

## The normal dimensions of the Sella Turcica in North Karnataka region- A Computed tomographic study

Lohit V Shaha<sup>\*</sup>, Babasaheb G Patil<sup>\*\*</sup>, Sanjeev I Kolagi<sup>\*\*\*</sup>

### Abstract

**Aim of the study:** Sella turcica is an important structure in middle cranial fossa. It is a saddle shaped concavity in the body of sphenoid bone. It is bounded by dura of cavernous sinuses bilaterally, the lamina dura and dorsum sellae posteriorly and the tuberculum sellae and planum sphenoidale anteriorly. The present study was undertaken to study the normal dimensions of sella turcica morphometry.

**Material and methods:** This observational study was conducted in S Nijalingappa medical college and HSK hospital, Bagalkot. 1650 computed tomographic images of healthy Indians aged 21-70 years were collected. Radiant Dicom viewer software was used to determine the linear dimensions of sella turcica. Data was analysed using t test and ANOVA with Epi Info software.

**Results:** The mean values (in millimeter) of length, width and height of sella turcica in different age groups was  $8.80 \pm 1.65$ ,  $10.83 \pm 1.35$  and  $8.52 \pm 1.50$ .

**Conclusion:** The dimensions of sella turcica vary in different populations and these findings could form an initial database for Indian population which may provide a good anatomical knowledge during objective evaluation and detection of pathological conditions of sella turcica and hypophysis cerebri.

**Key words:** Sphenoid bone, Linear dimensions, Hypophysis cerebri

### Introduction

Sella turcica is an important structure in middle cranial fossa. It is a saddle shaped concavity in the body of sphenoid bone. Sella turcica gets its name from Turkish language because of its similarity to the hypophyseal fossa. The pituitary gland is situated in the hypophyseal fossa. It is bounded by dura of cavernous sinuses bilaterally, the lamina dura and dorsum sellae posteriorly and the tuberculum sellae and planum sphenoidale anteriorly (1,2,3)

The importance of morphometry of sella turcica in connection with occurrence of symptoms of pituitary gland diseases has long been recognized. Microsurgery is required for effective and

safe treatment of various pituitary disorders such as macroadenomas or craniopharyngiomas. All anatomical details concerning the possible variants of sellar region must be taken into account by neurosurgeons in order to decide the surgical approach (transfrontal, transethmoidal, transsphenoidal, sublabian or endonasal) to be chosen (4)

The enlarged sella turcica on a radiograph has been found to be associated with adenomas, meningiomas, primary hypothyroidism, prolactinoma, gigantism, acromegaly, empty sella syndrome and Neison's syndrome. A small size may lead to decreased pituitary function causing symptoms such as short stature and retarded skeletal growth(5)

The computed tomography (CT) scan is superior option than X-ray to study the bony parameters. The aim of this study was to determine the average dimensions of sella turcica in different age groups.

### Materials and Methods

The radiographic study was conducted after obtaining Institutional ethics committee clearance, during a time period of two years from December 2015 to November 2017. The study included 1650 computed tomographic images of skull covering sellar region from the patients of age group between 21-70 years of both the genders from the department of radiology of S Nijalingappa medical college and HSK hospital, Bagalkot, Karnataka and were grouped into five categories based on the age, i.e., 21-30, 31-40,

\* Phd Scholar, \*\* Professor,

Department of Anatomy, Shri B M Patil Medical College and Research Center, BLDE (Deemed to be University), Vijayapura- 586103. Karnataka, India

\*\*\* Professor and HOD, Department of Anatomy, S Nijalingappa Medical College, HSK Hospital and Research Center, Bagalkot – 587103. Karnataka, India

### Address for correspondence :

Lohit V Shaha

Phd Scholar, Department of Anatomy,

Shri B M Patil Medical College and Research Center,

BLDE (Deemed to be University),

Vijayapura 586103. Karnataka, India

E mail – drlohitshaha83@gmail.com Mobile no - 9986289021

41-50, 51-60 and 61-70 years respectively. The images were analyzed for sellar morphology by using Radiant dicom viewer software.

#### Inclusion criteria

CT of normal brain.

CT of normal PNS covering the sellar region.

CT images having clear visualization.

#### Exclusion criteria

Head injury cases.

Road traffic accident cases.

