

# Evaluation of Etiological Factors and Visual Field Defects in Patients with Papilloedema

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## ABSTRACT

**Introduction:** Papilloedema is defined as edema of the optic disc or nerve head due to raised intracranial pressure. The aim of this study was to evaluate the etiological factors and to analyze the visual field defects in patients with papilloedema.

**Material and methods:** Prospective study of 50 patients with papilloedema over a period of 2 years between 2012 and 2014 was done in the Department of Ophthalmology NRI Medical College and General Hospital, ChinnaKakani, Guntur. Neuroimaging was done in all the cases. Visual fields evaluation was done with computerized automated perimeter.

**Results:** Among the 50 cases, 19 were males and 31 were females. The mean age in the present study was 29.5 years. There were 19 cases of papilloedema due to vascular causes. There were 12 cases of papilloedema due to inflammatory causes. Idiopathic Intracranial Hypertension was seen in 10 cases. Papilloedema due to intracranial tumors was recorded in 9 cases.

In the present study, the most common visual field defect recorded was enlargement of blind spot in 28 cases. Normal visual fields were recorded in 17 cases.

**Conclusion:** The diagnosis of papilloedema requires prompt workup to rule out serious pathologies. Permanent visual loss can be prevented by early diagnosis and treatment. Serial visual field examinations are required to monitor the progression of papilloedema and to determine the course of management. Because visual loss is reversible if treatment is begun before the onset of optic disc changes associated with chronic papilloedema.

**Keywords:** Papilloedema, Visual Field Defects, Enlargement of blind spot, Idiopathic Intracranial Hypertension (IIH).

## INTRODUCTION

Papilloedema is defined as edema of the optic disc due to raised intracranial pressure. Optic nerve is enclosed within the meningeal sheaths common to the brain. Subarachnoid and subdural spaces around the nerve are freely continuous with those around the brain. Any rise in the intracranial pressure becomes equally evident around the nerve.<sup>1</sup>

Experimentally this was proved in a successful animal model developed by Hayreh. He produced papilloedema in monkeys by slowly inflating a balloon that had been placed in the subarachnoid space within the skull, thus simulating a space occupying lesion. Later he demonstrated the regression of the papilloedema on the same animal model by opening the dura and arachnoid around the optic nerve on one side. This forms the basis of the surgery for relieving the papilloedema (optic nerve sheath fenestration).<sup>2,3</sup>

The common causes of papilloedema are intracranial tumors or space occupying lesions, Idiopathic intracranial hypertension (pseudo tumor cerebri), decreased cerebrospinal fluid drainage (eg, venous sinus thrombosis, inflammatory processes, meningitis, subarachnoid hemorrhage) and increased production

of CSF due to tumors.

Symptoms of papilloedema are headache that is worse on waking up and is exacerbated by coughing, nausea and vomiting, transient obscurations of vision, poor color perception, flickering sensation and diplopia.

Fundus signs of papilloedema are blurring of the margins of the optic disc, filling of the optic cup, folds in retina and choroid, venous congestion, splinter hemorrhages, cotton-wool spots, absence of venous pulsations, hyperemia of the optic nerve head and hard exudates forming a macular fan or a star.<sup>4</sup>

The most common causes of papilloedema are Intracranial tumors arising from midbrain, parieto occipital region and cerebellum. Pseudo tumor cerebri (PTC) is also known as Idiopathic Intracranial Hypertension (IIH). It causes raised intracranial pressure in the absence of intracranial space occupying lesion. Lumbar puncture shows normal CSF and high opening pressure. Obese young women are the most commonly affected. IIH is usually idiopathic. Drugs such as Tetracycline, Nalidixic acid, Vitamin A, Steroids and contraceptive pills may produce IIH.<sup>4</sup>

When papilloedema is diagnosed in funduscopy further evaluation with a CT or MRI of the brain is performed. Ultrasound is used to measure optic nerve sheath diameter for detection of increased intracranial pressure when fundus is not visualized.<sup>5</sup>

Enlargement of the blind spot is the most common visual field defect seen in the patients with papilloedema.<sup>6</sup> Enlargement of the blind spot is due to hyperopia and detachment of peripapillary retina and choroidal folds. Defects from choroidal folds results from an angular misalignment of photoreceptors. (Stiles-Crawford effect).<sup>7</sup> Constriction of the visual field is a late sign which occurs in chronic papilloedema as it progresses to optic atrophy.

Medical treatment usually consists of diuretics, especially carbonic anhydrase inhibitors and, in cases of IIH, weight reduction and repeated lumbar punctures. Optic nerve sheath decompression or lumboperitoneal shunt is done in cases where papilloedema is not controlled by medical management.<sup>8</sup> The present study aimed to evaluate the etiological factors and to analyze the visual field defects in patients with papilloedema.

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## MATERIAL AND METHODS

The study was approved by the institutional ethics committee and chairman has given ethical clearance for the study. Informed consent was obtained from all the patients after explanation of the nature of the study.

50 Cases of papilloedema, who reported the OPD of Department of Ophthalmology, were included in this study. The study was conducted in the Department of Ophthalmology, NRI Medical College and General Hospital between the period October 2012 and October 2014. Complete history, detailed fundus examination, visual acuity, color vision, MRI brain were done. The etiological pattern of papilloedema in different age groups was analyzed. Visual fields examination with computerized automated perimetry was done in 46 cases and in four patients fields were not recorded because of very young age. Visual field defects in papilloedema were evaluated.

### Inclusion Criteria

All patients presenting with disc edema due to raised intracranial pressure.

