

## Etiology of Papilledema and Visual Outcome Following Treatment – A Prospective, Observational Study

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### Abstract

**Background:** Papilledema is an ophthalmic emergency which requires immediate medical attention. Most patients with elevated intra-cranial pressure (ICP) present to ophthalmologist with headache, nausea, vomiting, abducent nerve paresis, transient obscuration of vision (TOV). Papilledema serves as an important indicator and warning signal of intracranial pathology and needs timely intervention.

**Materials and Methods:** An observational study of 50 patients with Papilledema was done. All patients were between 10 to 60 years, clinically diagnosed as papilledema were included in the study.

**Results:** In the present study of 50 patients, females were more than males. The maximum number of patients belonged to 21- 40 years age group ( 56%) followed by 11-20 years (16%) age group. Intracranial space occupying lesions (52%) was most common cause of papilledema followed by idiopathic intracranial hypertension (18%).

**Conclusions:** Papilledema occurs more commonly in the age group of 21- 40 years, females were affected more than males. Intracranial space occupying lesions (52%) was most common cause of papilledema followed by idiopathic intracranial hypertension (18%). Visual prognosis depends upon the history, stage of papilledema, duration, timely intervention and early management.

**Keywords:** Papilledema, Intra Cranial Space Occupying Lesions, Idiopathic Intra Cranial Hypertension, Visual Acuity.

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### Introduction

Papilledema is one of the Neuro-Ophthalmic emergencies which requires immediate medical attention. Patients present with signs and symptoms of raised intracranial pressure such as headache,

nausea, vomiting, transient obscuration of vision and abducent nerve paresis. Papilledema serves as a warning sign of an intracranial pathology and needs timely intervention.

Papilledema is defined as a non-inflammatory passive edema of the optic nerve head due to raised intracranial pressure which is almost always bilateral. Paton and Holmes in 1911 differentiated the terms, Papilledema as a passive edema due to raised intracranial pressure without primary inflammatory changes and often without disturbance of function and Optic neuritis as swelling of the disc associated with inflammation and loss of function. The term papilledema carries neurological and neurosurgical association. Longstanding cases result in bilateral optic nerve dysfunction because of compromised axonal integrity. In K.Vengala Rao et al's study<sup>[1]</sup>, 110 cases were evaluated for the cause of papilledema, 16 were due to Idiopathic Intracranial Hypertension ( IIH ) and 21 were due to Tuberculous meningitis, and the rest 73 cases were intracranial space occupying lesions. In Howden et al.'s study<sup>[2]</sup> the mechanical theory postulates that elevated Intra Cranial Pressure ( ICP ) causes direct compression of axons. The high ICP compresses the Optic nerve at its junction with the globe and distends its pre laminar axons as their axoplasm piles up at the scleral lamina. Sinclair A J et al's study<sup>[3]</sup> (2011) reported a reduction in Cerebro Spinal Fluid (CSF) pressure in IIH patients treated with a 425 calorie per day diet for 3 months. Thus, these authors demonstrated that weight loss effectively reduces not only headache but also Intra Cranial Pressure.

Papilledema is of varied etiology, management of these patients requires close collaboration between different specialties. Visual prognosis depends on the early diagnosis, identification of causative factors and specific modalities of management.

Hence this study was taken to identify etiology of papilledema and various factors involved in the visual outcome of the patients following treatment.

## Aim and Objectives

To study the etiology of papilledema and to assess visual outcome following treatment

## Materials and Methods

A cross sectional, prospective, observational study of 50 cases enrolled with Papilledema was done from December 2017 to August 2019 in the Department of Ophthalmology, Rangaraya Medical College, Government General Hospital, Kakinada, East Godavari District of Andhra Pradesh, India.

**Inclusion Criteria:** All the male and female patients between 10 to 60 years clinically diagnosed as papilledema were included in the study.

**Exclusion Criteria:** Mentally challenged and uncooperative patients were excluded from the study.

Informed consent was taken from all the patients. Demographic data regarding age, gender, place, income, education, occupation and presenting complaints were recorded. Most of the cases presented with headache and vomiting. Some had transient visual obscurations (TOV) and abducent nerve paresis.

Best Corrected Visual Acuity (BCVA) was tested by Snellen's chart (distant), Jaegger's chart (near) and Ishihara chart for colour vision.

Thorough anterior segment examination was done by using slit lamp biomicroscopy and pupillary reactions were noted. Fundus examination was done with direct and indirect ophthalmoscope and with a + 90 D lens using a slit lamp. Fundus pictures were taken with a Canon fundus camera. Visual fields were recorded with Humphreys field analyser.

