



Upper Facial Height of Adult Human Skulls in Thailand

Kimaporn Khamanarrong MD¹, Tarinee Sawatpanich PhD¹, Bowornsilp Chowchuen MD, MBA²

¹ Department of Anatomy, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

² Division of Plastic Surgery, Department of Surgery, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

Objective: Understanding the similarities and differences in the anatomy of the male and female face is important for the surgeon doing facial reconstructive procedures. The current study aims to evaluate the average normal value of upper facial height from the skull of donated cadavers of males and females for maxillary osteotomy in conjunction with orthodontics.

Materials and Methods: A total of 196 adult dry human skulls (100 males and 96 females) were obtained from donated cadavers in the Department of Anatomy, Faculty of Medicine, Khon Kaen University, Thailand. The length of upper facial height, nasion (n) to prosthion (pr) or n-pr, was measured and the mean length vis-a-vis males and females was assessed using SPSS version 17.

Results: The respective mean upper facial height (n-pr) in males in females was 68.6 and 65.84 mm. The mean length of upper facial height in males was 2.76 mm higher than in females.

Conclusion: Upper facial height measurement in the current study was clinically significant. The data can be used in orthognathic surgery in conjunction with orthodontics for males and females in Thailand.

Keywords: Upper facial height, Human skulls, Thailand

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Understanding the male versus the female face is important for the surgeon who will conduct facial reconstructive procedures like maxillary osteotomy in conjunction with orthodontics⁽¹⁾. The current study aimed to evaluate the average value of upper facial height of Thai males and females from the skulls of donated cadavers.

Materials and Methods

A total of 196 adult dry human skulls (100 males and 96 females), ranging between 33 and 104 years of age at decease, were obtained from the Human Skeleton Research Center, Faculty of Medicine, Khon Kaen University, Thailand. The length of upper facial height (Figure 1, n-pr) was measured using a digital Vernier caliper. The nasion (n) was the point of intersection between the fronto-nasal suture and

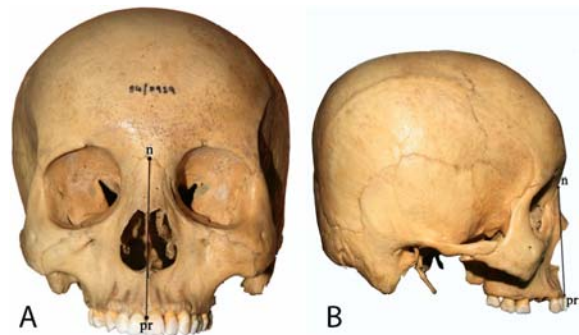


Figure 1. Frontal view (A) and lateral view (B) of the skull (n = nasion, pr = prosthion).

midsagittal plane, and the prosthion (pr) the most anterior point in the midline on the alveolar process of the maxilla (Figure 1). All measurements were done in triplicate so the data represented a mean \pm standard deviation. The data were analyzed using the student t-test and *p*-values less than 0.05 were accepted as statistically significant. Analyses were performed using SPSS version 17.0. The study was reviewed and approved by the Human Ethics Committee (HE#561 135).

Correspondence to:

Chowchuen B, Division of Plastic Surgery, Department of Surgery, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.

Phone: +66-43-363 123

E-mail: bowcho@kku.ac.th

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Results

The respective mean upper facial height (n-pr) among the 100 male skulls vs. 96 female skulls was 68.62 ± 7.73 vs. 65.84 ± 6.59 mm. The mean difference in length of upper facial height among males over against the females was 2.78 mm higher (p -value = 0.007, 95% CI = 0.76, 4.81) (Table 1).

Discussion

The face is commonly considered a key feature in determination of attractiveness⁽²⁾. The study of the normal range and anatomical variation of craniofacial skeleton can be used in maxillary osteotomy in conjunction with orthodontics⁽³⁾. Both skeletal and dental relationships contribute to the smile components, with a statistically significant difference between males and females⁽⁴⁾. The facial aspects of the cranium have been described with respect to their clinical significant^(5,6).

The height of the skull is usually measured from the basion to the bregma, and the proportion of height to length (height $\times 100$)/length constitutes the vertical or height index. The length of the face may be measured from the ophryon or nasion to the chin. The skull of the adult female is typically lighter and smaller, the contour of the face more rounded, the facial bones smoother, and the maxilla and mandible and their contained teeth smaller⁽⁷⁾. In the current study, the mean difference in length of the upper facial height was 2.78 mm higher among the males.

