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VISUAL FIELD CHANGES IN NEURO-OPHTHALMIC DISEASES: AN OBSERVATIONAL STUDY

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ABSTRACT **Aims:** The aim of the present study is to identify different types of visual field defects in various Neuro-ophthalmic diseases detected by Humphreys automated perimeter. **Methods and Material:** It is a Hospital-based study carried out by Random sampling method. 50 patients attending the Outpatient Department of Ophthalmology with complaints of defective visual function or diagnosed patients who have been referred from other medical specialities with complaints pertaining to visual field defects were included in the present study. In all the above cases, the other major cause of visual field defects like glaucoma has been ruled out by measuring intraocular pressure. A questionnaire of symptoms and ocular examination was used to collect demographic data, medical history (ex. history of trauma or surgery), ocular history (ex. cataract surgery and refractive surgery), and medication use from all participants. Informed consent will be taken from all the patients. The 30-2 and 24-2 program on Humphrey's Field Analyzer was used for visual field examination. **Results:** It is found that out of 50 patients, 11 cases with bitemporal hemianopia(22%) is the most common visual field defects; 11 cases with ipsilateral total field loss(22%), total field loss with hemianopia(16%) homonymous hemianopia(10%). **Conclusions:** A significant correlation is expected to be found between patterns of field changes and neuro-ophthalmic cases, indicating that patients with visual field changes are more likely to be found in an advanced stage of the disease.

KEYWORDS : Neuro-ophthalmic cases, perimetry, visual field changes, Humphrey field analyser, ophthalmic manifestation.

INTRODUCTION

Visual field assessment is crucial in the evaluation of lesions involving the visual pathway and testing should be performed at the baseline level with periodic follow-up. There are various potentially serious disorders of the nervous system that may first present with ocular manifestation. Visual field defects in neurological diseases have diverse presentations and provide a clue in localizing the site of the lesion, help us in monitoring the progression or recurrence of disease, measure functional visual loss, and guide treatment. They also guide us in assessing the postoperative recovery in surgical removal of a tumor as well as early diagnosis leading to a decrease in morbidity and mortality of the patient. Visual field defects can adversely affect activities of daily living such as personal hygiene, walking, reading, and driving and should be taken into consideration when planning rehabilitation strategies. The preferred method of choice is standard automated perimetry, which is simple, reliable, and accurate has largely superseded traditional methods of testing visual fields and is helpful for patients with severe visual and neurological abnormalities as well as those with peripheral visual field problems.

Since neurological problems usually result in visual field loss, perimetry is routinely requested by eyecare practitioners for patients with a suspected or established diagnosis. There are currently no standards for measuring visual fields in neurological diseases. Finding reference standard visual field programs for neurological diseases is vital. The clinician's treatment options will significantly expand as a result, and the patient's condition may even be better managed. The goal of visual rehabilitation is to decrease functional disability and preserve the remaining vision. Patients and their families can benefit from the rehabilitation process by being aware of the choices for therapy and where to direct patients with visual impairments following a stroke.

Material and Methods:

After approval by Institutional Ethical Committee, this hospital-based study using Random sampling method. was carried out on patients attending the Outpatient Department of Ophthalmology with complaints of defective visual function or diagnosed patients who have been referred from other medical specialties with complaints pertaining to visual field defects were included in the present study. The defective vision occurred during the course of the disease in majority of the patients. Behavioural and psychiatric changes were noted in patients with parietal, frontal & temporal lobe tumors and stroke patients.

In all the above cases, the other major cause of visual field defects like glaucoma has been ruled out by measuring intraocular pressure and optic disc evaluation. The study was conducted from January 2021 to June 2022 in the outpatient department of Ophthalmology.

It is an Observational study.

Inclusion criteria: Patients who attended the outpatient department of ophthalmology, Gwalior with complaints of defective visual field or patients who have been referred from other medical specialties with complaints of visual field defects.

Exclusion criteria:

1. Co-existing cataract and Glaucoma cases.
2. Patients are too ill to perform an adequate visual assessment on automated perimetry.
3. Patients not oriented and non-cooperative with automated perimetry.
4. Patients having corneal pathology and any other ocular abnormalities like pterygium, entropion, trichiasis, and corneal opacity.
5. Refusal to participate in studies.

A questionnaire of symptoms and ocular examination was used to collect demographic data, education level, medical history (ex. history of trauma or surgery), ocular history (ex. cataract surgery and refractive surgery), and medication use from all participants. Informed consent was taken from all the patients.

Ocular examination specifically includes visual acuity, near vision, color perception, confrontation test, brightness, extraocular muscle movements, optic disc, retinal examination, and Humphrey automated perimetry.

Fields Protocol: The 30-2 program on Humphrey's Field Analyzer with a white-on-white Goldman size 3 target was used for visual field examination1. All patients underwent a full threshold strategy for visual field examination.

The reliability criteria used were fixation losses < 20%, false positive and false negative errors < 33%. Only fields reliably performed were including the analysis.

Any field defect was diagnosed by the following criteria:

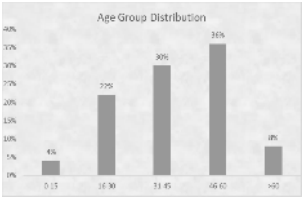
1. Depression of thresholds 5 DB or more in 3 or more contiguous points adjacent to the vertical midline.