### Exclusion Criteria

- All patients presenting with disc edema due to other causes (i.e. non-cerebral causes).
- All patients having blurring of disc margins but due to pseudopapilloedema.

## STATISTICAL ANALYSIS

A master chart was designed for the data collected during the study period. Statistical analysis of the obtained data was done using descriptive statistics. The mean of the ages of 50 patients was calculated. The number of cases and the average values were calculated in each group.

Etiology	Number of cases	Percentage
Vascular	19	38
Inflammatory	12	24
IIH	10	20
Intracranial tumours	9	18
Total	50	100

**Table-1:** Etiology of papilloedema in the present study

Age group (in years)	Tumors	Vascular	Inflammatory	IIH	Total
0-10	1	1	3	0	5
11-20	1	0	2	3	6
21-30	1	6	3	2	12
31-40	2	6	3	3	14
41-50	4	5	1	2	12
51-60	0	1	0	0	1

**Table-2:** Etiology with respect to different age groups

	Vascular causes	Number of cases	Percentage
1.	Subdural hematoma	7	14%
2.	Cavernous sinus venous thrombosis (CSVT)	6	12%
3.	Grade 4 hypertension	6	12%
	Total	19	38%

**Table-3:** Vascular causes of papilloedema

## RESULTS

In the present study, the age group ranged from 2 years to 57 years. Maximum number of patients belonged to the fourth decade (28%). Among the 50 cases, 19 (38%) were males and 31 (62%) were females. A total of 49 (98%) bilateral cases and 1 (2%) unilateral case comprised the study.

### Etiology of papilloedema in the present study

The most common cause of papilloedema in this group was due to vascular causes which were recorded in 19 cases (38%). Papilloedema due to inflammatory causes was seen in 12 cases (24%). IIH was seen in 10 cases (20%). Papilloedema due to intracranial tumours was recorded in 9 cases (18%) (Table-1).

### Etiology with respect to different age groups

In the present study, most of the patients with tumours belonged to fourth decade. Vascular causes were seen between 21-50 years. Inflammatory causes were seen between 2-40 years. IIH was seen between 11-50 years (Table-2).

### Vascular causes of papilloedema

There were 19 cases of papilloedema due to vascular causes. Among these 19 cases, subdural hematoma was seen in 7 cases (14%). CSVT was seen in 6 cases (12%). Grade 4 hypertension was seen in 6 cases (12%) (Table-3)

### Inflammatory causes of papilloedema

There were 12 cases of papilloedema due to inflammatory causes. Among these 12 cases, Meningoencephalitis with septicemia was seen 7 cases (14%). TB meningitis was seen in 5 cases (10%)

### Tumours causing papilloedema

Papilloedema due to intracranial tumours was recorded in 9 cases (18%). Infratentorial tumours were seen in 5 cases, Supratentorial tumours were seen in 4 cases.

### Visual field changes in papilloedema

Visual fields examination with computerized automated perimetry was done in 46 cases and in four patients fields were not recorded because of very young age. In the present study, the most common visual field defect recorded was enlargement of blind spot which was recorded in 28 cases (56%). Normal visual fields were recorded in 17 cases (34%) (Table-4).

Visual field	Number of cases	Percentage
Enlargement of blind spot	28	56%
Concentric constriction of field	1	2%
Normal	17	34%
Could not be done due to small age group	4	8%

**Table-4:** Visual field changes in papilloedema

## DISCUSSION

The results obtained in our study are comparable to other studies. Enlargement of the blind spot was the most common visual field defect recorded in present study. Similar results were recorded by other investigators like Grehn F et al<sup>6</sup> Corbett JJ and et al<sup>8,13</sup> and Wall. M et al<sup>10</sup> (Table-4).

Early treatment and resolution of papilloedema leads to complete visual recovery. Long standing or severe papilloedema may result in bilateral optic nerve dysfunction and secondary optic atrophy.<sup>9</sup> This leads to irreversible visual loss, constriction of visual fields and poor colour vision.

In addition to papilloedema and the potential for visual loss, increased intracranial pressure can cause other signs and symptoms. After complete treatment of papilloedema, there occurs no permanent visual loss but it is important to continue consultations with the ophthalmologist until the papilloedema goes away because chronic papilloedema may lead to blindness. The visual field defects are reversible in early papilloedema and irreversible in cases having chronic papilloedema.<sup>10</sup>

The prognosis for papilloedema is largely dependent on the cause. Most patients who have metastatic brain tumors have bad prognosis; those who have ventricular obstructive disease may need shunting. Patients who have IIH usually can be managed by diuretics and serial lumbar punctures.<sup>11,12</sup> The diagnosis of papilloedema requires a prompt work-up to rule out serious pathologies. Neurological, neurosurgical, or neuroradiological consultation is required. Once the problem has been reduced to that of papilloedema only, the ophthalmologist can best determine how aggressive the course of management needs to be. Permanent visual loss occurs in around 50% of cases of IIH.<sup>9</sup> Visual loss is reversible if treatment is begun before the onset of the optic disc changes of chronic papilloedema. Patients with papilloedema should be monitored carefully with frequent perimetric testing.<sup>13</sup> Concentric contraction of the visual field may be reversible but usually it becomes worse in spite of neuro-surgical procedure and this visual loss is permanent.<sup>14</sup>

## CONCLUSION

On detection of papilloedema urgent neurological workup is important to save life or vision. Visual field testing should be done to diagnose axonal damage in the optic nerve even before the visual acuity decreases. A multidisciplinary approach is mandatory. A team work is needed by the Ophthalmologist, Neurophysician and Neurosurgeons for carefully monitoring of visual acuity, visual fields and color vision.

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