The bones of male skull are much heavier than the female skull with prominent superciliary arches and glabella, eversion of the angle of the mandible, and a large mastoid process⁽⁸⁾. A cephalometric study revealed a significant difference in the ratio of the anterior facial height to posterior facial height between males and females⁽⁹⁾. In the current study, the mean length of upper and lower facial height among males was 2.78 mm higher than females.

Identification of standard landmarks from anthropometrics-the study of the human face and facial proportion⁽⁹⁾-is a component of facial analysis. The

geometric measurement of established, landmarked points is one of the most important elements in the analysis and planning of reconstruction of the vertical and horizontal components of the facial and craniofacial skeleton.

Detailed facial analysis is an important method evaluation of orthognathic surgical patient^(10,11). Diagnostic tools, such as cephalometry, is used for treatment planning of patients with craniofacial deformities, and in orthognathic surgery for the rearrangement of the maxilla-mandibular complex, secondary to congenital malformations and acquired deformities⁽¹²⁾. In orthodontic treatment, postero-anterior cephalometry is useful in patients with facial asymmetry, dento-alveolar asymmetries, dental and skeletal cross-bites and mandibular discrepancies. The 3-dimensional computer-generated measurements typically produce more correct landmarks and various combinations of cephalogram projections compared with direct and CT measurements⁽¹³⁾.

The geometric measurement of established points and landmarks in the current study can be used in the analysis and planning of reconstruction of the vertical component of the facial and craniofacial skeleton among both male and female northeast Thais.

Limitations of the study

The samples at the Human Skeletal Research Center have been uncompleted totally; therefore, the sample sizes were limited.

Conclusion

Upper facial height measurement in the current study was clinically significant. The data can be used for planning orthognathic surgery and orthodontic approaches among ethnic Thais, both males and females.

What is already known on this topic?

The geometric measurement of established points and landmarks are used in the analysis and planning for reconstruction of the vertical component

Table 1. Comparison of upper facial height (n-pr) between males and females

	N	Mean (mm)	SD (mm)	Mean difference (mm)	95% CI	p -value
Males	100	68.62	7.73	2.78	0.76, 4.81	0.007
Females	96	65.84	6.59			

of the facial and craniofacial skeleton.

What this study adds?

This study reported upper facial height among Thais. Facial analysis remains one of the most important elements for evaluation of orthognathic surgical patients.

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Potential conflicts of interest

The authors declare no conflicts of interest.

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ความสูงของใบหน้าส่วนบนจากกะโหลกศีรษะผู้ใหญ่ในประเทศไทย

กิมพร ชมะณะรงค์, ธาธิณี สวัสดิ์พาศิษย์, บวรศิลป์ เชาวนชื่น

วัตถุประสงค์: ความเข้าใจใบหน้าของชายและหญิงมีความสำคัญต่อสัลยแพทย์เพื่อการวิเคราะห์และผ่าตัดเสริมสร้างใบหน้า การศึกษานี้จึงได้วัดความสูง ส่วนบนของใบหน้าจากกะโหลกศีรษะของผู้บริจาคคนไทย เพศชายและเพศหญิง เพื่อเป็นข้อมูลในการผ่าตัดขากรรไกรบนร่วมกับการจัดฟัน

วัสดุและวิธีการ: กะโหลกศีรษะของผู้บริจาคร่างกายของภาควิชากายวิภาคศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่นที่เป็นผู้ใหญ่ จำนวน 196 ราย (ชาย 100 ราย และหญิง 96 ราย) ได้ถูกนำมาศึกษาโดยวัดความยาวของความสูงของใบหน้าส่วนบนจากเนเซียน (n) ไปยังโปรสธอน (pr) หรือระยะ n-pr และวิเคราะห์ความแตกต่างระหว่างเพศชายและเพศหญิง

ผลการศึกษา: ค่าเฉลี่ยของความสูงของใบหน้าส่วนบนในกะโหลกศีรษะเพศชายเท่ากับ 68.62 มิลลิเมตรและเพศหญิงเป็น 65.84 มิลลิเมตร ความสูงของใบหน้าส่วนบนของกะโหลกศีรษะเพศชายมีค่าเฉลี่ยมากกว่าเพศหญิง 2.78 มิลลิเมตร

สรุป: จากการศึกษาความสูงของใบหน้าส่วนบนของกะโหลกศีรษะมีความสำคัญต่อการจัดกระดูกขากรรไกรและในการรักษาฟันที่ไม่เป็นระเบียบในเพศชายและเพศหญิงของประเทศไทย
