

# Characteristics of Pituitary Adenomas at Jordan University Hospital: An 18-year single center experience

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## Abstract

**Background:** Pituitary adenomas comprise about 10-15% of the total brain tumors and are mostly benign. Many of them are incidentally found, others present with a wide variety of symptoms and different sizes.

**Aim & Objectives:** In this study, we aim to report the characteristics (age, gender, size, functionality) of pituitary adenomas at our institution during the last eighteen years

**Methods:** We conducted a retrospective chart review at Jordan university hospital (JUH) over the period of 2001 to 2019 for all patients with diagnosis of pituitary adenoma. A total of 323 patients were included in this study. All data regarding age, gender, size, radiological reports and clinical presentation were collected from electronic files and archives.

**Results:** The mean age was 37.43 ( $\pm 15.52$ ) years. There were 104 (32.2%) male and 219 (67.8%) female. One hundred and sixty patients (49.6%) had microadenomas, 163 (50.4%) had macroadenomas. One hundred thirty patients (40.3%) were diagnosed to have functioning pituitary adenomas.

**Conclusion:** Pituitary adenomas are benign tumors with variable characteristics in different cohorts. Further studies should be encouraged in different hospitals across Jordan to establish a database for pituitary adenomas in Jordan.

**Keywords:** Pituitary Adenomas, Jordan University Hospital.

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## Introduction

Pituitary tumors are slow growing tumors that develop in the pituitary gland. Pituitary tumors comprise about 10-15% of total brain tumors, making them the third most common brain tumors after glioma and meningioma<sup>(1)</sup>. These tumors are mostly benign, although malignant tumors can be seen, and rarely metastatic tumors from breast, lung, and melanomas have been reported. The most common pituitary tumors are pituitary

adenomas<sup>(2)</sup>. Most pituitary adenomas are asymptomatic and incidentally discovered. However, they might also present with a variety of symptoms depending on their secretory status and hormonal activity. Other presenting symptoms include symptoms related to mass effect like headache and visual disturbances<sup>(3)</sup>.

Pituitary adenomas can be classified according to the size, and functional status. Tumors less than one cm in size are defined as

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microadenomas and tumors one centimeter or larger are defined as macroadenomas. If a pituitary adenoma does not secrete a sufficient detectable level of hormones, it is considered non-functioning <sup>(4)</sup>.

It is difficult to provide an accurate estimate of the prevalence of pituitary adenomas in the general population <sup>(5)</sup>. The small size of many pituitary adenomas, their propensity to produce little or no symptoms and the scarcity of data available are all contributing factors to this difficulty. Nonetheless, existing epidemiological data suggest that the incidence of pituitary adenomas is rising, this could be explained by the widespread access to CT or MRI and accurate biochemical testing, leading to improved recognition of clinically relevant pituitary adenomas <sup>(6)</sup>.

Pituitary adenomas were reported to be the third most common primary brain tumor in Jordan <sup>(7)</sup>. However, data regarding the size, functional status, age, and gender distribution for these tumor is not widely available. So we aimed in this study to report characteristics of pituitary adenomas in our hospital including: size, functional status, MRI findings of pituitary adenomas, the demographics and clinical presentations during last eighteen years.

## **Patients & Methods**

We conducted a retrospective chart review at Jordan university hospital (JUH), a tertiary care center between the period of March/2001-June/2019. The study was reviewed and approved by the institutional review board (IRB) at JUH.

All laboratory and imaging data were collected from the computerized data system in JUH supported by the Information

Technology Centre at Jordan University. Clinical data between 2014 and 2019 was also computerized. Clinical data before 2014 was collected from archived paper files in JUH.

Data regarding clinical presentation, size, radiological findings and functional status were collected. Patients were categorized according to their clinical presentations into five main categories (pressure symptoms, menstrual irregularities, galactorrhea, erectile dysfunction or decreased libido, or any other presentation). Patients who were known cases or who had incidental finding of adenoma were also identified.

