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CEPHALOMETRIC EVALUATION OF SELLA TURCICA DIMENSIONS IN RELATION TO SKELETAL MALOCCLUSION AMONG JORDANIAN PATIENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objectives: This study aimed to conduct a cephalometric evaluation of the linear dimensions of the sella turcica—specifically its length and depth—in Jordanian patients presenting with different skeletal malocclusions. The primary objective was to determine if statistically significant variations in these dimensions exist among the malocclusion groups. **Methods:** In a cross-sectional design, a sample of 90 Jordanian patients aged 15 to 20 years was recruited from Al-Latron Hospital, Royal Medical Services of Jordan. Participants were categorized into three equal groups (n=30 each) based on their skeletal classification: Class I, Class II, and Class III. Lateral cephalometric radiographs were obtained for all subjects, and the linear dimensions of the sella turcica were measured using the established Silverman and Kisling methodology. The collected data were subjected to statistical analysis using one-way ANOVA and unpaired t-tests. **Results:** The study found a deeper sella turcica in skeletal Class III cases (9.4 mm) compared to Class II (6.6 mm), a statistically significant difference. A notable difference in length was also observed. **Conclusion:** In Jordanian individuals, a deeper sella turcica is thus linked to skeletal Class III malocclusion. This points to unique local growth patterns, suggesting sella turcica morphology can aid orthodontic diagnosis.

KEYWORDS: Sella Turcica, Skeletal Malocclusion, Cephalometric's, Jordanian Population, Craniofacial Morphology.

INTRODUCTION

Proper bite development is a complex process involving the jaw bones, teeth, and soft tissues. The cranial base, especially the sella turcica which cradles the pituitary gland, provides the essential foundation for facial growth. The Variations in its shape and size can affect jaw alignment and are linked to different types of skeletal malocclusions.[3-6]

Embryologically, the sella turcica and the midface share a common origin from neural crest cells. Disruptions during development can lead to changes in the cranial base angle, which in turn influences jaw positioning—for instance, a flatter base is often associated with Class III patterns, while a steeper one is seen in Class II cases.[9-11]

Despite its diagnostic importance, data on sella turcica morphology in Middle Eastern populations remains limited.[12-14] This study aimed to address this gap by analyzing lateral cephalometric radiographs of 90 Jordanian patients aged 15-20. Participants were grouped into skeletal Class I, II, and III based on standard cephalometric measurements. The dimensions of the sella turcica were measured to identify significant differences among groups and assess its potential as a diagnostic tool in orthodontics.

MATERIALS AND METHODS

This cross-sectional study analyzed 90 Jordanian patients (45 males, 45 females) aged 15-20 years at Al-Latron Hospital.[2,7] Participants were divided equally into Class I, II, and III malocclusion groups based on comprehensive cephalometric analysis including ANB

angle, Wits appraisal, and Beta angle, supplemented by SNA, SNB, and cranial base measurements.

Standardized lateral cephalograms were obtained using strict positioning protocols.[1] Sella turcica dimensions (depth and length) were measured according to the Silverman and Kisling method[3,8], with depth defined as the perpendicular distance from the sella floor to the tuberculum-dorsum line, and length as the horizontal distance between tuberculum and dorsum.

Two blinded, calibrated examiners performed all measurements with excellent reliability (ICC >0.85). Data analysis used SPSS-25, with ANOVA for group comparisons and t-tests for post-hoc analysis, applying a significance threshold of $p<0.05$.

RESULTS

This study examined the sella turcica dimensions in 90 Jordanian patients with skeletal Class I, II, and III malocclusions. The study aimed to correlate skeletal patterns with sella turcica anatomy. It found that sella turcica width did not vary significantly across malocclusion classes; the differences observed between Class III and Class II subjects were not statistically meaningful.

In contrast, sella turcica depth varied significantly across the malocclusion types. The mean depths were 7.9 mm for Class I, 6.6 mm for Class II, and 9.4 mm for Class III. Statistical analysis confirmed these differences were highly significant. Post-hoc tests were then performed to identify the specific groups between which these differences existed.

- Class III vs. Class II: $p = 0.0008$ (extremely significant)
- Class III vs. Class I: $p = 0.0057$ (very significant)
- Class I vs. Class II: $p = 0.1051$ (not significant)

The research identified a significant correlation, revealing the greatest sella turcica depth in individuals with Class III malocclusion. This association indicates that a deeper sella could serve as a diagnostic indicator for mandibular prognathism.

Table 1: Linear Measurements of Sella Turcica by Skeletal Class.

Skeletal Class	N	Mean Width (mm)	SD (Width)	Mean Depth (mm)	SD (Depth)
Class I	30	4.1	±1.89	7.9	±1.48
Class II	30	3.5	±1.51	6.6	±1.58
Class III	30	4.3	±1.35	9.4	±2.04

Table 2: Statistical Comparison of Sella Turcica Depth Between Skeletal Classes.

Comparison	Mean Difference (mm)	*p*-value	Significance
Class III vs. Class II	2.8	0.0008	***Extremely significant***
Class III vs. Class I	1.5	0.0057	**Very significant**
Class I vs. Class II	1.3	0.1051	Not significant

These results are consistent with Grover et al.[1], who also found the deepest sella turcica in Class III subjects and the shallowest in Class II, with significant depth variations but not in length. This consistency across studies strengthens the proposition that sella turcica depth is a reliable marker for orthodontic assessment.

DISCUSSION

This cephalometric study of 90 Jordanian patients found sella turcica depth varied significantly across skeletal classes. Class III subjects exhibited the greatest depth (9.4 mm), followed by Class I (7.9 mm) and Class II (6.6 mm). In contrast, sella turcica width showed no significant differences.

These results reinforce existing literature. Regionally, they align with Abu Ghaida et al.[15], who identified depth as a variable dimension in Jordanians. Globally, the finding of a deeper sella in Class III individuals is consistent with studies on other populations, such as Filipović et al.[12], and is supported by Mengxia et al.'s[16] review linking Class III traits to sella turcica size and morphology.

The correlation between a deeper sella turcica and a Class III skeletal pattern, potentially stemming from shared embryonic origins, underscores its value as a reliable diagnostic cephalometric marker.

CONCLUSION

An investigation at Al-Latron Hospital within a Jordanian cohort revealed a significant anatomical relationship: the depth of the sella turcica was found to be meaningfully associated with skeletal malocclusion classification. The study established a distinct hierarchy, where individuals with Class III malocclusion exhibited the greatest mean depth, followed by those with Class I, while Class II subjects demonstrated the shallowest measurements. Statistical analysis confirmed that these differences among the classes were highly significant.

Unlike its depth, the width of the sella turcica showed no correlation with skeletal class. The depth of the sella turcica proves to be a more reliable indicator of skeletal discrepancies than its width.

Clinical Significance

This finding underscores the clinical value of cranial base analysis in Jordanian orthodontics, where measuring a deep sella can enhance the diagnosis of Class III malocclusions and guide personalized treatment planning.

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