## **Original Research Article**

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## Clinical presentation and hormonal profile of patients with pituitary tumour

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### ABSTRACT

**Background:** Pituitary tumours represent about 10% of intracranial tumours. To know about the common clinical presentations and hormone profile of patients with pituitary tumour help in early diagnosis and treatment of the disease.

**Methods:** A prospective study was carried out for a duration of 16 months from 1<sup>st</sup> June 2018 to 30<sup>th</sup> September 2019, among 93 patients admitted with diagnosis of pituitary tumour in department of neurosurgery in a tertiary care centre. Study involved initial clinical assessment followed by assessment of hormone profile. In the end of the study the most common clinical presentation and the common pituitary hormones that were deranged in those cases were found out. Statistical analysis was done to find out relationship between hormone levels and clinical symptoms.

**Results:** From the study it was found that the most common clinical presentations of pituitary tumour were headache [58 patients (62.4%)] and visual disturbance [53 patients (56.9%)]. Hormone over production was reported in 35 patients (37.6%), of which 25 patients (26.9%) were having high prolactin levels. Most common hormone that showed below normal values in pituitary tumour patients was luteinizing hormone (LH), in 19 patients (19.35%). Study also found out statistically significant association between elevated prolactin levels and headache.

**Conclusions:** In patients with pituitary tumours most common clinical presentations included headache and visual disturbance. Prolactin was the most common hormone which was above normal levels. Most common hormone that was below normal levels were gonadotropins.

Keywords: Pituitary, Prolactin, LH

### **INTRODUCTION**

Pituitary tumours constitute about 10% of intracranial tumours. Pituitary adenomas are the most common type of pituitary tumor.<sup>1</sup> Pituitary adenomas are categorized based on primary cell origin and type of hormone secreted into non-functioning and functioning adenomas (prolactin/TSH/GH/ACTH/FSH/LH secreting adenomas).<sup>2</sup> Clinical presentations of pituitary tumours include symptoms due to mass effect of tumour, hormone hypersecretion, hormone under secretion, pituitary apoplexy and finally few are detected incidentally.<sup>3,4</sup> All

patients with pituitary tumours undergo hormone profile workup, which is needed for formulating treatment strategy. Knowledge about the common clinical presentation and hormone derangement of pituitary tumours help in early detection and treatment of pituitary tumours.

This study was conducted to find out to various clinical presentations in pituitary adenoma, the common pituitary hormones that get deranged in pituitary adenomas. Also, to find out the relationship between hormone levels to clinical symptoms. This may help in early detection of pituitary tumour, which in turn may help in early and effective treatment of pituitary tumours.

#### **METHODS**

A prospective study was carried out for a duration of 16 months, from 1<sup>st</sup> June 2018 to 30<sup>th</sup> September 2019 among patients admitted with diagnosis of pituitary tumour in the department of neurosurgery, in a tertiary care centre.

Inclusion criteria for the study included diagnosed cases of pituitary tumour.

Exclusion criteria excluded other seller and suprasellar lesions and cases without proper hormone profile work up.

Study involved initial clinical assessment of all patients admitted with pituitary tumour in the ward. Clinical presentation included symptoms due to mass effect (headache, visual disturbance, imbalance, vomiting, urinary incontinence, memory impairment, cranial nerve hypersecretion of pituitary hormones palsy), (infertility/menstrual disturbance, decreased libido, galactorrhoea. acromegaly, Cushing's disease. hyperthyroid symptoms), under secretion of pituitary hormones (hypopituitary features), features of pituitary apoplexy and incidental detected tumours.

Hormone profile of all these patients were also done. This included assessment of levels prolactin, adrenocorticotrophic hormone (ACTH), growth hormone (GH), thyroid stimulating hormone (TSH), follicle stimulating hormone (FSH) and luteinizing hormone (LH) levels

In the end of the study the most common clinical presentation in pituitary tumour cases was found out. The common pituitary hormones that are deranged in those cases were also found out.

The collected data was entered in Microsoft excel and analysed using SPSS software (version16.0). Statistical analysis was done to find out relationship between hormone levels to clinical symptoms. Percentages were calculated for categorical data, whereas numerical data was represented as mean  $\pm$  SD. Chi-square test and cross tabs were used to compare categorical and numerical variables respectively. Probability  $\leq 0.05(p \leq 0.05)$  was consider significant.