Patients who presented with symptoms suggestive of biochemical abnormalities were grouped into four main groups (hyperprolactinemia, acromegaly, Cushing, and hypothyroid). Pituitary function was assessed and pituitary adenomas were classified into functional and non-functional according to the normal reference ranges in JUH.

Pituitary adenomas were classified into macroadenomas and microadenomas according to the largest dimension of the pituitary lesion in mm. Macroadenomas were defined as any pituitary lesion with any dimension equal to or greater than 10 mm. Microadenomas were defined as any pituitary lesion with all dimensions less than 10 mm.

Findings on pituitary MRIs were grouped into: signs of tumor aggression (invasion of the optic chiasm, cavernous sinus, internal carotid, skull bones, sinuses and sella turcica). Other findings included deviation of the pituitary stalk, hemorrhagic lesions, pituitary cystic components and others (previous history of hemorrhage or signs of necrosis).

### *Statistical analysis*

We used SPSS version 21.0 (Chicago, USA) in our analysis. We used mean ( $\pm$  standard deviation) to describe continuous variables (i.e. age). We used count (frequency) to describe other nominal variables (i.e. gender). We performed independent sample t-test to analyze the mean difference between measurements and each of gender, presentation, and symptomatology, and we presented data in mean (standard deviation). We adopted a p value of 0.05 as a significant threshold.

## **Results**

### *Patients*

A total of 323 patients were included in this study, with a mean age of 37.43 ( $\pm$ 15.52) years. They were 104 (32.2%) male and 219 (67.8%) female. 160 (49.6%) had microadenoma, 163 (50.4%) had macroadenoma. 193 (59.7%) were non-functioning, see table 1.

### *Symptoms correlation with age and gender*

Upon analyzing the age difference in regard to symptomatology, we found that pressure symptoms, impotence, and incidental are more likely to be the presentation at older ages, while menstrual symptoms, and galactorrhea present at younger ages, see table 2.

Gender differences in relation to biochemical abnormality are shown in Table 3. All functional abnormalities are predominant in female group, with acromegaly group showed the minimal gender differences.

In relation to the size of the adenoma, significant differences were found only for acromegaly ( $p= 0.001$ ), where macroadenoma were more common than microadenoma (data not shown). With regards to aggressiveness in

relation to size, we found a significant difference ( $p< 0.001$ ), where macroadenoma were more likely to be show higher aggressiveness compared to microadenoma (data not shown).

## **Discussion**

Pituitary adenomas are common intracranial pathology with reported prevalence of 3-27% in the general population (8-12). Our data showed that 323 patients were diagnosed to have pituitary adenomas during last eighteen years, included all cases referred to our tertiary academic institution. Reports did not show any geographical or racial differences in prevalence of these tumors.

Daly et al (9) found that 67.6% of those with pituitary adenomas were female and the group had a mean age at diagnosis of 40.3 years. Our cohort demonstrated comparable figures: the number females in our study was 219 (67.8%) whereas the number of males was 104 (32.2%), women to men ratio was 2:1. The mean age was 37.43( $\pm$ 15.52) years.

Macroadenomas were found in 50.4% of our cases, while microadenomas were found in 49.6%. The reported prevalence of pituitary macroadenomas in our current report is higher than previously reported by Hadidi et al (7) at JUH. Another study by Aljabri et al (5) in Saudi Arabia, also showed that macroadenomas were more common (69 %) than microadenomas (31%). We believe that the discrepancy between our results and those of the above mentioned reports could be explained by referral bias in our population as JUH is a tertiary care referral center, and the change in pattern of presentation and improvement of diagnostic methods.

Hyperprolactinemia was found to be the most common biochemical abnormality and

was more prevalent in females than males. These findings are consistent with literature where in Saudi Arabia, 73.5% of pituitary adenomas are prolactin secreting<sup>(5)</sup>. And with the data reported by Daly et al (13), where prolactinomas were most common followed by growth hormone excess. One hundred and twenty-seven patients (43.6%) presented clinically with pressure symptoms like headache, vomiting, blurry vision or visual field defects. This is consistent with a study done by Abe et al (14), where headache was the most prevalent symptom among patients with prolactinoma (57.1%). Other common presentations include menstrual irregularities and galactorrhea which is consistent with the study of Aljabri et al (5). Patients with pressure symptoms were significantly older than the group without pressure symptoms (40.65 vs 34.99 years). Our data also show that presentation with impotence was more commonly seen in older individuals. On the

other contrary menstrual irregularities, and galactorrhea, present at younger ages (Table 2). These findings are consistent with the study of Aljabri et al (5).

