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## Original Research Article

## Presentation and causes of optic disc oedema at a tertiary centre in Rajasthan

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## ABSTRACT

**Aims:** The purpose of this study was to assess the causes of optic disc oedema and their systemic associations and to study the various clinical presentations of optic disc oedema.

**Methodology:** This is a retrospective observational study which was conducted at Department of Ophthalmology, JLN Medical College, Ajmer. All patients who reported to OPD with Optic disc oedema during the study period (February 2020 to August 2021) were evaluated. Complete ophthalmic examination included visual acuity, anterior segment examination using slit lamp, fundus examination using direct and indirect Ophthalmoscope and 90 Dioptre lens, B-scan for optic nerve sheath diameter (ONSD) and OCT for retinal nerve fibre layer thickness (RNFL) measurement. fundus photography was also done. Investigations like complete blood test, Visual field testing using perimetry, computed tomography scan and magnetic resonance imaging were done as and when indicated.

**Results:** Total 80 optic disc oedema cases were included in our study. Out of 80 cases, 44(55%) and 36(45%) were males and females respectively. Different causes of optic disc oedema were found to be papilloedema 48 cases (60%), optic neuritis 13 cases (16.25%), NA-AION 9 cases (11.25%), CRVO 3 cases (3.75%), diabetic papillopathy 2 cases (2.5%), traumatic optic neuropathy 2 cases (2.5%) respectively. In 3 cases (3.75%) cause could not be detected (idiopathic).

**Conclusion:** The most common cause was papilloedema, followed by optic neuritis and NA- AION.

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## 1. Introduction

Optic disc oedema is optic disc swelling which is diagnosed by ophthalmoscopy, caused by increase in CSF pressure in optic nerve sheath. It causes stasis of axoplasmic flow in surface nerve fibre layer and prelaminar region of optic nerve and causes swelling of optic nerve fibres leading to optic disc oedema. Unilateral or bilateral disc oedema may be found. Most frequently found causes of unilateral optic disc oedema are optic neuritis, NA-AION, CRVO, compressive optic neuropathy, diabetic papillopathy, traumatic optic neuropathy and bilateral disc

oedema were caused due to papilloedema, infiltrative optic neuropathy, toxic optic neuropathy, and malignant hypertension.<sup>1</sup>

For identification of various causes of disc oedema, detailed history taking, complete ocular examination and workup, including both anterior and posterior segment is required. Determining the type of optic disc oedema is necessary for proper management of optic disc oedema and whether it is true oedema or pseudopapilloedema and is it due to increased intracranial tension or another cause<sup>2</sup>. The complications are less if the disease is diagnosed in the early stage.

Von Gräfe, in 1860 found that papilloedema occurs due to axoplasmic flow alteration resulting in intra-axonal

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oedema in the area of optic nerve.<sup>2</sup> When CSF pressure increases, it is transmitted to the optic nerve sheath, and this compressive force causes decreased axoplasmic transport, due to which there is optic disc oedema. Signs and symptoms of raised intra cranial tension such as headache, vomiting, blurring of vision, eye pain, diplopia and paresis of sixth nerve are present. On ophthalmoscopy hyperaemic disc, blurred disc margins, retinal nerve fibre layer oedema, and absence of spontaneous venous pulsation helps in confirming the diagnosis. In OCT imaging increased RNFL thickness in all quadrants is present in optic disc patients as compared to normal individuals.<sup>3,4</sup>

In this geographical area in Rajasthan, no such study was done on the causes and clinical presentation of disc oedema, therefore this study was done aiming to determine the clinical presentations and causes of disc oedema in this particular area. Occasionally there is confusion in identifying the cause when the finding is only disc oedema.

## 2. Aims and Objectives

1. To identify causes of optic disc oedema, affected age group, sex distribution, associated systemic diseases & risk factors if any.
2. To know the various clinical presentation of optic disc oedema.

