgery in Government medical college,Srinagar.

Results
In this cohort of 44 patients with bilateral optic disc edema, the most common etiology was increased intracranial pressure (ICP), observed in 61.36% of cases. Other significant causes included hypertensive retinopathy (13.6%), pseudopapillitis (11.36%), uveitis (6.8%), ischemic causes (4.5%), and bilateral optic neuritis (2.27%).
When examining the distribution of etiologies by age group, increased ICP was the most prevalent cause in all age groups. In the 0-20 years group, which comprised the smallest demographic (5 patients), the most common causes were increased ICP and papillitis. In the 21-50 years age group, which represented the majority of the study cohort (29 patients), increased ICP remained the leading cause of optic disc swelling, followed by pseudopapillitis, hypertensive retinopathy, uveitis, ischemic causes, meningitis, and meningiomas. In the >51 years age group, the etiologies were similar to those observed in the 21-50 years group, despite the age group having fewer patients (10 patients) [Table 1].

Table 1: Etiologies of Bilateral Optic Disc Edema in Different Age Groups

Disease	Age 0-20 Years	Age 21-50 Years	Age >51 Years
Increased ICP	2	18	7
Hypertensive retinopathy	0	3	3
Uveitis	1	2	0
Bilateral optic disc drusen	1	1	0
Ischemic causes	0	2	0
Bilateral myelinated nerve fibre	0	0	0
Hyperopic disc	0	1	0
Bilateral optic neuritis	1	0	0

Table 2 highlights the specific causes of idiopathic intracranial hypertension (IIH) among the patients in the study. It details the number of patients, their gender, age, associated risk factors (such as obesity and oral contraceptive pill use), and the results of imaging modalities and CSF pressure measurements. The majority of IIH patients were females, with obesity being a common risk factor, especially among those aged 21-50 years. CSF pressure levels varied from 240 to 350 mm H20, and imaging often showed an empty sella.

Table 2: Idiopathic Intracranial Hypertension (IIH) Causes by Patient Demographics

Number of Patients	Sex	Age Group	Onset Risk	MRI Findings	CSF Pressure (mm H2O)
2	Female	<20	Obesity	None	240,270
2	Male	21-50	None	Empty Sella	300,340
4	Female	21-50	OCP use	Normal	270,290,350
4	Female	21-50	None	Empty Sella (2), Normal (2)	300,350,290,350
6	Female	21-50	Obesity	Normal	260,290,270,290

Two primary risk factors identified in the study for CVST were long-term steroid use, particularly in patients with nephrotic syndrome, and the lack of a specific risk factor in other cases. The imaging modalities used included MRI and MRV, which were instrumental in confirming the diagnosis [Table3].

Table 3: Cerebral Venous Sinus Thrombosis Causes by Patient Demographics

Number of Patients	Sex	Age	Onset Risk	Imaging Modality
1	Female	55	None in particular	MRI + MRV
2	Female	59	Prolonged steroid use for nephrotic syndrome	MRI + MRV

The most common visual impairment was reduced visual acuity, which was observed in a majority of patients. Additionally, many patients presented with visual field defects, particularly in the form of an enlarged blind spot [Table 4].

Table 4: Distribution of Visual Impairments Among Patients with Bilateral Optic Disc Edema

Visual Impairment	Number of Eyes (%)
Best Corrected Visual Acuity (BCVA) 6/6 – 6/18	78.3%
Visual Field Defects (Enlarged Blind Spot)	39.7%
Color Vision Defects	36.6%
Reduced Contrast Sensitivity	31.4%

The most common etiology for bilateral optic disc edema in this study. The most prevalent lesions contributing to increased ICP were hypertensive retinopathy, followed by cerebral venous sinus thrombosis (CVST) and brain tumors. Cerebral hemorrhage, hydrocephalus, and chronic subdural hematoma were less frequently observed [Table 5].

Table 5: Frequency of Brain Lesions in Patients with Increased ICP

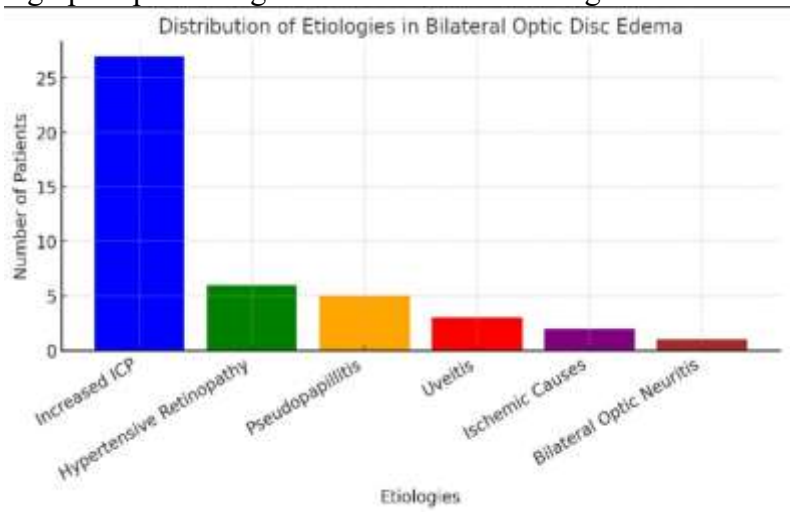
Brain Lesion	**Number of Patients (%)**
Hypertensive Retinopathy	30%
Cerebral Venous Sinus Thrombosis (CVST)	20%
Brain Tumor	20%
Cerebral Hemorrhage	10%
Non-communicating Hydrocephalus	10%
Chronic Subdural Hematoma	10%

Increased ICP was the most common cause in all age groups. However, specific etiologies varied with age. For instance, hypertensive retinopathy appeared more frequently in older patients (age >50), while younger patients (0-20 years) were more likely to have causes such as papillitis and bilateral optic neuritis [Table 6].