A thorough systemic examination was done especially central nervous system to find out any associated neurological abnormalities. Routine blood investigations were done which includes -

hemoglobin, total counts, differential count, erythrocyte sedimentation rate, fasting blood sugar, post prandial blood sugar.

Relevant Radiological investigations were done including X-ray. Chest PA view, X-ray Skull, CT scan and MRI brain. In selective cases CSF analysis and MR Venography were done. Patients were followed up weekly for a month, monthly for 3 months and 6 monthly for one and half year. Fundus changes and visual parameters were assessed at every visit.

### Statistical Data Analysis

**Gender:** In the present study out of 50 patients 27 patients (54%) were females and 23 patients (46%) were males.

**Age:** 15 patients ( 30 % ) belonged to 21-30 years age group, followed by 31- 40 years were 13 patients (26%), 11-20 years were 8 patients (16%), 41-50 years and 51-60 years age group were 7 patients (14%) each.

**Etiology:** In present study 26 patients (52%) with papilledema had intracranial space occupying lesions (ICSOLS) and 8 patients (16%) had meningitis, 9 patients (18%) had idiopathic intracranial hypertension, 7 patients (14%) had Grade IV hypertensive retinopathy.

**Visual Acuity at Admission:** In the study 25 patients (50%) of papilledema had visual acuity between 6/6 and 6/12 and 15 patients (30%) had 6/18-6/36 visual acuity, 10 patients (20%) had visual acuity less than 6/60 – No perception of light (No PL ).

**COLOR VISION:** In the study, only 2 patients (4%) had defective colour vision and the remaining 48 patients (96%) had normal colour vision

**Visual Fields:** In the study, the visual field pattern was assessed, 8 cases (16%) had normal visual field pattern. 7 cases (14%) had only blind spot enlargement. 16 cases (32%) had defective visual field pattern which includes peripheral field constriction, caecocentral scotoma and homonymous hemianopia. 19 cases (38%) were not cooperative for visual field testing.

**Stage of Papilloedema:** In the present study, 19 patients (38%) presented to us at early stage of papilloedema, 25 cases (50%) presented at established stage and 5 cases (10%) presented at chronic stage. One case (2%) presented with atrophic stage.

**Visual Outcome Following Treatment:** In this study, post-treatment visual outcome was good in medically as well as surgically managed patients. Visual outcome is particularly good in Idiopathic Intracranial Hypertension (IIH) patients.

Pre-treatment Visual Acuity in log MAR was 0.50 +/- 0.31 which changed to 0.15 +/- 0.18 post-treatment. There was significant improvement in visual acuity following treatment.

### Results

In our study out of 50 patients 27 patients (54%) were females and 23 patients (46%) were males.

In our study 26 patients (52%) with papilledema had intracranial space occupying lesions, 8 patients (16%) had meningitis, 9 patients (18%) had idiopathic intracranial hypertension, 7 patients (14%) had grade IV hypertensive retinopathy. (Table 1)

**Table 1: Etiology of Papilledema**

Etiology of Papilledema	No. of cases	Male	Female
Intracranial space occupying lesions (ICSOLS)	26	12	14
Idiopathic intracranial hypertension (IIH )	9	2	7
Tuberculous meningitis	8	4	4

Hypertensive retinopathy (grade IV)	7	5	2
	50	23	27

In the study 25 patients (50%) of papilledema had best corrected visual acuity at admission between 6/6 and 6/12 and 15 patients (30%) had 6/18-6/36 visual acuity, 10 patients (20%) had visual acuity less than 6/60 – No perception of light and showed no improvement with glasses. (Table 2)

