



Pituitary Incidentaloma: A Tertiary Care Single Center Experience from Pakistan

Muddasar Ahmed^{1*}, Sadeem Lodhi², Muhammad Nadeem Sohail³, Muhammad Asif¹, Abdul Sattar Anjum² and Salma Tanweer¹

¹Department of Endocrinology, Nishtar Hospital, Multan, Pakistan

²Department of Radiology, Nishtar Hospital, Multan, Pakistan

³Nishtar Hospital, Multan, Pakistan

*Corresponding author: Muddasar Ahmed, Post-Graduate Training Fellow in Endocrinology, Nishtar Hospital, Multan, Pakistan, E-mail: endophysician1985@gmail.com

Received date: April 01, 2021; Accepted date: April 16, 2021; Published date: April 23, 2021

Abstract

Background and Objectives: With the extensive use of MRI now a days, the discovery of pituitary incidentalomas is increasing worldwide. We aimed to determine the prevalence of pituitary incidentaloma at Nishtar Hospital Multan.

Methodology: It was retrospective observational study. We retrieved post-contrast MRI-brain from the PACS system of department of Diagnostic Radiology, Nishtar Hospital Multan, Pakistan during September 2017 to September 2020 and then analyzed the films for incidental pituitary lesions.

Results: 606 MRI brains were reviewed, and 100 cases of pituitary tumors identified (16.5%). The pituitary tumors comprised of 65 cases of macroadenoma (65%) and 35 cases of microadenoma (35%). Pituitary incidentalomas were equally distributed between male and female patients. However, microadenomas were more prevalent in females and macroadenomas in males (p-value<-.0001). Males were more likely to harbor macroadenomas at later age, whereas females had a younger age of diagnosis with microadenoma.

Conclusion: In conclusion, pituitary adenomas were discovered in 1 out of 6 patients. Furthermore, macroadenomas were more common in middle to old age males in contrast to the females where microadenomas tend to occur at a younger age.

Keywords: Pituitary incidentaloma; sellar masses; pituitary tumor; microadenoma; macroadenoma.

Introduction

Worldwide incidence of pituitary lesions ranges from 1.5% to 38% in different studies. Tumors in the pituitary area can arise from the six subtypes of pituitary cells, Rathke's cleft ectodermal cells, neurons, fat cells, vessels, meninges, germ cells and metastatic deposits. Despite all these etiologies pituitary adenoma is the most common lesion accounting for 91% of the cases in one series [1]. Amongst the pituitary adenomas, Prolactinoma is the most common tumor followed by nonfunctioning adenoma, Growth hormone secreting tumor, ACTH

producing tumor and TSH producing tumor, respectively [2]. Pituitary tumors can be sporadic or familial. These can occur as an isolated lesion or as a part of bigger syndromes involving multiple endocrine systems [3]. Pituitary adenomas are categorized on the basis of hormone secretion (functional or nonfunctional) and size [macroadenomas (>1 cm) or microadenomas (<1 cm)]. Macroadenomas pose threat to the surrounding structures by invasion while microadenomas exert their effects by producing endocrine substances which contribute to the mortality and morbidity [4]. Surgery is the treatment of choice for nonfunctional tumors and all functioning tumors except prolactinoma which is treated medically. Other treatment modalities can be deployed where indicated and include medical therapy, radiotherapy, and chemotherapy [5].

Traditionally, CT scans and MRI are both used for brain imaging, but MRI is more sensitive at picking pituitary lesions. The routine MRI study includes contrast/without contrast brain imaging. Sequences include pre-contrast T1-weighted and T2-weighted coronal/sagittal sections and post-contrast T1-weighted spin-echo. Pituitary masses are best visualized using thin slices and delayed images using above sequences [6].

There is a paucity of data on pituitary incidentaloma in Pakistan. Our aim is early radiological detection of pituitary masses. It will provide a window of opportunity for neurosurgeons and endocrinologists to fix these lesions before significant growth or hormonal activation occurs.

Material and Methods

It was a retrospective observational study conducted after approval from the ethical review committee. Our sample comprised of 606 MRI brain with IV-contrast which were done at Nishtar Hospital Multan in the last 3 years from September-2017 to September-2020 regardless of the indications, gender, and age. Sampling was consecutive in the date order from old to new. Nishtar Hospital Multan is one of the busiest tertiary care centers in Pakistan providing health services to people from all over the country. Nishtar Hospital is equipped with two 1.5 T MRI capable of performing dozens of MRI brain plain/contrast per day. Due to this magnitude of MRI scans being done at Nishtar Hospital, we had the opportunity to analyze a large data for pituitary incidentalomas.

