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ORIGINAL ARTICLE

CROSS-SECTIONAL STUDY OF VISUAL FIELD DEFECTS IN PITUITARY GLAND TUMORS

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ABSTRACT: AIM: To study the proportion of patients with visual field defects in pituitary adenomas And to study the pattern of visual field defects in pituitary adenomas. **MATERIALS AND METHODS:** 24 patients diagnosed with a pituitary adenoma underwent complete ophthalmic and Humphrey's Perimetry 30 – 2 visual field test at Department of ophthalmology, M. S Ramaiah Hospital between November 2011 to May 2013. **RESULTS:** Among the 24 cases in the study, 3 cases were of pituitary micro adenoma constituting 12.5% and the remaining cases (21 cases) were pituitary macro adenoma, constituting 87.5%. Visual acuity of 6/6 – 6/12 were observed in 28 (58.3%) out of total 48 eyes. Visual field defects were observed in 19 cases (79%). Bilateral temporal hemianopia was observed in the majority (41%) of cases with field defects. One eye blind and contra lateral temporal hemianopia was observed in 20.8%. One eye temporal hemianopia and other eye involvement of 3 quadrants seen in 2 patients (8.4%). 5 patients had no visual field defects. **CONCLUSION:** Although ophthalmologists have a minor role in primary diagnosis of pituitary adenoma, routine ophthalmologic examination is very important. To detect early visual field defects, automated perimetry should be done as a part routine examination in patients with suspected pituitary adenoma.

KEYWORDS: Visual field defects, pituitary adenoma, bitemporal hemianopia.

INTRODUCTION: The pituitary gland is a small endocrine gland, weighing about 500 mg. P pituitary adenomas account for 12–15 % of all intracranial tumors. The estimated prevalence of pituitary adenoma s is found to be 14.4–22.5 %.[1] It has been reported that pituitary adenomas occur with a prevalence rate of 190 – 280 cases per 10,00,000.[2]

It is a benign tumor originating in adenohypophyseal cells of anterior lobe of unction of secreting (functional) or non-secreting (non- functioning) pituitary adenoma. According to the size, adenomas are classified into micro adenomas (≤ 10mm) and macro adenomas (>10 mm).[3] Women have a 2 fold increased risk of developing pituitary adenoma in comparison with men.[4]

Pituitary adenoma is non-malignant tumor, however it tends to renew/ recur itself.

Adenomas may cause symptoms in 2 ways:

- Due to tumor related hyper secretion or hypo secretion of hormones.
- Due to compression of pituitary adenoma to surrounding structures.[3]

Hypophysis is in the sella turcica, 8 – 13 mm lower than the optic chiasm. Therefore, when it increases, it can easily compress the optic nerve fibres in the chiasm. Micro adenomas can have a negligible effect on the visual system or on the function impairment when pituitary adenoma compresses the frontal part of optic nerve; impairments in visual fields, visual acuity, and color

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contrast sensitivity are possible. Visual impairment can also be triggered by a micro adenoma when it grows directly to the optic pathways and causes swelling of the pituitary gland. [3]

The long standing compression of the chiasm induces primary optic nerve atrophy, which directly impairs visual function. Functionally active pituitary adenomas usually appear with specific clinical symptoms because of hormone hyper secretion.

They cause less damage to the visual function than the non-functioning glands, because the functioning pituitary adenomas become symptomatic due to hormone secretion. Non-functioning pituitary adenomas grow slowly, compress the optic chiasm, which is directly above the pituitary gland, and cause progressive visual loss. [5]

Pituitary adenomas are diagnosed earlier nowadays due to availability of radioimmunoassay techniques for the hormones and increasing use of CT scanning and MRI imaging, done for indications unrelated to suspicions of pituitary tumors like head injury, evaluation of headache.

