



A Clinical Study to Evaluate the Dimension and Structure of Sella Turcica in Various Skeletal Patterns among Indian Scenario: A Lateral Cephalometric based Original Research Study

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KEYWORDS

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ABSTRACT:

Aim: The sole aim of the study was to evaluate the Dimension and Structure of Sella Turcica by lateral cephalogram in Various Skeletal Patterns among Indian Scenario.

Materials & Methods: This study was intended, abstracted and conducted on 120 patients including 60 male and 60 female subjects in the age range of 25-35 years. The sella turcica of each lateral cephalogram was traced by solo operator to ensure data consistency. The samples were grouped as per their Skeletal Classes based on ANB angle. Group 1 has Skeletal Class I: $2^\circ \leq \text{ANB} \leq 4^\circ$, Group 2 has Skeletal Class II: $\text{ANB} > 4^\circ$, Group 3 has Skeletal Class III: $\text{ANB} < 2^\circ$. Length, Depth and antero-posterior diameter related linear measurements were completed and shape of the sella turcica was checked as per the categorization given by the study of Axelsson et al.

Statistical Analysis and Results: The mean age of all participating patients were 27.2 years. In the age range of 25-28 years, maximum 55 patients reported while in the age range of 33-35 years only 30 patients were seen. For Length measurements sella turcica, the statistical Mean for class 1, class 2 and class 3 jaw relation was 2.91, 1.08, 1.01 respectively. P value was highly significant for Class I. For Antero-Posterior Diameter measurements of sella turcica, statistical Mean for class 1, class 2 and class 3 jaw relation was 2.84, 1.64, 1.03 respectively. P value was highly significant for Class I. One-way ANOVA assessments done Between 3 jaw relations revealed highly significant difference and p value (0.002).

Conclusion: Within the limitations of the study authors concluded extremely significant outcomes and stated that there was high significant difference in the linear Length, Depth and Anter-posterior diameter of sella turcica among the class 1 skeletal patterns only. There was no significant difference in the linear Length, Depth and Anter-posterior diameter of sella turcica among the class 2 and class 3 skeletal patterns.



Introduction

Sella Turcica is a saddle shaped space in the sphenoid bone of cranium cavity. Sella Turcica is very closely related to an endocrinal gland/pituitary gland. As shown and confirmed by several researchers in the literature, Sella Turcica is an imperative bony landmark in orthodontics which is used for accurate assessment of malocclusions, abnormal jaw growth and related prognostic outcomes.¹⁻³ Sella Turcica is also utilized in cephalometric tracing and related events. cephalometric tracing primarily attempted to estimate the position of the maxilla and mandible in relation to cranium. There are several radiological methods those have been tried and experimented in the past to accurately record the Sella Turcica.^{4,5} Most commonly used radiological method to study Sella Turcica is lateral cephalograms. Length, Depth and antero-posterior diameter of Sella Turcica is highly subjective and vary from individual to individual. Researchers have extensively studied the changing patterns of dimensions in Length, Depth and antero-posterior of Sella Turcica.⁶⁻⁷ Therefore keeping all these intermingling facts and information in mind, this study was conducted to evaluate the Dimension and Structure of Sella Turcica by lateral cephalogram in Various Skeletal Patterns among Indian Scenario.

Materials and Methods

This study was planned, designed and conducted on the retrospective methodology. Total 120 patients were screened from the recent archives of the orthodontic patients those treated for their various orthodontic problems. This study was based on lateral cephalograms of all participating patients. All the lateral cephalograms were attempted and developed by single trained radiographic technicians. Standard parameters and techniques were utilized for making all lateral cephalograms. This was to ensure the uniformity and purity of data. Authors included 60 male and 60 female subjects precisely. All studied patients were in the age range of 25-35 years. Inclusion criteria were; lateral cephalograms with high-quality clarity of all cephalometric structures particularly stressing on obvious revelation and detection of the dorsum sellae and tuberculum sellae. All lateral cephalograms those not meeting with above criteria were discarded immediately and fresh lateral cephalograms was attempted accordingly. The sella turcica of each lateral

cephalogram was traced by solo operator to ensure data consistency. Patients with severe sickness or medical condition were not included since these have the potential possibility of altering the size and shape of sella turcica as per the recent studies in the literature.^{3,4,5} For the categorization and analysis, the samples were grouped as per their Skeletal Classes based on ANB angle. Group 1 has Skeletal Class I: $2^{\circ} \leq \text{ANB} \leq 4^{\circ}$, Group 2 has Skeletal Class II: $\text{ANB} > 4^{\circ}$, Group 3 has Skeletal Class III: $\text{ANB} < 2^{\circ}$. The sella turcica of each lateral cephalogram was traced by only one operator. Length, Depth and antero-posterior diameter related linear measurements were completed by using the method given by Silverman & Kisling. Shape related exterior and arrangement of the sella turcica was checked as per the categorization given by the study of Axelsson et al.

Statistical Analysis and Results

All the observational notations were compiled and sent for statistical evaluation using statistical software Statistical Package for the Social Sciences version 22 (IBM Inc., Armonk, New York, USA). The obtained data was subjected to suitable statistical tests to calculate p values and other statistical inferences. Responses and outcomes were analyzed. Table 1 showed that mean age of all participating patients were 27.2 years. In the age range of 25-28 years, maximum 55 patients reported while in the age range of 33-35 years only 30 patients were seen. Male and female were seen in equality (n=60 each). Table 2 illustrated about the fundamental Statistical Description with Level of Significance Evaluation Using Pearson Chi-Square Test for Length measurements sella turcica as per different skeletal pattern. Statistical Mean for class 1, class 2 and class 3 jaw relation was 2.91, 1.08, 1.01 respectively. P value was highly significant for Class I. It was 0.01. Least Statistical Mean was noted for class 3 jaw relation. Table 3 showed the fundamental Statistical Description with Level of Significance Evaluation Using Pearson Chi-Square Test Length measurements for Antero-Posterior Diameter measurements of sella turcica as per different skeletal pattern. Statistical Mean for class 1, class 2 and class 3 jaw relation was 2.84, 1.64, 1.03 respectively. P value was highly significant for Class I. It was 0.04. Least Statistical Mean was noted for class 3 jaw relation. Table 4 demonstrated about the fundamental Statistical Description with



Level of Significance Evaluation Using Pearson Chi-Square Test for Depth measurements of sella turcica as per different skeletal pattern. Statistical Mean for class 1, class 2 and class 3 jaw relation was 2.14, 1.14, 1.21 respectively. P value was highly significant for Class I.