Our study has limitations due to the retrospective nature of the study, single institute experience, recall of data bias and limitations of confounders studied. This study represents the experience of a single medical center in Jordan, and it would further help if data is collected from different centers to get a more representative national data.

### Conclusion

Pituitary adenomas are benign intracranial tumors with variable characteristics in different cohorts. Our cohort showed comparable pituitary adenomas characteristics with similar reports. Further studies should be encouraged in different hospitals across Jordan to establish a database for pituitary adenomas in Jordan.

**Table 1. Patients Characteristics.**

<b>Total number</b>	<b>323</b>
<b>Age (Mean ±SD)</b>	<b>37.43 ±15.52</b>
<b>Gender</b>	
Male	104 (32.2%)
Female	219 (67.8%)
<b>Size</b>	12.92± 9.51 mm
Macroadenoma	163(50.4%)
Microadenoma	160(49.6%)
<b>Functional status</b>	
Nonfunctioning (Including incidentalomas)	193(59.7%)
Functioning	130(40.3%)
Hyperprolactinemia	80
Acromegaly	34
Cushing disease	10
Hypothyroid	6

MRI findings (isolated or in combination)	
Stalk deviation	127
Invasive	80
Cystic changes	43
Hemorrhage	38

Table 2: Symptoms

		Count	Column N %	Mean age (SD)	P value
Pressure Sx	No	164	56.4%	34.99 (15.32)	0.002
	Yes	127	43.6%	40.65 (15.95)	
Menstrual	No	195	67.0%	41.52 (16.92)	<0.001
	Yes	96	33.0%	29.20 (8.75)	
Galactorrhea	No	239	82.1%	38.87 (16.56)	< 0.001
	Yes	52	17.9%	30.96 (9.59)	
Impotence	No	253	86.9%	36.36 (16.08)	<0.001
	Yes	38	13.1%	44.74 (11.74)	

Table 3: Gender-specific biochemical abnormality

	Male		Female	
	Count		Count	
	<b>Hyperprolactinemia</b>	19(23.7%)		61(76.3%)
<b>Acromegaly</b>	15(44.1%)		19(45.9%)	
<b>Cushing</b>	1(10%)		9(90%)	
<b>Hypothyroid</b>	0(0%)		6(100%)	

References

- Sivakumar W, Chamoun R, Nguyen V, Couldwell WT: Incidental pituitary adenomas. Neurosurg Focus 2011;31(6):E18
- Farooq, Khalid & Malik, Tayyaba: pituitary macroadenomas; demographic, visual, and neuro-radiological patterns. The Professional Medical Journal 2010
- Gittleman, Haley et al.: Descriptive epidemiology of pituitary tumors in the United States, 2004-2009: Clinical article. Journal of neurosurgery 2014; 121: 527-535
- Miller NR. Walsh and Hoyt's Clinical Neuro-ophthalmology, vol 3, 4th ed. Baltimore: Williams and to direct Wilkins,1988: p 1447.
- Khalid S. Aljabri, Samia A. Bokhari, Faisal Y. Assiri, Muneera A. Alshareef, Patan M. Khan: The epidemiology of pituitary adenomas in a community-based hospital: a retrospective single center study in Saudi