## 3. Materials and Methods

This retrospective observational study was conducted at Department of Ophthalmology, JLN Medical College, Ajmer after taking permission from review board of our institution. All patients who reported to OPD with Optic disc oedema during the study period (February 2020 to August 2021) were evaluated. 80 patients with optic disc oedema were included in this study. One eyed patients, pregnant females and patients aged <2yr were excluded from this study. Complete ophthalmic examination included visual acuity, pupillary reaction, colour vision, anterior segment examination using slit lamp, fundus examination using direct and indirect ophthalmoscope and 90 Dioptre lens, B-scan for optic nerve sheath diameter (ONSD) and OCT for retinal nerve fibre layer thickness (RNFL) measurement. Fundus photography and fundus fluorescein angiography (FFA) were also done. Investigations like complete blood test, Visual field testing using perimetry, computed tomography scan and magnetic resonance imaging were also done as and when needed.

## 4. Results

80 patients were included in this study. Among 80 patients, 44 (55%) were males and 36 (45%) were females. Patient's mean age was  $39.76 \pm 17.43$  years. More commonly affected cases were of 21-60 years age group (Figure 1). 3(3.75%) cases were within the age group of 3-10 years.

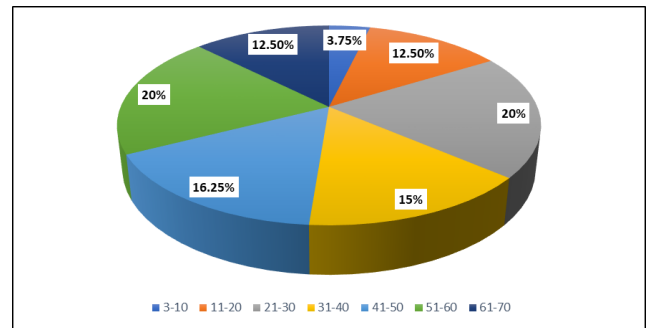


Fig. 1: Age distribution in discoedema cases

The most common cause of optic disc swelling in our study was papilloedema which was seen in 48 cases followed by optic neuritis (ON) seen in 13 cases and nonarteritic anterior ischemic optic (NA-AION) neuropathy seen in 9 cases. CRVO was seen in 3 cases, diabetic papillopathy and traumatic optic neuropathy was seen in 2 cases each (Figure 2). Cause could not be found (idiopathic) in 3 cases.

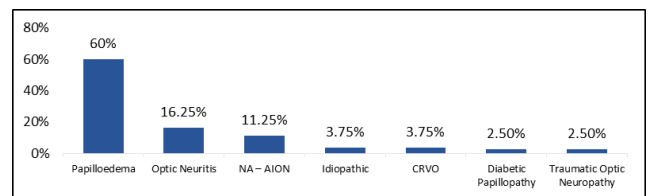


Fig. 2: Causes of disc oedema

Unilateral and bilateral disc oedema was seen in 29 (36.25%) and 51 (63.75%) cases respectively. 94.11% had papilloedema and 1.96% had diabetic papillopathy in cases of bilateral disc oedema. Cause could not be found (idiopathic) in 3.92% cases. (Figure 3) Among unilateral cases 44.82% had Optic neuritis followed by NA-AION (31.03%), CRVO (10.34%), traumatic optic neuropathy (6.89%), diabetic papillopathy (3.44%) and idiopathic (3.44%). (Figure 4)

Of papilloedema cases 27.08% had malignant hypertension, 20.83% had meningitis, 16.66% cases had Intracranial space occupying lesion, 12.5% had idiopathic intracranial hypertension whereas least number of cases were of obstructive hydrocephalus, Intracerebral haemorrhage and nutritional anaemia. (Figure 5)

Colour vision was found to be impaired in 15 patients (18.75%) and normal in 65 patients (81.25%). Pupillary reaction was observed to be normal in 73.75% cases. RAPD was present in 22.5% cases. In 3.75% cases pupil was sluggish reactive. In our study diminution of vision was main complaint. Headache and ocular pain were also complained apart from decreased vision. In 55(68.75%) cases vision was diminished. Diminished