It was 0.02. Least Statistical Mean was noted for class 2 jaw relation. Table 5 is about the evaluation amongst all 3 studied jaw relations using one-way ANOVA. Assessments done Between 3 jaw relations revealed highly significant difference and p value (0.002).

Table 1: Fundamental Demographic Details of all Patients including Age and Gender of Participants

Basic Demographic Details of All Patients		Values (N=120)
Age in Years	Mean ± SD	27.2±2.3
	Range	25-35
Age Group	25-28 years	55 (46%)
	29-32 years	35 (29%)
	33-35 years	30 (25%)
Gender	Male	60 (50%)
	Female	60 (50%)

Table 2: Fundamental Statistical Description with Level of Significance Evaluation Using Pearson Chi-Square Test for Length measurements sella turcica as per different skeletal pattern

Status	Mean	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Square	Chi- df	p value
Length Measurements Sella Turcica								
Class I	10.62	2.91	0.940	0.376	1.96	1.549	1.0	0.01*
Class II	9.73	1.08	0.230	0.940	1.18	1.904	2.0	0.09
Class III	11.30	1.01	0.432	0.935	1.12	1.764	2.0	0.06
*p<0.05 significant								



Table 3: Fundamental Statistical Description with Level of Significance Evaluation Using Pearson Chi-Square Test Length measurements for Antero-Posterior Diameter measurements of sella turcica as per different skeletal pattern

Status	Mean	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Square	Chi- df	p value
Antero-Posterior Diameter of Sella Turcica								
Class I	11.12	2.84	0.650	0.386	1.26	1.249	1.0	0.04*
Class II	10.13	1.64	0.130	0.921	1.34	1.924	2.0	0.06
Class III	10.65	1.03	0.765	0.934	1.12	1.234	2.0	0.08
*p<0.05 significant								

Table 4: Fundamental Statistical Description with Level of Significance Evaluation Using Pearson Chi-Square Test for Depth measurements of sella turcica as per different skeletal pattern

Status	Mean	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Square	Chi- df	p value
Depth Measurements of Sella Turcica								
Class I	7.02	2.14	0.250	0.316	1.16	1.219	1.0	0.02*
Class II	9.03	1.14	0.230	0.121	1.31	1.912	2.0	0.16
Class III	7.05	1.21	0.735	0.914	1.15	1.434	2.0	0.48
*p<0.05 significant								

Table 5: Evaluation amongst all 3 studied Jaw Relations using One-Way ANOVA

Variables	Degree of Freedom	Sum of Squares Σ	Mean Sum of Squares $m\Sigma$	F	Level of Sig. (p)
Between 3 jaw relations	3	2.054	1.238	1.1	0.002*
Within 3 jaw relations	18	2.039	0.125	-	
Cumulative	121.42	12.577	*p<0.05 significant		



Discussion

Sella Turcica has been extensively studied in the literature by several pioneer workers.⁸⁻¹¹ Silverman and other studied about the Roentgen standards for-size of the pituitary fossa from infancy through adolescence. This study was in terms of dimensional status of Sella Turcica in their populations wherein they stated highly critical inferences.¹² Chilton and other co-workers have experimented about the volume of the sella turcica in children. They also stated that more than half of their studied population were having normal sella turcica morphology. Their inferences were in accordance with our results.¹³ Choi and other researchers have performed a study on shape and size of normal sella turcica in cephalometric radiographs. Their inferences were highly significant and clinically applicable also in the indicated clinical situations.¹⁴ Quaknine and colleagues have experimented about the microsurgical anatomy of the pituitary gland and the sellar region. Their results were highly predictable and comparable with Indian scenarios.¹⁵ Preston studied comprehensively about the Pituitary fossa size and facial type in the American population. They also agreed that more than half of their studied population were having normal sella turcica morphology.¹⁶ Elster and other researchers have studied in detail about the Pituitary gland by MR imaging and physiologic hypertrophy in adolescence.¹⁷ Weisberg and other pioneer workers have experimented about the Diagnosis and evaluation of patients with an enlarged sella turcica. They also confirmed the imperative role of dimensional status of Sella Turcica in orthodontic treatment planning and diagnosis.¹⁸ Moreover the Literature has well evidenced about the significant of Sella Turcica in orthodontics.¹⁹⁻²²

Conclusion

Our study results unquestionably showed the dimensional status of Sella Turcica in studied patients with different jaw relationships. Within the limitations of the study authors concluded very critical outcomes. They concluded that there was high significant difference in the linear Length, Depth and Anter-posterior diameter of sella turcica among the class 1 skeletal patterns only. There was no significant difference in the linear Length, Depth and Anter-posterior diameter of sella turcica among the class 2 and class 3 skeletal patterns. Also most of the participants

had the natural/normal/usual sella turcica morphology which was approximately 59.2% of the studied population. Inferences of our study should be considered as suggestive for assuming prognosis for similar clinical circumstances. However, authors expect few large scale studies to be conducted in these regards.

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