CT images having poor quality.

The following measurements were calculated (FIGURE 1)

1. **Sellar length:** was measured as the distance from the tuberculum sellae to the posterior clinoid process.
2. **Sellar width:** (anteroposterior greatest diameter): was measured from the sellar anterior(SA) to sellar posterior(SP).
3. **Sellar height :** was calculated by using vertical distance, as measured perpendicular to Frankfort horizontal(FH) from a point midway between Tuberculum sellae and posterior clinoid process (PClin) to sellar floor (6).

**Table 1. Age wise distribution of sella turcica parameters**

Parameters	N	Mean	SD	Min	Max	p value	Significance
<b>Sellar length (mm)</b>							
21 – 30 years	568	8.71	1.66	5.3	13.7	0.56	ns
31- 40 years	427	8.73	1.64	5.1	13.8	0.42	ns
41- 50 years	217	8.98	1.60	5.6	13.2	0.93	ns
51-60 years	254	8.80	1.59	5.6	13.4	0.38	ns
61- 70 years	184	9.06	1.76	5.5	13.6	0.5	ns
Total	1650	8.80	1.65	5.1	13.8		
<b>Sellar width (mm)</b>							
21 – 30 years	568	10.83	1.35	7.2	15.5	0.94	ns
31- 40 years	427	10.74	1.34	7.7	15.6	0.74	ns
41- 50 years	217	10.97	1.28	7.3	14.2	0.82	ns
51-60 years	254	10.75	1.36	7.2	15.2	0.07	ns
61- 70 years	184	11.0	1.46	7.4	15.4	0.9	ns
Total	1650	10.83	1.35	7.2	15.6		
<b>Sellar height (mm)</b>							
21 – 30 years	568	8.46	1.46	5.3	13.2	0.07	ns
31- 40 years	427	8.41	1.52	5.3	13.3	0.2	ns
41- 50 years	217	8.57	1.41	4.2	13.2	0.84	ns
51-60 years	254	8.55	1.48	5.3	12.6	0.82	ns
61- 70 years	184	8.85	1.68	4.2	13.2	0.81	ns
Total	1650	8.52	1.50	4.2	13.3		

N- Number of individuals, SD-standard deviation, ns- not significant

**Statistical analysis:** Data collected was tabulated in microsoft excel and was analysed by Epi Info software. Categorical outcomes were summarized by rates (%) and proportions and numerical outcomes were summarized by mean  $\pm$  SD. The t test and ANOVA were used to test the difference between means.

#### Results

1650 images were analyzed in this study and the range of age was 21- 70 years. The results are shown in table 1. There is no statistical significance in the sellar length, sellar width, and sellar height in different age groups.

#### Discussion

Numerous studies have been done on size of sella turcica, however methods differ widely. Quakinine and Hardy performed a microsurgical anatomical study on 250 sphenoidal blocks obtained from cadavers of different ages, they found the average

transverse width of sella was 12mm, the length 8mm and average height 6mm(7). The size of sella turcica was studied by Axlessen et al in a Norwegian of ages 6-21 years. In their study the sellar length was almost constant and diameter increased with the age(8), It was observed that linear dimensions of sella turcica almost constant in our study. Terditis et al conducted a study on 325 orthodontic patients of 6-49 years of age. They measured linear dimensions on lateral cephalogram, the anteroposterior diameter ranges from 6.0 to 17.0mm, mean value was found to be  $10.9 \pm 1.8$ mm and the depth varied from 2.5 to 12.5mm with a mean of  $7.6 \pm 1.7$ mm(9). Camp conducted a the study on adults(10) and reported the values for the width (termed as length in the present study) and value for height (termed as depth in the present study), as being 10.6mm and 8.1mm, compared to 8.8mm & 8.52mm in the present study.

The linear dimensions were on an average 1.2mm to 2.25mm larger in the present study, when it was compared to a Jordians sample(11).

These discrepancies can be due to difference in method and ethnic origin.

### Conclusion

The findings of this study form an initial database for Indian population which may provide a good anatomical knowledge during objective evaluation and detection of pathological condition of sella turcica and hypophysis cerebri. These findings also guide the neurosurgeons in planning surgical procedures involving sellar region. The results of present study of sellar size may be used as reference guide for future studies about sella turcica morphology.

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