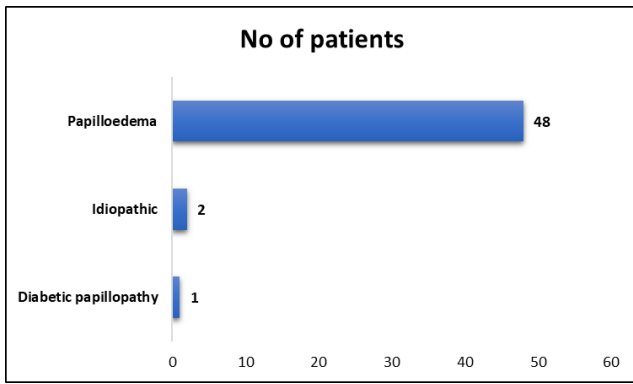


Fig. 3: Causes of bilateral disc oedema

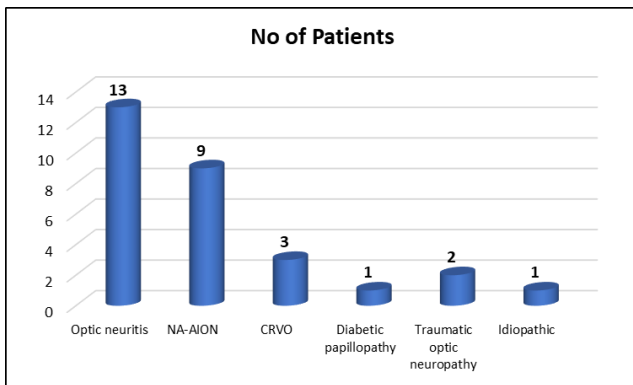


Fig. 4: Causes of unilateral disc oedema

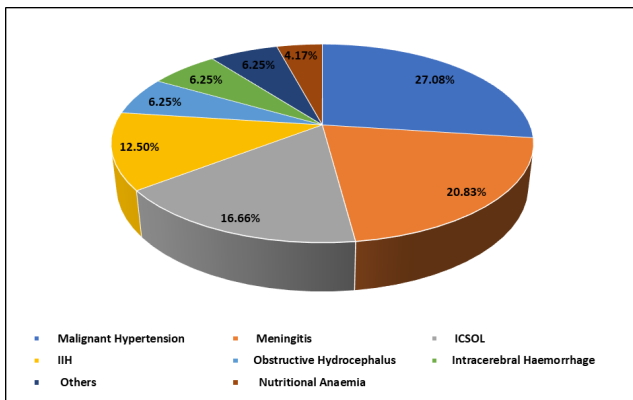


Fig. 5: Causes of papilloedema

vision was seen in nearly all patients of optic neuritis, CRVO, NA-AION, traumatic optic neuropathy and diabetic papillopathy. Papilloedema cases most commonly presented with headache (35%). In 13 (16.25%) cases ocular pain was seen. It was present only in cases of optic neuritis. Diplopia was seen in 2.5% cases which was present in papilloedema patients.

Increased intraocular pressure was present in 66.67% subjects of CRVO. Inferior visual field defect was seen in

cases of NA-AION.

Systemic illness was associated with all patients of diabetic papillopathy (100%) followed by CRVO (66.67%), NA-AION (55.55%), papilloedema (39.58%) and optic neuritis (15.38%). Hypertension was most commonly present in papilloedema cases and diabetes was most commonly present in disc oedema due to diabetic papillopathy and CRVO.