- Arabia. Published Online:6 Oct 2016
6. Verdecchia A, De Angelis G, Capocaccia R. Estimation and projections of cancer prevalence from cancer registry data. *Stat Med.* 2002; 21:3511–3526
  7. Hadidy Azmy, Jallad Dana, Haroun Azmi, Mahafza Waleed, Ajlouni Kamel. Pituitary magnetic resonance imaging experience in Jordan. *Neurosciences 2009 (Riyadh, Saudi Arabia)*; 14:143-7
  8. Burrow GN, Wortzman G, Rewcastle NB, Holgate RC, Kovacs K. Microadenomas of the pituitary and abnormal sellar tomograms in an unselected autopsy series. *N Engl J Med.* 1981;304:156-8.
  9. Parent AD, Bebin J, Smith RR. Incidental pituitary adenomas. *J Neurosurg.* 1981; 54:228-31.
  10. Chambers EF, Turski PA, LaMasters D, Newton TH. Regions of low density in the contrast-enhanced pituitary gland: normal and pathologic processes. *Radiology.* 1982;144:109-13.
  11. Muhr C, Bergstrom K, Grimelius L, Larsson SG. A parallel study of the sella turcica and the histopathology of the pituitary gland in 205 autopsy specimens. *Neuroradiology.* 1981;21:55-65.
  12. Costello RT. Subclinical adenoma of the pituitary gland. *Am J Pathology.* 1936;12:205-16.
  13. Adrian F. Daly, Martine Rixhon, Christelle Adam, Anastasia Dempegioti, Maria A. Tichomirowa, and Albert Beckers. High Prevalence of Pituitary Adenomas: A Cross-Sectional Study in the Province of Lie`ge, Belgium. *The Journal of Clinical Endocrinology & Metabolism* 91(12):4769–4775
  14. Abe, T., Matsumoto, K., Kuwazawa, J., Toyoda, I. and Sasaki, K.: Headache Associated With Pituitary Adenomas. *Headache: The Journal of Head and Face Pain* 1998, 38: 782-786
  15. Sutherland G, Florellr, Louwe, Choi W, Sima A: Epidemiology of primary intracranial neoplasms in Manitoba, Canada. *Can J Neurol Sei,* 1987;14:586-592.

## خصائص أورام الغدة النخامية في مستشفى الجامعة الأردنية: خبرة 18 عام في المستشفى

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### الملخص

**الخلفية:** تشكل أورام الغدة النخامية ما يقارب 10 إلى 15 بالمئة من أورام الدماغ، ومعظمها أورام حميدة، وبعضها يتم اكتشافه من خلال الصدفة والبعض الآخر تشكل مجموعة واسعة من الأعراض والأحجام المختلفة.

**الهدف من الدراسة:** يهدف الباحثون في هذه الدراسة إلى عرض خصائص أورام الغدة النخامية المختلفة التي تم تشخيصها في مستشفى الجامعة الأردنية على مدى 18 عام من حيث عمر المريض وجنسه وحجم الأورام ووظيفية هذه الأورام.

**الطرق:** تم عمل دراسة بأثر رجعي على جميع ملفات المرضى الذين تم تشخيصهم بورم في الغدة النخامية في المدة الزمنية الواقعة بين عامي 2001 و2019 في مستشفى الجامعة الأردنية. وتم شمول 323 مريض في هذه الدراسة. وجميع المعلومات الخاصة بعمر المرضى وجنسهم وحجم الأورام والتقارير الإشعاعية تم جمعها من ملفات المرضى والملفات الإلكترونية.

**النتائج:** أظهرت النتائج أن متوسط أعمار المرضى كان 37.43 (+15.52) سنة. كان من بينهم 104 ذكور بنسبة 32.2 بالمئة و219 أنثى بنسبة 67.8 بالمئة. 160 مريض (49.6%) كان لديهم أورام صغيرة، و163 مريض (50.4%) كان لديهم أوراماً كبيرة. 130 مريضاً (40.3%) كانت أورامهم ذات فاعلية

**الاستنتاج:** أورام الغدة النخامية هي أورام حميدة ولها خصائص مختلفة بحسب الدراسات المتعددة، يجب أن يتم تشجيع دراسات أخرى في مستشفيات مختلفة في الأردن من أجل عمل قاعدة معلومات عن هذه الأورام في الأردن.

**الكلمات الدالة:** أورام الغدة النخامية، مستشفى الجامعة الأردنية، الغدة النخامية.