Our study includes all the brain MRI that is with contrast regardless of whether they are done with or without pituitary protocols. No MRI brain was excluded from this study. All the scans meeting the inclusion criteria were added. After retrieval of DICOM files from PACS system we analyzed the scans using Radiant viewer focusing only on the pituitary gland. While reporting, we were accompanied by a senior consultant Radiologist having experience of more than 10 years. A pro forma was designed using four parameters: Pituitary lesions (present or absent), size (microadenoma or macroadenoma), age and gender. All the findings of individual scans were entered on the pro forma.

The data was entered and analyzed in SPSS version 23. The descriptive statistics were run for both qualitative and quantitative variables. Presence and type of pituitary incidentaloma was examined with regard to age groups and gender using chi-square test and p-value ≤ 0.05 was taken as significant.

Results

Our study showed the prevalence of pituitary incidentaloma was 16.5% (n=100) (Figure 1). Pituitary macroadenoma constituted 65 cases (65%) and 35 cases belonged to pituitary microadenomas (35%). The pituitary tumors were equally distributed in both male and female patients. On the other hand, macroadenoma was common in males (69.2%, n=45) while microadenoma was common in females (85.7%, n=30) (Table 1).

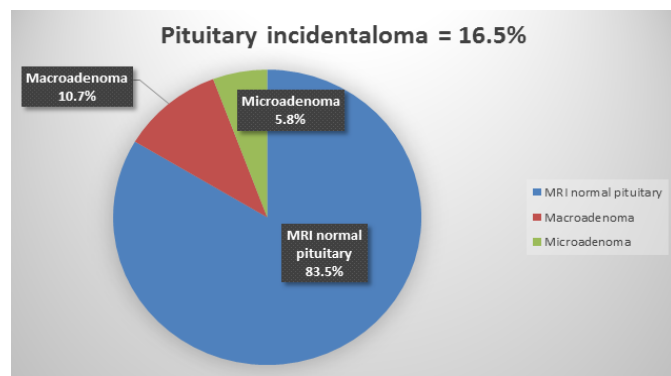


Figure 1: Prevalence of pituitary incidentaloma.

Gender	Microadenoma (n=35)	Macroadenoma (n=65)	p-value
Male	5 (14.3%)	45 (69.2)	0.0001
Female	30 (85.7)	20 (30.8)	

Table 1: Distribution of pituitary incidentalomas with regards to gender (n=100).

Age distribution of pituitary incidentalomas reveals that there was no case of macroadenoma in <20 years age group. However, 28.5% (n=10) cases of microadenomas were detected in <20 years age group. Similarly, prevalence of macroadenomas in >40 year age group was higher (38.5%) compared to microadenomas (14.3%) (Table 2).

Age (in years)	Microadenoma (n=35)	Macroadenoma (n=65)	p-value
<20	10 (28.5%)	0 (0%)	0.0001
20-40	20 (57.2%)	40 (61.5%)	
>40	5 (14.3%)	25 (38.5%)	

Table 2: Distribution of pituitary incidentalomas with regards to age (n=100).

Discussion

The prevalence of pituitary incidentaloma in our study was 1 out of 6 scans. Roughly 2/3rd of tumors are macroadenomas and remaining 1/3rd are microadenomas. The estimated worldwide prevalence of pituitary incidentalomas is between 1.5% to 38% in different studies and depends on the definition, era of study, population and on several factors. Although all the previous studies did not represent our population, our study showed a concordance in terms of prevalence. The two distinct way of diagnosing this condition is *via* autopsy or

Imaging modality *i.e.*, high resolution CT or 1.5 T MRI. The mean prevalence rate of incidentalomas on autopsy was 10.7% as calculated in a meta-analysis and it states that the lesions were equally distributed between age groups and genders [7]. The diagnosis of these lesions has been increasingly recognized owing to advancing technologies and better resolutions of the CT and MRI [8]. On the other hand, few studies demonstrated increased prevalence in elderly population.

Walter et al. were able to demonstrate the prevalence of pituitary incidentalomas in normal volunteers by using gadolinium contrast and high-resolution MRI. They were able to conclude that 10% of men and 10% of women had microadenoma that was 3-6 mm in size as demonstrated by the decreased intensity of focal areas on MRI. They compared it with prevailing data based on autopsies. Occult pituitary adenomas were 3% to 27% on autopsies at that time. And they concluded that 10% of normal population had microadenomas [9].

The pituitary adenomas can be seen on CT scan, but their sensitivity is quite low, and they can only demonstrate macroadenomas at times. A study showed only 0.2% incidences of pituitary macroadenomas on CT scan [10]. That was the reason we chose MRI for our study. The size of pituitary gland should not be more than 9 mm, but a normal variation of increased pituitary height is observed in pregnant women or due to age related changes of hypothalamic-gonadal axis [11].

The predominant findings of microadenoma in females are likely due to the reason that most tumors are prolactinomas which manifests earlier in the form of infertility or galactorrhea.

Whereas men do not have any specific symptoms unless the significant tumor growth occurs resulting in mass effect like headache, visual loss, and hormone deficiencies.