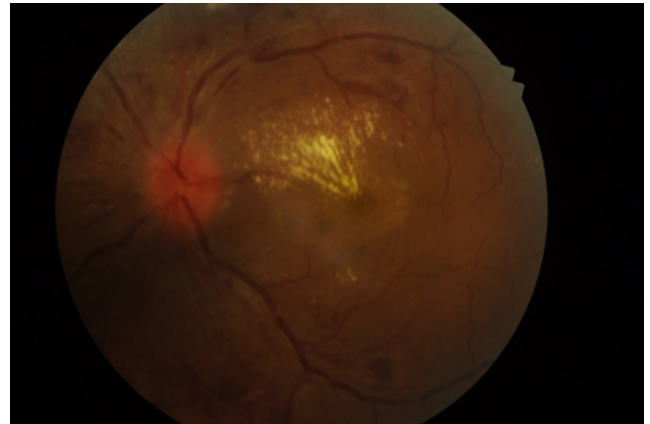


Fig. 6: Hypertensive retinopathy

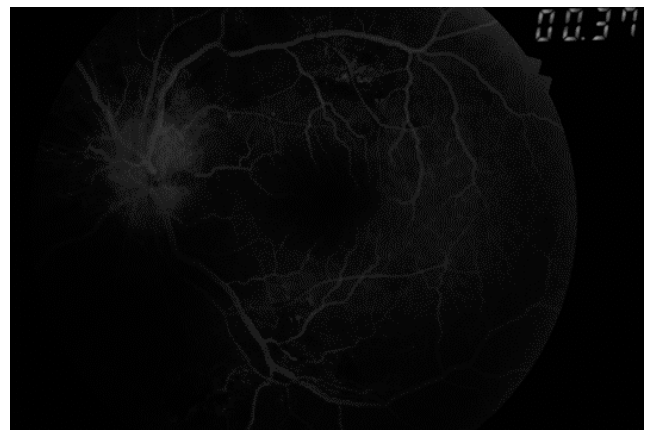


Fig. 7: Late arteriovenous phase showing increased fluorescence at disc and dilatation of disc capillaries, disc margins are blurred

## 5. Discussion

Optic nerve compression is caused by several reasons, due to which there is disturbance in normal axoplasmic transport and it causes swelling of optic disc. When optic disc swelling is associated with clinical features of increased intracranial pressure, it is called as papilloedema. Term disc oedema can be used, when it is not because of increased intracranial pressure.

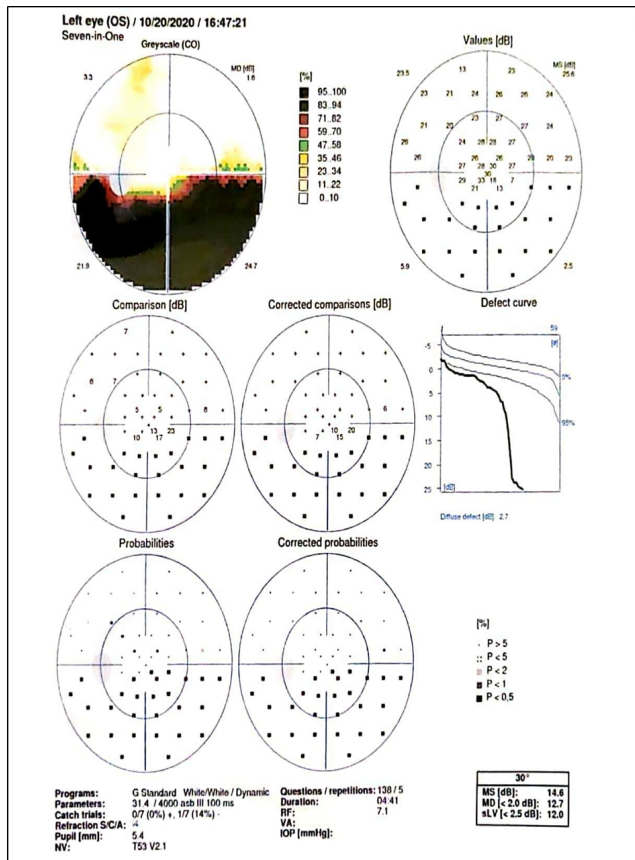


Fig. 8: Inferior Altitudinal field defect present in NA-AION

5.1. Pathogenesis

Increased CSF pressure in optic nerve sheath causes stasis of axoplasmic flow in surface nerve fibre layer and prelaminar region of optic nerve and causes swelling of optic nerve fibres and it leads to optic disc oedema. It may be because of mechanical and vascular causes.<sup>4</sup>

Present study was conducted at Department of Ophthalmology, JLN Hospital, Ajmer, Rajasthan. Purpose of the study was to assess causes and clinical presentation of patients of disc oedema. 80 cases of disc oedema were evaluated. Purpose of study was explained to them and informed consent was taken. 21-60 years age group was most commonly affected age group. 71.25% cases belong to this age group.

A prospective study on disc oedema was done by Solanki et al.<sup>5</sup> 50 patients in which 42% and 58% were male and female respectively were enrolled for their study. Age group which was affected most commonly 11-20 years. Unilateral disc oedema was seen in 30% cases. Bilateral disc oedema was seen in 70% patients of their study.

Predominantly male population (55%) was affected in our study. These results were similar to the study done by Distelmaier F et al<sup>6</sup> & Gandhi U et al<sup>8</sup>. Higher number of males were also observed in their studies.

