

## Relationship of Pituitary Gland Size with Both Age & Gender on Magnetic Resonance Imaging in Patients Visiting a Private Diagnostic Center

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### Abstract

### Original Research Article

Pituitary gland plays a central role in body's growth, metabolism, and reproductive function. The size of pituitary gland is of great importance. It varies with age with different pathologies most commonly with pituitary adenomas. That's why documenting its size in the normal population is of great importance to differentiate normal from abnormal. This study aims to produce some standard reference values for the dimensions of the gland the height, width, depth and volume of the gland were calculated using MRI as the technique of choice on a 0.5T machine using turbo spin echo sequence in a group of 50 patients visiting a private diagnostic center. These patients showed no signs of any pituitary anomaly. Our results showed mean pituitary height for males, females and total subjects (Mean+SD) 6.00±2.3, 6.29±1.87, 6.14±2.47 respectively. Our study showed values in accordance with the studies conducted internationally for the normal values of pituitary. In addition to this we formulated relations between the gland's dimensions with age and gender.

**Keywords:** Pituitary Gland, Magnetic Resonance Imaging, Pituitary Gland with age.

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## INTRODUCTION

Pituitary gland lies in the pituitary fossa within the sphenoid bone. It has a hollow stalk, the infundibulum which arises from the tuber cinereum in the floor of third ventricle [1]. The pituitary gland produces a series of hormones that either control most of the other hormone glands in the body or have a direct effect on specific organs [2, 3].

It controls almost all the fundamental functions of our body<sup>4</sup>. Variation in its size can result in some anomaly to differentiate normal from abnormal we want to calculate a somewhat normal range of variation in pituitary gland's size.

This research report aims to acquire data about the size of pituitary in different age groups. We aim to define a somewhat proper relationship between the gender, age and the size of pituitary gland using magnetic resonance imaging. Despite its significance Majority of the work done on the size of pituitary gland is 10 to 20 years old. We want to modify and upgrade the older information by collecting new data.

Because pituitary is one of the most important and main glands of human body, controlling most of the functions. We aim to define normal biological variation in the morphology and size of the pituitary gland and fossa because this information is critical for identifying potential pathological changes.

Change in the size of pituitary has been documented through the years using different modalities, earlier studies used computed tomography for the measurement of pituitary size. At that time the results acquired by CT & MRI were nearly equivalent but if we are talking about modern day technology then MRI has surpassed in advancement and has become the modality of choice for imaging pituitary gland.

In 2015 a study conducted on northwest Nigerian people showed that there is no significant statistical difference between the pituitary height and volume in both sexes. The mean pituitary heights were 6.45 ± 1.7 mm and 6.46 ± 1.57 mm in males and females, and The mean pituitary volumes were 334.1 ± .145.8 mm(3) and 328.1 ± 129.2 mm(3) respectively[5]. Tribhuvan University, Kirtipur Nepal

conducted a study on 170 patients with no pituitary anomaly. The results showed a linear increase in the size of pituitary gland during the first 30 years of life. The volume showed an increasing growth trend before the age of 20, In children the growth increased in the early teenage years (10 to 14 years old), and was more evident in females compared with males[6]. These results indicated that the growth of the pituitary gland was more prominent in adolescents, particularly in females.

## MATERIALS AND METHODS

The study was conducted under the supervision of department of medical imaging technology of the University of Lahore. This was a Cross-sectional analysis using Head MRI scans of people with no pituitary anomaly (26 males & 24 females) with ages ranging from (14-87 years) from a Siemens 0.5T MRI scanner unit located in Aznostics diagnostic center Lahore.

### Measurements

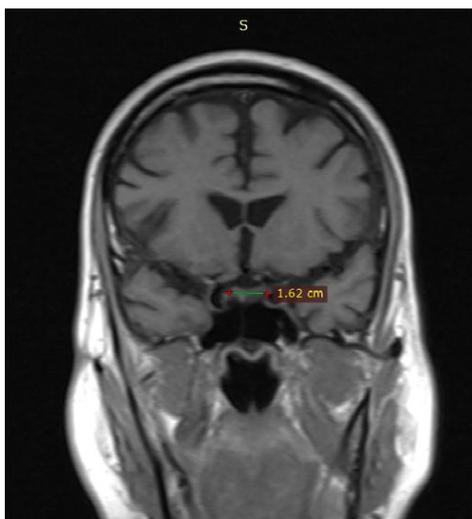


Fig-1



Fig-2

The data was collected conveniently from 50 patients whose ages were 14 or over. We obtained the height, width and depth from mid-sagittal and coronal planes and calculated the volume from these parameters.

The selection of patients was in accordance with convenient sampling, first 50 patients who visited the private diagnostic center for head scan

### Exclusion criteria

- Patients being assessed for pituitary abnormality

- Patients with pituitary anomaly
- Patients with previous brain surgery
- Patients on exogenous hormone therapy.

Figure 1 shows pituitary gland the height, width, depth and volume of the gland were calculated using MRI as the technique of choice on a 0.5T machine using turbo spin echo sequence in mid sagittal and coronal views.