Table 6: Relationship Between Age Group and Etiology of Bilateral Optic Disc Edema

Disease	**Age 0-20 Years (%)**	**Age 21-50 Years (%)**	**Age >51 Years (%)**
Increased ICP	40%	62%	70%
Hypertensive Retinopathy	0%	10%	30%
Uveitis	20%	7%	0%
Bilateral Optic Disc Drusen	20%	3%	0%
Ischemic Causes	0%	7%	0%
Bilateral Myelinated Nerve Fibres	0%	7%	0%
Hyperopic Disc	0%	3%	0%
Bilateral Optic Neuritis	20%	0%	0%

Bar graph:the bar graph representing the distribution of etiologies in bilateral optic disc edema.



Discussion:

Bilateral optic disc edema refers to swelling of the optic nerve heads in both eyes, which is an important finding in clinical practice, often indicating raised intracranial pressure (ICP) or other underlying systemic conditions affecting both optic nerves. Papilledema, a specific form of optic disc

edema caused by elevated ICP, should be promptly evaluated as it can indicate serious neurological conditions such as intracranial mass lesions, cerebrospinal fluid (CSF) abnormalities, or venous outflow obstructions [7]. The findings in our study were consistent with the fact that the most common etiology for bilateral disc swelling was increased ICP (61.3%), followed by hypertensive retinopathy (13.6%), pseudopapillitis (11.36%), uveitis (6.8%), ischemic causes (4.5%), and bilateral optic neuritis (2.27%).

The predominance of increased ICP as the leading cause of bilateral disc swelling is well-documented in the literature. Elevated ICP can arise from various etiologies, including intracranial mass lesions such as tumors and hematomas, increased CSF production, impaired CSF absorption, or venous outflow obstruction [7]. In this study, the most common causes of increased ICP included hypertensive retinopathy (30%), cerebral venous sinus thrombosis (CVST) (20%), brain tumors (20%), and cerebral hemorrhage (10%). These findings align with prior studies, which have highlighted the diverse range of causes contributing to raised ICP and, consequently, bilateral disc swelling [8].

In terms of age distribution, our study identified that increased ICP was the most frequent etiology across all age groups, but certain conditions exhibited age-related patterns. For example, in the 0-20 years age group, increased ICP was frequently associated with papillitis, bilateral optic neuritis, and pseudopapillitis, which is consistent with the literature suggesting a higher incidence of idiopathic intracranial hypertension (IIH) and other inflammatory causes in younger populations. In contrast, the 21-50 years group, which comprised the majority of our cohort, had a higher frequency of hypertensive retinopathy, ischemic causes, and CVST. The higher incidence of hypertensive retinopathy and ischemic causes in this age group could reflect the increasing burden of systemic diseases such as hypertension and diabetes, which are known to affect the retina [9].

Interestingly, the 51+ years age group demonstrated similar etiologies to the 21-50 years group, although the overall prevalence of bilateral optic disc edema was lower in this group. This finding suggests that older patients with bilateral optic disc edema may present with a similar spectrum of conditions as those in the younger adult population, with the added consideration of age-related vascular changes contributing to the pathogenesis of hypertensive retinopathy and ischemic events [10].

Regarding the management and prognosis of patients with bilateral optic disc edema, the treatment approach primarily targets the underlying cause of the increased ICP. In cases of IIH, for instance, weight management, diuretics such as acetazolamide, and, in some cases, surgical interventions such as optic nerve sheath fenestration or ventriculoperitoneal shunt placement, may be employed to relieve the raised ICP [11]. For conditions like CVST and brain tumors, appropriate neurological interventions, including anticoagulation therapy and tumor resection, are critical for managing ICP and preventing further optic nerve damage.

In our study, the management involved a multidisciplinary approach, including ophthalmologic examinations, MRI/MRV imaging, CSF analysis, and consultation with neurology or neurosurgery departments. This comprehensive evaluation is crucial in identifying the underlying etiology and formulating an effective treatment plan to manage bilateral optic disc edema and prevent complications such as permanent vision loss.

The findings of this study provide a valuable insight into the etiology of bilateral optic disc edema in a local cohort, emphasizing the importance of early detection and appropriate diagnostic evaluation. Understanding the diverse range of potential causes of bilateral optic disc swelling allows clinicians to better manage these patients and address the underlying causes promptly.

Conclusion:

The most common etiology for bilateral discswelling is therefore, raisedintracranial pressure, but it can also be triggered by a variety of other causes. When attempting todiagnose the etiology of bilateral disc swellingpatients should be immediately examined for the possible influence of other diseases which increase intracranial pressure.

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