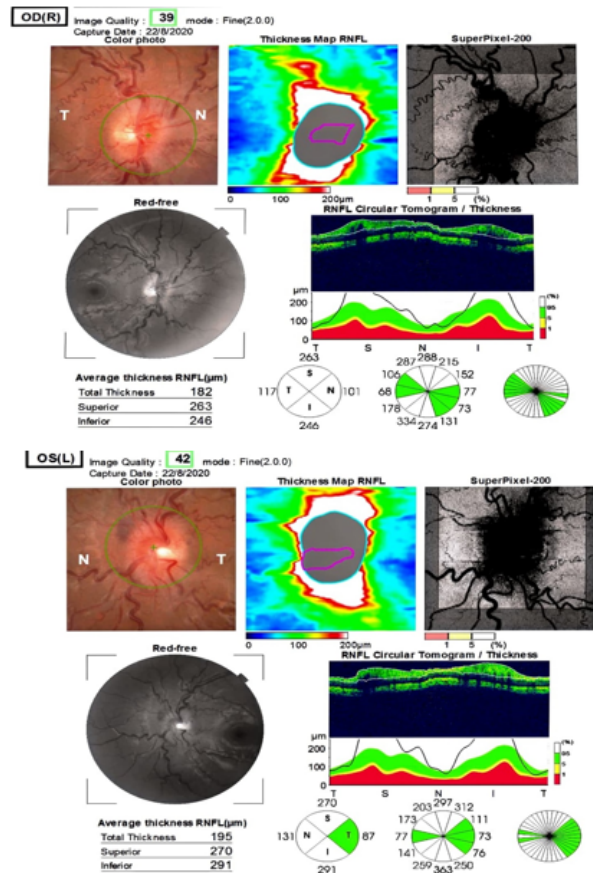


Fig. 9: OCT images showing increased RNFL thickness in Papilloedema

Papilloedema followed by optic neuritis, NA-AION, CRVO, Traumatic optic neuropathy and diabetic papillopathy were found as a cause of disc oedema in our study. In bilateral cases most common cause of optic disc oedema was papilloedema and in unilateral cases optic neuritis was main cause of disc oedema.

Papilloedema was seen in 48 cases. The causes for papilloedema were malignant hypertension, meningitis, intracranial space occupying lesion, idiopathic intracranial hypertension, intracranial haemorrhage, obstructive hydrocephalus and nutritional anaemia.

In 13 cases optic neuritis was diagnosed as a cause of disc oedema. These cases complained of diminution of vision and ocular pain. In optic neuritis treatment trial (ONTT) ocular pain was present in 90% of patients, which is almost similar to our study. In our study 100% patients with optic neuritis complained of ocular pain.<sup>7</sup>

In our study, NA -AION was also present. In earlier studies it was not as common. Optic disc oedema in NA-AION is due to decrease in blood supply in axons and capillary leakage in the optic nerve head.<sup>8</sup>

Systemic illness was associated with all patients of diabetic papillopathy (100%) followed by CRVO (66.67%), NA-AION (55.55%), papilloedema (39.58%) and optic neuritis (15.38%). Hypertension was most commonly present in papilloedema cases and diabetes was most commonly present in disc oedema due to diabetic papillopathy and CRVO.

## 6. Conclusion

If a patient with optic disc swelling presents to ophthalmology clinic, careful history, general and complete ophthalmological workup, with necessary investigations like CT, MRI (if needed, depending upon the cause of disc oedema) should be performed for each and every case of disc oedema.

Papilloedema, optic neuritis (ON) and nonarteritic anterior ischaemic optic neuropathy (NA-AION) were the commonest causes of disc oedema in this study. Most of the patients presented with bilateral disc oedema. Male preponderance was observed. Most frequent presentation were decreased vision and headache. In most of the cases of optic neuritis and NA-AION abnormal colour vision was found.

## 7. Limitations

As our study was a single institutional study involved with small sample size and were analysed in short duration, studies involving larger sample size, longer time duration and multi-institutional study would be required for better evaluation of clinical presentation and causes of disc oedema.

## 8. Source of Funding

None.

## 9. Conflict of Interest

None.

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