2. Pattern deviation plot showing 3 or more contiguous points adjacent to the vertical midline in the involved quadrant depressed to 1% probability level with normal mirror image points across midline.

Results

The study was conducted in 50 patients, out of which 62% were male and 38% were female. The age ranged from 11 to 70 years. A maximum number of patients (46%) were in the age range of 30 to 60 years. ‘

Graph 1: Age group distribution



This study observed 22% cases of pituitary tumors, 14% suprasellar SOL, 10% acoustic schwannomas, 8% craniopharyngiomas, 8% CP angle SOL and 20% cases of stroke/infarct. In this study, the most common brain tumors were pituitary tumors followed by parietal lobe, frontoparietal, frontal, frontotemporal, temporal, and parieto-occipital lobe lesions.

Table-1: Fundus findings in neuro-ophthalmic cases

Fundus changes	No. of Cases	Percentage (%)
Optic Atrophy Partial optic atrophy Complete Optic Atrophy	22 11 11	42
Papilledema	13	24
Normal	15	30
Total	50	100

Optic atrophy was the most common fundus finding followed by Papilledema. Optic atrophy was the most common disc change seen with severe loss of vision in 42% of patients followed by 24% of cases had papilledema in the present study.

Table-2: Visual field defects in neuro-ophthalmic cases

Visual field Defects	Disease	No. of cases	Percentage (%)
Bitemporal Hemianopia	Pituitary tumors, Sphenoidal Meningioma, Supra-seller SOL, CP angle SOL	11	22
Total field loss	Meningioma, Acoustic Schwannoma, Glioma, Cerebellopontine angle tumor, Planum Sphenoidal Meningioma, Craniopharyngioma, Hydrocephalus, Optic Neuritis (Demyelinating Disorder), Benign Intracranial Hypertension	11	22
Complete Field loss with Hemianopia	Meningioma, Craniopharyngioma-2, Supra-seller SOL, Pituitary tumors, CP Angle Tumor	8	16
Homonymous Hemianopia	Pituitary tumors, Suprasellar SOL, Acoustic Schwannoma, CP angle tumor,	5	10
Homonymous Hemianopia with macular sparing	PCA occlusion, Temporal lobe infarct, CP angle tumor	4	8
Complete Hemianopia	EDH, SDH, Suprasellar meningioma, Acoustic Schwannoma, CV Stroke	4	8
Incomplete Hemianopia	BIH, Temporal lobe Infarct, PCA occlusion	3	6
Homonymous inferior Quadrantanopia	Parietal lobe infarct	3	6
Homonymous superior Quadrantanopia	Temporal lobe infarct	1	2
Total		50	100

Visual field defects: Most field defects of neuro-ophthalmic significance are located in the central 30-degree field.

(a) Bitemporal hemianopia -it was the most common field defect found in the present study. The partial decussation of nerve fibres in the optic chiasma accounts for the characteristic visual field defect. It was seen in 22% of cases of Pituitary tumors, Sphenoidal Meningioma, Supra-seller SOL, and CP angle SOL.

(b) Complete field loss- in the present study complete field loss was seen in 22% of cases of Meningioma, Acoustic Schwannoma, Glioma, Cerebellopontine angle tumor, Planum Sphenoidal Meningioma, Craniopharyngioma, Hydrocephalus, Optic Neuritis (Demyelinating Disorder), Benign Intracranial Hypertension.

(c) Homonymous hemianopia occurs in optic tract lesions due to tumors in temporal, frontal, parietal & occipital lobes and 10% of cases of Pituitary tumors, Supra-seller SOL, Acoustic Schwannoma, CP angle tumors.

(d) Homonymous superior quadrantanopia was seen in one case of the temporal-frontal lesion due to the involvement of the inferior fibres in the optic radiation.

(e) Homonymous inferior quadrantanopia was seen in 3 cases of the parietal lesion due to the involvement of superior fibres in the optic radiation passing through the parietal lobe.

DISCUSSION:

The age ranges between 30 and 60 years was one with the highest occurrence in the current study. Rao et al. and Kwachearon et al, revealed a 52% incidence in the third and fourth decades. Partial and complete Optic Atrophy is seen in 42% of cases of pituitary tumors, chiasmal and peri-chiasmal SOL, CP Angle tumors, glioma, meningioma, and PCA occlusion. Optic atrophy is inadvertently caused by papilledema. Likewise, Kennedy and Smith et al made similar observations and found that the majority of individuals presented with visual impairment and optic atrophy in their study of 45 patients.

Bitemporal hemianopia(22%) was the most common field defect found in the present study. It was seen in 22% of cases of Pituitary tumors, Sphenoidal Meningioma, Supra-seller SOL, and CP angle SOL. Matthew C. Weed et al. observed that Pituitary Adenoma causing compression of the Optic Chiasma to cause painless progressive vision loss as well as Bitemporal hemianopia and junctional scotomas are both findings that may be present in the “chiasmal syndrome,” which describes visual field defects from compression of the optic chiasma.

CONCLUSION:

Ocular manifestations occur very frequently in neuro-ophthalmic cases, which in some cases helps us to diagnose the condition at an early stage. This study emphasizes the importance of ocular manifestations in the localization, extent of the lesion, and prognosis for the vision and life of the patient to plan further management and rehabilitation strategies. Early diagnosis and management help in reducing the risk of loss of visual function as well as symptoms to improve the quality of life and reduce the burden in society.

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