### RESULTS

Among 93 patients commonest age group of presentation was between 45-59 years, 45.2% of cases were from this age group in the study. Seventy-three percentage of cases (68 patients) came from 45-74 years. The age of presentation ranged from 13-82yrs (Figure 1). The study population consisted of 34 males (36.6%) and 59 females (63.4%). The female to male ratio was found to be 1.735:1 (Figure 2).



Figure 1: Bar chart of age distribution of the study population.



Figure 2: Pie chart of distribution of study population based on gender.



# Figure 3: Bar chart of distribution of clinical presentations.

The most common clinical presentation was headache which was seen in 58 (62.3%) patients, closely followed by visual disturbance in 53 (56.9%) patients. Other

common presenting symptoms included vomiting (27.9%), imbalance (13.9%), memory impairment (6.4%), urinary incontinence (6.4%), acromegaly (4.3%). Symptom of apoplexy (sudden onset headache, visual disturbance, loss of consciousness etc) were seen only in 4 (4.3%) patients. There were only 4 (4.3%) patients with incidentally detected tumour (Figure 3).



Figure 4: Bar chart of hormone profile in study population.



# Figure 5: Bar chart of decrease in hormone levels in the study population.

The most common hormone that was deranged in pituitary tumour patients was prolactin (abnormal in 29 patients), followed by LH (abnormal in 21 patients).

Hormone over production was reported in 35 (37.6%) patients. In 25 (26.9%) patients prolactin levels were high, and 2 of them were having very high value (>200 ng/ml). There were 3 patients with very high Growth hormone value (>3 times the normal) (Figure 4). Most common hormone that showed low levels among pituitary tumour patients was LH, in 18 (19.35%) patients, which was closely followed by FSH in 14 (15%) patients (Figure 5).

# Table 1: Headache versus prolactin level crosstabulation.

Variables		Patients with prolactin		Total
		Low/normal	High	Total
Patients	No	32	4	36
with headache	Yes	36	21	57
Total		68	25	93

\*Chi-square value-5.332, P value=0.021

# Table 2: Low ACTH level versus headache crosstabulation.

Variables		Patients with headache		Total
		No	Yes	10101
Patients	Low	0	7	7
with	Normal/	38	48	86
АСТН	high	20		00
Total		38	55	93

\*Chi-square=4.561, P value=0.040

### Table 3: LH versus FSH cross tabulation.

Variables		Patients with FSH		Tatal
		Low	Normal	Total
Patients	Low	12	7	19
with LH	Normal	2	72	74
Total		14	79	93
*01:	41 707 D 1	0.000		

\*Chi-square=41.727, P value=0.000

In the study among 93 patients only 25 patients were having elevated Prolactin level. Among these patients with elevated prolactin level, 21 (84%) had headache. This finding was found to be statistically significant (Table 1). All the 7 patients with low ACTH levels were found to have headache as clinical symptom, which was found to be statistically significant (Table 2). In 19patients Gonadotropic hormones were found to be below normal among which 11 of them had both LH and FSH below normal, which was found to be statistically significant (Table 3).

### DISCUSSION

The study was conducted in our institution among 93 patients admitted in department of neurosurgery with diagnosis of pituitary tumour, to assess their clinical and hormonal profile, for a duration of 16 months.

Study population consisted of 34 males and 59 females. Among females, 40 (70.2%) cases, came from 30 to 59year age group. Female: Male ratio was 1.735. Study by Gittleman et al on 49 population-based state cancer registries in united states, during the period of 2004 to 2009 have reported similar results with most commonly affected population as women.<sup>5</sup> However in his study incidence of pituitary tumors in men, actually surpasses that in women aged 55 to 85.<sup>5</sup> But in our study pituitary tumors almost equally affecting both sex after the age of 60. The explanation for the apparent higher prevalence of pituitary tumours in premenopausal women may be that their clinical manifestations-most notably, menstrual dysfunction-are more conspicuous and more readily diagnosed in women than in men.

The study showed the most common age group affected by pituitary tumour was from 45 to 59 years, with 45.1% cases coming from this age group. 68 (73.1%) patients cases came from 45 to 74 years age group. Gittleman et al again had report similar incidence, with most common age group of presentation between fourth and seventh decade of life.<sup>5</sup>