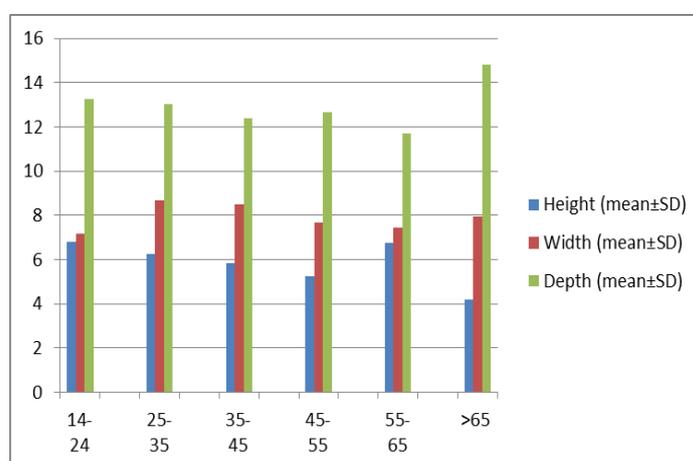
## RESULTS

**Table-1: The table below shows the mean values of the parameters and the standard deviation**

	Height (mean±SD)	Width (mean±SD)	Depth (mean±SD)
14-24 (n=10)	6.81±2.4	7.16±1.28	13.25±1.9
25-35 (n=13)	6.24±2.2	8.67±1.5	13.03±2.2
35-45 (n=10)	5.82±3.2	8.48±1.02	12.40±1.8
45-55 (n=5)	5.25±0.93	7.65±0.73	12.66±3.3
55-65 (n=9)	6.76±2.6	7.43±2.5	11.72±3.1
>65 (n=3)	4.18±1.2	7.94±1.24	14.8±1.06

**Table-2: Table represents the data collected split into the 6 age categories**

	Height (mm) (mean±SD)	Width (mm) (mean±SD)	Depth (mm) (mean±SD)
Male (n=26)	6.00±2.3	7.98±1.3	12.5±2.5
Female (n=24)	6.29±1.87	7.94±1.91	13.07±2.21
Total (n=50)	6.14±2.47	7.96±1.63	12.7±2.3



**Fig-2: This bar graph illustrates how the pituitary dimensions in correlation with age**

At first we produced a table where we separated the subjects on the basis of their sex (Table 1), Then in the second table we grouped the same subjects on the basis of their age putting them in six sub groups (Table 2), We calculated the height, width and depth of the gland by the procedure mentioned in the materials and methods above. We calculated their standard deviations and mean values.

The data Collected was tabulated in tables, as the purpose of this study is to compare the pituitary size between different age groups and genders. A graph was also made to demonstrate the changes between the dimensions of pituitary gland with age shown in (Fig 2).

No pituitary height greater than 11.4 or lesser than 3.32; Width greater than 12.0 or lesser than 3.00; Depth greater than 16.6 or lesser than 9.42 was noted in a female patient. No pituitary height greater than 14.4 or lesser than 2.26; Width greater than 11.1 or lesser than 5.52; Depth greater than 16.7 or lesser than 6.89 was noted in a male patient.

## DISCUSSION

We use MRI brain to assess the anomalies that are not visible on other modalities. It is usually performed to visualize brain's anatomy due to its superior soft tissue resolution [7, 8]. Pituitary gland is dubbed as the master gland in our body [9] that's why it's of abundant importance, Radiologist look for it to see that if there is any abnormality in pituitary that is causing the body to malfunction. It requires cautious observation to determine whether it's normal or not. We need to define certain parameters to label what is normal and what is not. Despite its importance majority of work done regarding it is decades old [10]. MRI has become the best modality to evaluate pituitary pathology and normal pituitary anatomy [11].

In this study we successfully acquired data correlating with the age and gender using MRI technique. The exclusion criteria were people with extra hormonal therapy, because that would have. Abnormality most commonly people with pituitary adenoma. The incidence of asymptomatic pituitary adenoma is 10% in adult population. People with adenomas were excluded from the study [12].

We obtained the data from mid-sagittal and coronal planes and calculated the volume from these parameters. The parameters of the machine were kept same to assure the reproducibility of the results, because a small. Error can cause a large variation. This study was performed due to lack of data and due to the need to improve the old data with new standards and superior modality.

We calculated the mean values and the standard deviations of the data acquired. The mean values for the pituitary height and standard deviation in of the female subjects is  $6.29 \pm 1.87$ ; width is  $7.94 \pm 1.91$  and depth is  $13.07 \pm 2.21$ . The mean values for the pituitary height and standard deviation in of the male subjects is  $6.00 \pm 2.3$ ; Width  $7.98 \pm 1.3$  and the depth is  $12.5 \pm 2.5$ . The mean pituitary height was the highest in the first age group ((14-24) (Table 3))  $6.81 \pm 2.4$  and smallest in people with ages ( $> 65$ )  $6.81 \pm 2.4$ . The mean pituitary height in females  $6.29 \pm 1.87$  was slightly greater than that of the males  $6.00 \pm 2.3$ .

This shows that the height of gland increases. With puberty then declines with age and is affected more in females than males. The depth of the pituitary gland is the greatest in the last age group i.e. ( $> 65$ )  $14.8 \pm 1.06$  the trend acquired from the study suggests that the pituitary height decrease with age and the depth increases with age. The normal pituitary height suggested by the data obtained is  $6.14 \pm 2.47$  (Mean+SD) as this study was done on a small sample size on a limited population; further studies and analysis are required to validate this information.

## CONCLUSION

This study incorporates up to the minute data regarding the dimensions of pituitary gland and the changes they go through with increasing age and the variations with gender and that magnetic resonance imaging is the modality of choice for imaging pituitary gland. It provided a trend that needs to be validated with further studies and analysis on a bigger population.

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