The prevalence of visual field defects in pituitary adenomas varies from 37 to 96% in different studies. Because of its anatomical relationship with optic chiasm, pituitary adenoma typically results in bitemporal hemianopia. However, according to the tumor size and optic chiasmal position, a variety of field defects can be produced by pituitary adenoma and the tumor size is a significant factor in the severity of VF defects. [6-9]

Goldmann perimetry has been classically considered to be the standard perimetry technique in neuro ophthalmology. However, several studies reported that most automated perimetry was similar or more sensitive than Goldmann perimetry in detecting and quantifying VF defects in Neuro ophthalmology. [10-12] The Swedish interactive threshold algorithms (SITA) are the most recently developed and most widely used program resulting in a much shorter VF testing process that is easier for the patient. [13]

NEED FOR THE STUDY: Pituitary tumor comprises 12-15% of all intracranial tumors. A spectrum of visual manifestations has been reported with these tumors, ranging from the absence of any visual field defects and loss of vision. The prevalence of visual field defect in pituitary tumors in general has been reported in various studies as 37- 96%. Ocular features sometimes form an early manifestation, which help us to diagnose the condition earlier and decrease the morbidity and mortality of the patients.[14-16]

Visual fields serve three important purposes:

- Diagnostic: visual field defects indicate involvement of the visual pathways and the pattern of visual field defect helps in localizing site of the lesion.
- Follow up: visual field provides an excellent tool to monitor resolution and/or recurrence of the disease processes affecting the visual pathways.
- Activities of daily living: since visual field defect adversely affects the patient's ability to perform day to day activities such as personal hygiene, reading, driving, these defects should be actively sought when planning rehabilitation strategies.

Visual fields are crucial in guiding ongoing treatment and judging treatment success in the number of patients with pituitary adenomas.

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Patients with pituitary macro adenoma may not have symptoms of visual disturbances, yet may have field defects consistent with compression of visual pathways. It is therefore important to perform field testing on patients with pituitary adenomas even if they have no visual complaints. Automated static threshold perimetry is the current gold standard for visual field testing. [14]

MATERIALS AND METHODS: Patients diagnosed as having pituitary tumor were taken for a visual field test in the department of ophthalmology and neurosciences, M.S Ramaiah hospital during November 2011 to May 2013 for a cross sectional hospital based observational study. 24 patients were recruited in our study, according to the inclusion and exclusion criteria.

INCLUSION CRITERIA: Patients diagnosed to be having a pituitary adenoma on imaging.

EXCLUSION CRITERIA: Patients with ocular media opacities Patients with glaucoma, choroiditis, retinitis pigmentosa, optic neuritis, or any other ocular pathology affecting the visual field. Patients physically and/or mentally unfit for detailed ocular examination Patients in whom visual field testing is not possible.

PARAMETERS ASSESSMENT:

FIELD PROTOCOL:

- THE 30 -2 program on the Humphrey field analyzer (Humphrey instrument model 630/640) with a white on white Goldmann size III target were used for visual field testing.
- The reliability criteria used was fixation losses less than 20 %, false positive and false negative error less than 33%
- Quadrantanopia was diagnosed if either of the following criteria were fulfilled:
    - Depression of threshold by 5 db or more, in 3 or more contiguous points adjacent to the vertical meridian in the involved quadrant as compared to their mirror image points across the vertical meridian.
    - The pattern deviation plot shows 3 or more points adjacent to the vertical meridian in the involved quadrant depressed to the 1% probability level with normal mirror image points across the vertical meridian.
- For the diagnosis of hemianopia, the diagnostic criteria for quadrantanopia have to be applicable to both quadrants comprising the hemi field.
- Advanced field defects were considered hemianopic if the comparison of the least involved quadrant across the vertical meridian, met the threshold depression criteria for the diagnosis of quadrantanopia.
- Atypical field defect is defined as defect that does not fit into any characteristic diagnostic pattern considered typical of pituitary adenomas.

RESULTS: the present study titled “cross sectional study of visual field defects in pituitary gland tumors “was done on patients diagnosed as having pituitary tumor and taken for visual field tests in the department of ophthalmology, M.S Ramaiah Hospital between November 2011 to May 2013 for a cross sectional Hospital based observational study. 24 patients were recruited in our study, according to the inclusion and exclusion criteria.