In the study most common clinical presentations included headache seen in 62.3% patients, closely followed by visual disturbance in 56.9% patients. These 2 clinical presentations are explained by mass effect caused by the tumour. Studies by Jane et al and Thapar et al have described pituitary hyperfunction symptoms as common clinical presentation (such as amenorrhoea, infertility, galactorrhoea, decreased libido, acromegaly).3,4 But in our study hormone hypersecretion was only seen in 37.6% patients. In other words, 62.4% patients were having hormone level either normal or low, which suggest that most of the tumours in our series were nonfunctioning adenomas. So, the most common symptoms were that of the mass effect. Results similar to our study were observed in an Indian study done by Bhuyan et al in Gauhati medical college between 2014 to 2015 among 32 patients. In this study, headache was seen in 75% patient and visual disturbance was seen in 50% patients.<sup>6</sup>

Other common presenting symptoms found in our study population include vomiting (27.9%), imbalance (13.9%), memory impairment (6.4%), urinary incontinence (6.4%), acromegaly (4.3%). Symptom of apoplexy (sudden onset headache, visual disturbance, loss of consciousness etc) were seen only in 4 (4.3%) patients. This was similar to Wilson's series, 3% of his patients with macroadenomas had an episode of pituitary apoplexy.<sup>7,8</sup> But in another series of 560 pituitary tumors by Wakai et al, a high incidence of 17% was found.<sup>9</sup>

Incidentally detected adenomas constituted about 4 patients (4.3%). Scangas et al have reported 10 to 12 percent subtle signal intensity changes in pituitary gland in routine MRI, which were considered as incidentalomas, most of which were managed conservatively.<sup>10</sup>

In our study 33(37.6%) patients showed hormone hypersecretory state. The most common hormone that was deranged in pituitary tumour patient was prolactin (abnormal in 29 patients), followed by LH (abnormal in 21 patients). In 25 (26.9%) patients prolactin levels were high, and 2 of them were having very high value (>200 ng/ml). The 2 cases with very high prolactin values were diagnosed as prolactinomas. The rest 23 patients with raised prolactin levels may be either due to stalk effect or prolactinoma itself. There were 3 patients with very high GH value (>3 time the normal). All the 3 were having features of acromegaly. But the study by Biller et al quotes approximately 65% of adenomas secrete an active hormone (48% Prolactin, 10% GH, 6% ACTH, 1% TSH), which is very high compared to our study.<sup>11</sup> This low number of hyperfunctioning adenoma in our study, especially Prolactinomas may be due to bias in admission of patients. Many of the Prolactinomas due to their good response to medical management usually get treated in outpatient basis. This may explain both lack of prolactinomas as well as lack of hormone excess presenting symptoms in our study.

Most common hormone that showed decreased levels (hormone under production) was gonadotropins, that includes LH, in 19 (19.35%) patients, which was closely followed by FSH in 14 (15%) patients. TSH and ACTH were decreased in 7 patients each. Prolactin was decreased in 4 patients. This order of underproduction of pituitary hormones are similar to that described in literature, which says gonadotrophs, thyrotropes, somatotrophs, and eventually corticotropes in decreasing order. This decrease in hormone level is explained by compression of normal pituitary gland or its stalk, or hypophysiotropic areas of hypothalamus by large tumour.

Our study was able to find statistically significant relationship between elevated prolactin value and headache. In the study population only 25 patients were having elevated prolactin. Among patients with elevated prolactin, 21 (84%) were having headache which means patients with elevated prolactin levels usually have headache as presenting symptom. Most of these prolactin values (20 patients) were less than 200ng/ml which suggest that the raise in prolactin levels may be due to stalk effect. So raised prolactin levels may be an indirect evidence of suprasellar extension of tumour, causing headache, maybe due to pressure on the diaphragm sella (which is pain sensitive).

In the study only 7 patients were having low ACTH levels. All these 7 patients were found to have associated headache as clinical symptom, which was found to be statistically significant. In other words, if a patient is having low ACTH values patient is likely to have headache as the presenting symptom. Further research is needed in this direction to know its clinical significance.

In 21 patients gonadotropic hormones were found to be low. Twelve of them had both LH and FSH below normal, which was found to be statistically significant. This may be due to the reason that some gonadotropin secreting cells secrete both FSH and LH, hence affecting both levels together in pituitary tumours.

### CONCLUSION

To conclude, in the study population the most common age group affected by pituitary tumours was from 45 to 59 years. Women especially in premenopausal age group were the most affected, with female: male ratio of 1.735.

The most common clinical presentations included headache and visual disturbance, as majority of the patients in the study population were having nonfunctioning adenomas.

The most common hormone excess was seen with prolactin. Most common hormone that showed below normal levels (hormone under production) was gonadotropins (LH>FSH).

The study was able to find statistically significant relationship between elevated prolactin value and headache (may be an indirect evidence of pressure on diaphragm sella and pituitary stalk compression).

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