The management of incidentally found adenoma of pituitary gland is largely dependent on suspected nature of the tumor (*i.e.*, pituitary adenoma, cystic lesion, Rathke's cleft cyst or craniopharyngioma), size, symptoms (optic chiasm compression) and hormonal status. The endocrine society suggests that initial approach should be history and relevant physical examination followed by neuroimaging and visual field examinations. Lastly, surgery is offered to the patients with macroadenoma and clinical manifestations due to pressure effect [12]. As a result of surgery and or radiotherapy, most of the patients develop pituitary hormone deficiencies [13]. Replacement and optimization of deficient hormones is required in whom surgery and or radiotherapy was used. Prolactinomas are treated with dopamine agonist and rarely require surgery or radiotherapy [14]. Lifelong surveillance of tumor is required with serial imaging and pituitary hormone profiles, whereas genetic testing is increasingly being utilized for the diagnosis and prognosis of pituitary tumors [15,16].

Limitation

We analyzed the data of past 3 years only so our study could not show whether the prevalence is the same or changed. We get referred patients with suspected brain pathology so this study may not represent general population. Technical artifacts due partial volumes when 3 mm cut includes part of different anatomical structures and mimic adenoma. Magnetic susceptibility artifact results in geometrical distortion and signal changes. Pituitary lesions of less than 3 mm may be missed by MRI.

Conclusion

Pituitary Incidentalomas are not uncommon in our population. MRI can unveil various condition of pituitary gland incidentally even before any symptoms or signs. The morbidity and mortality from these lesions can be greatly reduced by paying special emphasis on pituitary area while reporting an MRI. Although the results of this study are concordant with the international prevalence, large scale studies are still needed to consolidate these findings in our population.

References

1. Freda PU, Beckers AM, Katznelson L, Molitch ME, Montori VM, et al. (2019) Pituitary incidentaloma: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab* 96: 894-904.
2. Arafah BM, Nasrallah MP (2001) Pituitary tumors: pathophysiology, clinical manifestations and management. *Endocr Relat Cancer* 8: 287-305.
3. Vandeva S, Jaffrain-Rea ML, Daly AF, Tichomirowa M, Zacharieva S, et al. (2010) The genetics of pituitary adenomas. *Best Pract Res Clin Endocrinol Metab* 24: 461-76.
4. Molitch ME (2017) Diagnosis and treatment of pituitary adenomas: A review. *JAMA* 317: 516-524.
5. Solari D, Pivonello R, Caggiano C, Guadagno E, Chiamonte C, et al. (2019) Pituitary adenomas: What are the key features? What are the current treatments? Where is the future taking us? *World Neurosurg.* 127: 695-709.
6. Faje A, Tritos NA, Swearingen B, Klibanski A (2016) Neuroendocrine disorders: Pituitary imaging. *Handb Clin Neurol* 136: 873-85.
7. Lania A, Beck-Peccoz P (2012) Pituitary incidentalomas. *Best Pract Res Clin Endocrinol Metab* 26: 395-403.
8. Molitch ME (2008) Nonfunctioning pituitary tumors and pituitary incidentalomas. *Endocrinol Metab Clin North Am* 37: 151-71.
9. Hall WA, Luciano MG, Doppman JL, Patronas NJ, Oldfield EH (1994) Pituitary magnetic resonance imaging in normal human volunteers: occult adenomas in the general population. *Ann Intern Med* 120: 817-20.
10. Nammour GM, Ybarra J, Naheedy MH, Romeo JH, Aron DC (1997) Incidental pituitary macroadenoma: a population-based study. *Am J Med Sci* 314: 287-91.
11. Bjornerem A, Straume B, Midtby M, Fonnebo V, Sundsfjord J, et al. (2004) Endogenous sex hormones in relation to age, sex, lifestyle factors, and chronic diseases in a general population: the Tromso Study. *J Clin Endocrinol Metab* 89: 6039-6047.
12. Paschou SA, Vryonidou A, Goulis DG (2016) Pituitary incidentalomas: A guide to assessment, treatment and follow-up. *Maturitas* 92: 143-149.
13. Theodoros D, Patel M, Ruzevick J, Lim M, Bettgowda C (2015) Pituitary adenomas: Historical perspective, surgical management and future directions. *CNS Oncol* 4: 411-429.
14. Varlamov EV, McCartney S, Fleseriu M (2019) Functioning Pituitary Adenomas - Current Treatment Options and Emerging Medical Therapies. *Eur Endocrinol* 15: 30-40.
15. Lissett CA, Shalet SM (2000) Management of pituitary tumours: strategy for investigation and follow-up. *Horm Res* 53: 65-70.
16. Shaid M, Korbonits M (2017) Genetics of pituitary adenomas. *Neurol India* 65: 577-587.