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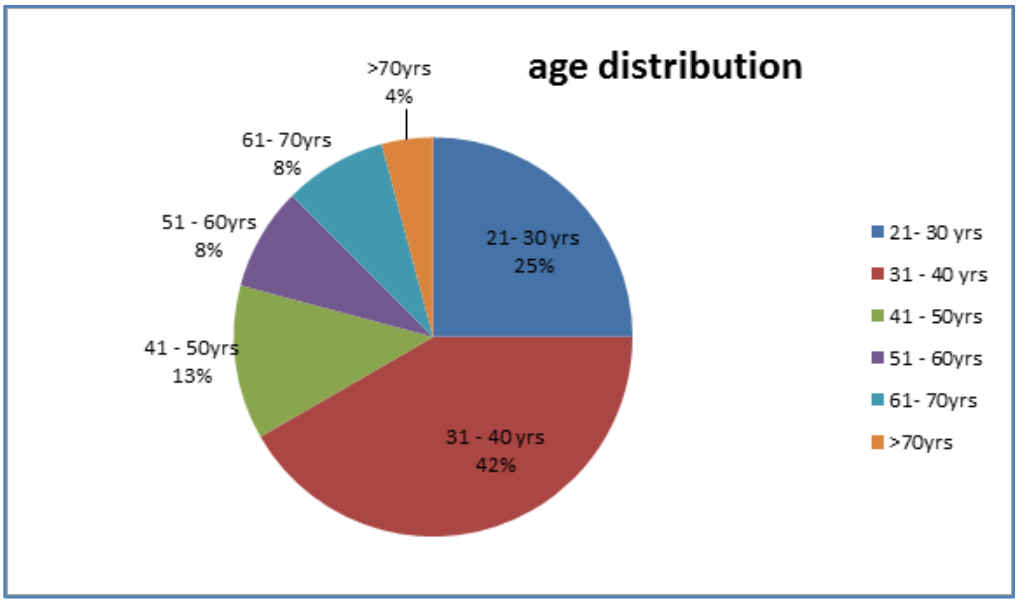
AGE	FREQUENCY	PERCENT
21-30	6	25
31-40	10	41.7
41-50	3	12.5
51- 60	2	8.3
61-70	2	8.3
>70	1	4.2
Total	**24**	**100.0**

Table 1: Age distribution of the patients studied

N	MEAN AGE	SD	MEDIAN	MIN	MAX
24	39.5	14.124	36.5	21	75

Table 2: Mean age of the patients studied



Graph 1: Age distribution

GENDER	FREQUENCY	PERCENT
MALE	9	37.5
FEMALE	15	62.5
TOTAL	**24**	**100.0**

Table 3: gender distribution of patients studied

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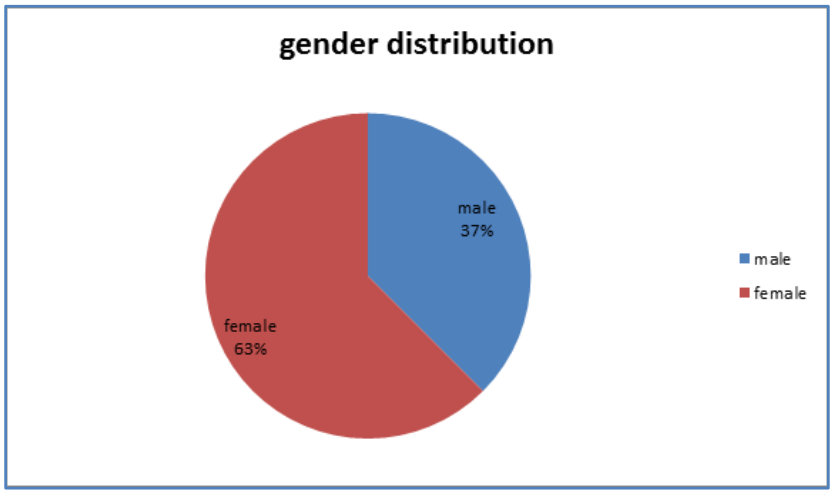
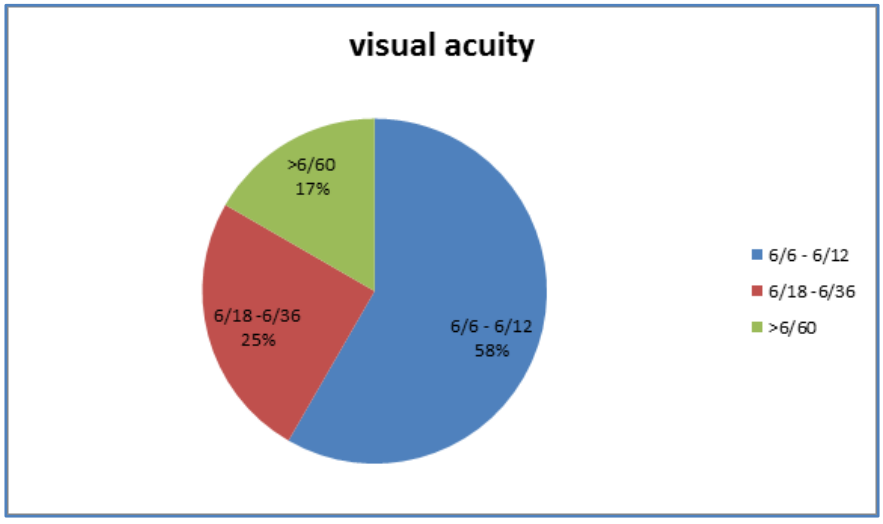