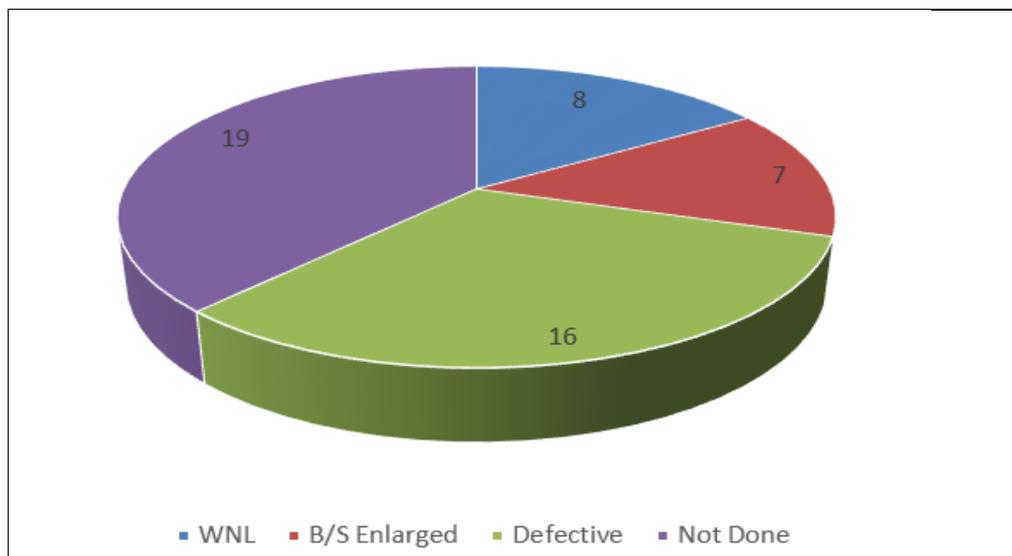
**Table 2: Best corrected visual acuity ( BCVA ) at admission**

BCVA (Best Corrected Visual Acuity)	No. of cases
6/6 -6/12	25
6/18-6/36	15
6/60-Counting fingers 1 mt	8
Counting fingers < 1 mt- Perception of light+	1
No Perception of light	1
Total	50

In the study, only 2 patients (4%) had defective colour vision and the remaining 48 patients (96%) had normal colour vision.

In the study, the visual field pattern was assessed, 8 cases (16%) had normal visual field pattern. 7 cases(14%) had only blind

spot enlargement. 16 cases (32%) had defective visual field pattern which includes peripheral field constriction, caecocentral scotoma and homonymous hemianopia. 19 cases (38%) were not cooperative for visual field testing.



**Figure 1: Visual Fields**

In the present study, 19 patients (38%) presented to us at early stage of papilloedema, 25 cases (50%) presented at established stage and 5 cases (10%)

presented at chronic stage. One case ( 2% ) presented with atrophic stage.

In this study 29 (58%) patients were managed under medical therapy and 20

(40%) patients underwent surgical treatment whereas one case was referred to radiotherapy. 12 patients (24%) were treated by anti-tubercular medication and 7 patients (14%) with anti-hypertensive medication. Anti-epileptics and anti-coagulants were given to 5 cases (10%) and steroids and oral acetazolamide was advised for 5 cases (10%). 13 patients (26%) underwent excision of tumor, 4 (8%) patients underwent shunt procedures

and 3 (6%) patients were treated by temporal burr hole procedure. One case required radiotherapy.

In this study, post-treatment visual outcome was good in medically as well as surgically managed patients. Pre-treatment Visual Acuity in log MAR was 0.50 +/- 0.31 which changed to 0.15 +/- 0.18 post treatment. There was significant improvement in visual acuity following treatment. (Table. 3)

**Table 3: Best Corrected Visual Acuity after Treatment**

Etiology	VA -Pre-Treatment	No. of Cases	VA Posttreatment	No. of Cases
ICSOLs	6/6-6/12	7	6/6-6/12	24
	6/18-6/36	12	6/18-6/36	1
	6/60-CF 1mtr	6	6/60-CF 1mtr	1
	CF1mtr- PL+	1	<CF 1mtr- PL+	
IIH	6/6-6/12	9	6/6-6/12	9
	6/18-6/36		6/18-6/36	
	6/60-CF 1mtr		6/60-CF 1mtr	
	<CF1mtr -PL+		<CF 1mtr -PL+	
TB Meningitis	6/6-6/12	7	6/6-6/12	7
	6/18-6/36		6/18-6/36	
	6/60-CF 1mtr		6/60-CF 1mtr	
	<CF1mtr -PL+		<CF 1mtr -PL+	
	NoPL	1		1
Hypertensive Retinopathy (Grade 4)	6/6-6/12	2	6/6-6/12	5
	6/18-6/36	3	6/18-6/36	2
	6/60-CF 1mtr	2	6/60-CF 1mtr	
	<CF 1mtr -PL+		<CF 1mtr -PL+	

## Discussion

In our study, majority of patients belonged to 21-40 years age group (56%). Idiopathic intracranial hypertension being the most common condition affecting 21 to 30 years age group. The study by K. Vengal Rao et al. who reported 52% in the 3rd decade.

There was female preponderance, 27 females (54%) compared to 23 males (46%). Idiopathic intracranial hypertension is more common in females. In the study of K.Vengal Rao et al., they found 55% males and 45% females.

