# THE CRANIAL BASE IN RELATION TO CRANIOFACIAL SKELETAL PATTERN AND FACIAL HEIGHT AMONG MALAY ADOLESCENTS AGE 8-19 YEARS IN HOSPITAL UNIVERSITI SAINS MALAYSIA


**By**

**Dr. TAWFEEQ ABDULLA AHMED ABDULLA**


**Thesis Submitted In Fulfillment Of the Requirements**

**For The Degree of**

**Master of Science in Dentistry (ORTHODONTICS)**

**JUNE 2008**

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# ABSTRACT

## ABSTRACT

Cranial base measurements in adolescents have been used to interpret differences in craniofacial morphology. Its unique location enables links to the development of the facial complex that influences the developing facial structures. These measurements vary between ethnic groups worldwide. This cross sectional study utilized 150 (98 males and 52 females) 3-Dimensional Computerized Tomography (3D CT) scans of healthy Malay adolescents aged 8-19 years in Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan. The CT scans were further categorized into four subgroups that were 8-10, 11-13, 14-16, and 17-19 years to detect changes in dimensions. These were analysed using the Advantage Workstation AW 4.0-05 with a software package for processing images acquired from medical imaging systems. The anterior cranial base (ACB) measurements in males presented most significant increments in the 11-13 years and 14-16 years age group. The posterior cranial base (PCB) measurements continued to increase from the age of 8-10 years up to 14-16 years but ceased by the age of 17-19 years. The total cranial base (TCB) measurements were significantly increased in the 11-13 years and 14-16 years age group. In females the ACB measurements showed a significant increase in the 8-10 years and 11-13 years age group after which, there were no significant increments. The PCB seemed to grow more slowly and the rate of increments in all the four age subgroups was insignificant. The TCB increments were significantly observed in the age group of 8-10 years through 11-13 years with insignificant subsequent increments in older age groups. The three linear measurements in males had higher values compared to females in similar age sub-group categories. The most obvious differences between sexes were the significant age of growth period where males demonstrated significant

increments after the age of 11-13 years while females showed significant increments at an earlier age of 8-10 years. In both sexes, the cranial base angle (CBA) showed a significant positive correlation with the craniofacial skeletal pattern (ANB). However the CBA did not show any significant relationship with the anterior facial height in both sexes. The cranial base measurements among Malay male and female adolescents in Kota Bharu are similar to those found in several Caucasian data. However cranial base measurements among females illustrated that growth spurts were uncommon after the chronological and skeletal ages of thirteen years. These findings have implications for clinicians in the decisions regarding the timing of orthodontic treatment and orthodontic treatment plan for the Malay ethnic group.

# ABSTRAK

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Ukuran dasar kranium dalam kalangan remaja sering diguna untuk menterjemah perbedaan dalam morfologi kraniofasial. Kedudukan dasar kranium yang unik membolehkan perkembangan kompleks fasial mempengaruhi struktur muka yang sedang membentuk dihubungkaitkan. Ukuran ini nyata berbeda antara kumpulan etnik sedunia. Kajian hirisan lintang ini menggunakan 150 keping (98 lelaki and 52 perempuan) imbasan 3 dimensi tomografi berkomputer bagi remaja etnik Melayu berumur 8-19 tahun di Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan. Imbasan tersebut seterusnya dikategori kepada empat sub-kumpulan umur iaitu 8-10, 11-13, 14-16, and 17-19 tahun bagi mengesan perubahan ukuran. Ia kemudian dianalisa dengan Advantage Workstation AW 4.0-05 menggunakan pakej perisian bagi pemprosesan imej untuk sistem imejan perubatan. Ukuran Dasar Kranium Anterior (DKA) dalam remaja lelaki menunjukkan pertambahan paling signifikan pada sub-kumpulan umur 11-13 tahun dan 14-16 tahun. Ukuran Dasar Kranium Posterior (DKP) terus menunjukkan peningkatan dari umur 8-10 tahun hingga ke 14-16 tahun tetapi berhenti pada sub-kumpulan umur 17-19 tahun. Ukuran Dasar Kranium Total (DKT) menunjukkan pertambahan signifikan dalam sub-kumpulan umur 11-13 tahun dan 14-16 tahun. Bagi remaja perempuan, ukuran DKA menunjukkan pertambahan signifikan pada umur 8-10 tahun dan 11-13 tahun yang mana selepas umur ini, tidak berlaku pertambahan ukuran yang signifikan. Pertumbuhan DKP adalah lebih lambat dan kadar pertambahan adalah tidak signifikan. Ukuran DKT dilihat signifikan pada umur 8-10 tahun hingga 11-13 tahun tetapi pertambahan adalah tidak signifikan dalam sub-kumpulan umur yang lebih tinggi. Ukuran linear dalam remaja lelaki menunjukkan nilai-nilai yang lebih tinggi jika dibandingkan dengan remaja

perempuan dalam kategori sub-kumpulan umur yang sama. Perbedaan yang paling ketara terserlah di antara remaja lelaki dan perempuan adalah tempoh pertumbuhan pada umur yang signifikan di mana remaja lelaki menunjukkan pertambahan yang signifikan selepas umur 11-13 tahun manakala remaja perempuan menunjukkan pertambahan yang signifikan pada umur 8-10 tahun. Bagi kedua-dua jantina Sudut Dasar Kranium (SDK) menunjukkan korelasi positif dengan pola skeletal fasial. Walaubagaimanapun SDK tidak menunjukkan hubungan yang signifikan dengan ketinggian muka bagi kedua-dua jantina. Ukuran dasar kranium dalam kalangan remaja Melayu di Kota Bharu adalah serupa dengan ukuran yang terdapat pada data Kaukasian. Walau bagaimanapun ukuran dasar kranium dalam kalangan remaja Melayu perempuan menunjukkan jarang berlaku pecutan pertumbuhan selepas umur kronologi dan umur skeletal tiga belas tahun. Penemuan ini mempunyai implikasi klinikal terhadap keputusan tentang waktu untuk rawatan ortodontik dan perancangan rawatan ortodontik bagi remaja etnik Melayu.