GRAPH 2: gender distribution of patients studied (n=24)

	BCVA			TOTAL	x^2	P value
	6/6 -6/12	6/18-6/36	<6/60			
RIGHT EYE	15	5	4	24		
	62.5%	20.8%	16.7%	100.0%		
LEFT EYE	13	7	4	24		
	54.2%	29.2%	16.7%	100.0%		
TOTAL	28	12	8	48	0.476	0.788
	58.3%	25.0%	16.7%	100.0%		

Table 4: visual acuity of the patients included in the study



Graph 3: distribution of visual acuity

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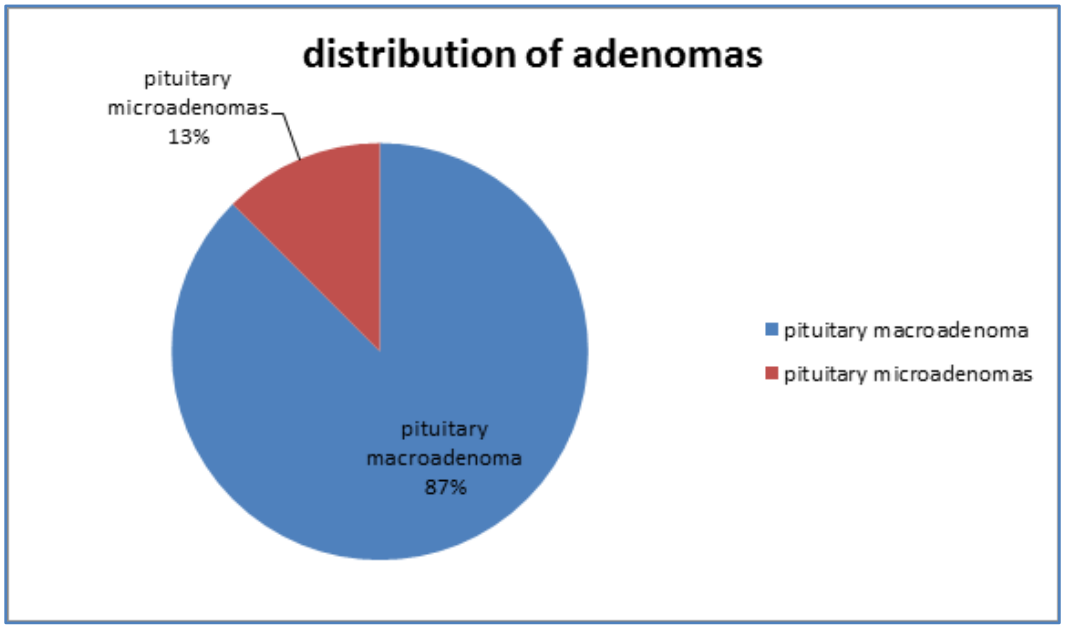
CT SCAN	FREQUENCY	PERCENT
Pituitary micro adenoma	3	12.5
Pituitary macro adenoma	21	87.5
Total	**24**	**100.0**

Table 5: number of patients with different types of adenomas



Graph 4: distribution of different types of adenomas

VISUAL FIELDS	FREQUENCY	PERCENT
Bitemporal hemianopia	10	41.6
Non-specific changes	1	4.2
normal	5	20.8
One eye blind and contra lateral temporal hemianopia	5	20.8
One eye temporal hemianopia, other eye superotemporal quadrantanopia	1	4.2
One eye temporal hemianopia, other eye involvement of 3 quadrant s	2	8.4
Total	**24**	**100.0**