In this study, 26 patients (52%) with papilledema was due to intracranial space

occupying lesions. This is in concurrence with the study by K. Vengal Rao et al.

Eight cases (16%) of papilledema was due to tuberculous meningitis, including one case of HIV positive with disseminated TB meningitis.

Eight cases (16%) of papilledema were due to trauma, five patients had subarachnoid hemorrhage and three had subdural hemorrhage.

In 9 cases (18%) papilledema was due to idiopathic intracranial Hypertension, in one patient papilledema was due to Vitamin A over dosage. One patient had papilledema with empty sella. CT and

MRI/MRV was normal for remaining 7 (14%) patients.

For all 50 cases of papilledema MRI brain was done. MR Venogram was done in 9 cases to look for tumour, hydrocephalus, cerebral venous thrombosis. Intracranial hypertension without any intracranial lesion (mass lesion, arteriovenous shunt, venous thrombosis) was diagnosed as Idiopathic Intracranial Hypertension.

Two cases were associated with severe anaemia manifested with papilledema. Papilledema in iron deficiency anaemia is mainly due to cerebral ischemia and cerebral oedema. This is in concurrence with study by V. Biousse et al [4].

In 9 cases (18%) the papilloedema is due to hypertensive retinopathy (grade IV), similar to Shelburne et al. study [5]

In this study the visual field pattern was assessed by automated perimetry. 8 cases (16%) of papilledema showed normal visual field pattern. 7 cases (14%) of papilledema showed blind spot enlargement. 16 cases (32%) of papilloedema showed defective visual field pattern. Trautman et al.[6] detected that visual fields are affected more often than visual acuity. Out of 16 patients, 10 patients (20%) showed caecocentral and central scotoma, 5 patients (10 %) showed typical of constricted peripheral visual field defect and one patient had homonymous hemianopia. 19 cases (38%) were not cooperative for visual field testing.

More than 50% of patients who were reported with headache, which is in concurrence with the results obtained by K Vengal Rao et al. The priority for patients with chronic IIH is the control of disabling headaches. Friedman et al.[7] has proposed that the diagnosis of Idiopathic Intracranial Hypertension without papilledema should only be made in those with unilateral or bilateral sixth nerve palsy. Tacconi et al. [8] found headache to be the most

common symptom in both pediatric and adult age groups with papilledema being the main clinical sign in adults (63.1%).

Weight loss is the current proven disease modifying treatment for all overweight patients of IIH. In this study, few patients were advised diet schedule for 3 months along with medical treatment. Durcan et al [9]. observed that the incidence of IIH is up to 13 per one lakh in obese women aged 20-44 years of age who were > or equal to 10% over ideal weight and up to 19.3 per one lakh population if > or equal to 20% over ideal weight. This study is similar to it, as in this study as well women diagnosed as IIH were above 30 years and were overweight.

Out of 26 patients with ICSOL, 7 patients had cerebellopontine angle tumor, 8 case had head injury, 4 patients had tuberculoma, 3 had meningioma, 2 had craniopharyngioma, and one case of pineal gland tumor and one case of Tuberous sclerosis. Onakpoya et al [10]. found meningioma (36.4% prevalence rate ) to be the most common brain tumor.

Visual acuity of less than 6/36 was seen in 10 (20%) cases. In this study, post-treatment visual outcome was good both in medically as well as surgically managed patients. The commonest field defect observed was enlargement of blind spot and caecocentral scotoma. These results were similar to those obtained in the study done by Saurabh et al. [11]

### Conclusion

Papilledema found more common in the age group of 21 to 40 years. Females were affected more than males. The common etiological factor for papilledema was intracranial space occupying lesions. More than three fourth of patients had normal visual acuity. Less than half of the patients had visual field involvement. Visual prognosis depends upon the stages of papilledma, duration and early approach on removal of the underlying cause. In the present study ICSOLs was the most

common cause of papilledema, followed by Idiopathic Intracranial Hypertension (IIH). Patients with Idiopathic Intracranial Hypertension, Hypertensive Retinopathy grade IV had good visual outcome with medical management. ICSOLs presented at early stage of papilledema showed favourable outcome after surgical treatment.

A careful history and complete ophthalmological work up with relevant investigations like X- Rays, CSF analysis, CT, MRI, MR Venogram are mandatory to diagnose patients with papilledema. Since papilloedema can be a manifestations of life threatening condition Ophthalmologist should detect early papilledema and refer them for appropriate management to play an important role in saving the life and vision of these patients.

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