Table 6: Pattern of visual field defects in pituitary adenomas

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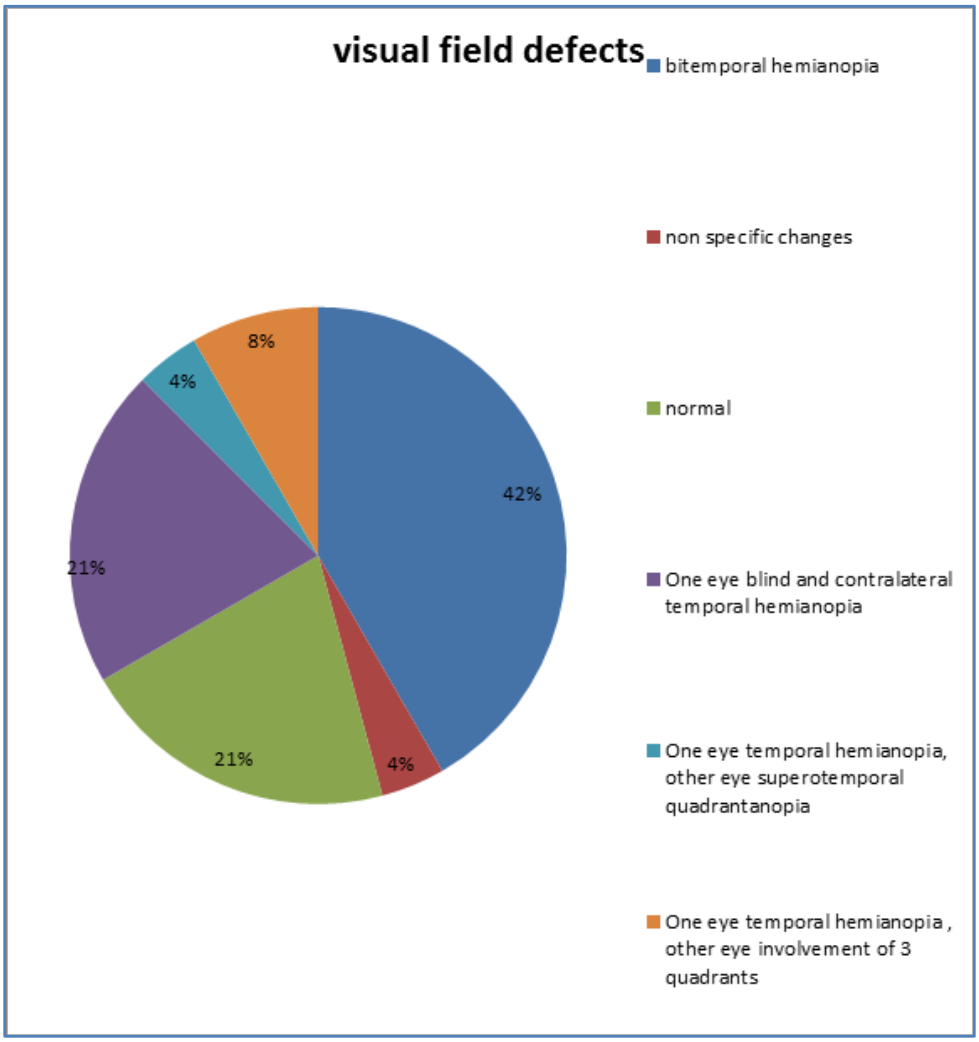

Graph 5: Visual field defects

CONCLUSION: The results of the study have been concluded as follows. Of the total 24 cases taken in the study:

- The study included 24 subjects consisting of 15 females (62.5%) and 9 males (37.5%).
- The vulnerable age group were those in the 31 – 40 years, followed by age group of 21- 30 yrs.With a range of 21 – 75 years and a mean age of 39.5 +/- 14.12 yrs.
- Among the 24 cases in the study 21 cases were pituitary macro adenoma constituting 87.5 % and remaining 3 cases were of pituitary micro adenoma constituting 12.5 %.
- Visual acuity of 6/6 – 6/12 was observed in 28 (58.3%).
- Visual field defects were observed in 19 cases (79%) out of 24 cases.
- Bitemporal hemianopia was observed in the majority (41%) of cases with field defects. One eye blind and contra lateral hemianopia was the second most common field defect observed accounting for 20.8 %.

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