UNIVERSITI TEKNOLOGI MARA

BIOMETRIC ANALYSIS OF FACIAL FEATURES AND ARCH DIMENSIONS OF MALAYSIAN MALAY

HEBA ABDULKARIM MOHAMMAD

Thesis submitted in fulfillment of the requirements for the degree of
Master of Dental Science (MDSc)

Faculty of Dentistry

May 2011
Candidate’s Declaration

I declare that the work in this thesis was carried out in accordance with the regulation of universiti teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non academic institution of any other degree or qualification.

In the event that my thesis be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree be subjected to the disciplinary rules and regulations of Univesiti Teknologi MARA.

Name of Candidate Heba Abdulkarim Mohammad
Candidate’s ID NO. 2009858916
Programme Master of Dental Science
Faculty Faculty of Dentistry
Thesis Title Biometric Analysis of Facial Features and Arch Dimensions of Malaysian Malay

Signature of Candidate
Date May 2011
ABSTRACT

Many researchers tried to define and prove certain correlation between the different components of biometric, anatomical landmarks and facial features of different ethnic groups. However, these studies may be specific for an ethnic group and cannot always be applied for others. The aim of this study is to evaluate the biometric and radiographic analysis of the craniofacial skeleton in both genders of Malaysian Malay. The method involved clinical examination, collection and analysis of dental casts and lateral cephalometric radiograph of Malaysian Malay subjects. The total sample was collected from the students of Universiti Teknologi MARA and patients attending the dental clinic of Faculty of Dentistry Universiti Teknologi MARA who fulfilled the inclusion criteria. The study sample consists of 60 subjects from Malaysian Malay pure ethnic groups. The ages ranged between 20-24 years old, equal from both genders (30 females and 30 males) selected under specific criteria. This study based on comparison of dental arch dimension, skeletal features and facial profile for both genders. These information were gathered from collection and analyzing of orthodontic dental cast for upper and lower arch and lateral cephalometric radiograph. Several points were determined to measure dental arch width, length, depth and circumference. Digital caliper used for the straight measurements on the dental cast and calibrated tape to measure the anterior and posterior arch circumferences. Lateral cephalometric radiograph was taken for each individual by digital cephalometric machine. Using a special software program (VistaDent OC ver. 4.2.61) all cephalometric landmarks were located and determined and subsequently tracing has been done according to Steiner Analysis. Descriptive statistics were described for all the measurements of this study. Statistical comparisons between the groups (Malaysian Malay and Caucasian and other ethnic groups from previous studies) were done using t-test. The results of this study show that the Malaysian Malay maxilla and mandible is set more forward than Caucasian. They also show bimaxillary dental protrusion when compared to Caucasian. Malaysian Malay has more protrusive upper and lower arch, the chin is less prominent when compared to Caucasian. Malaysian Malay also have higher cant of both the occlusal and the mandibular planes, mandibular posterior rotation when compared to the Caucasian. They also show sexual dimorphism in dental incisor position. The female has measurably more prominent dento-alveolar structure compared to the male. The upper lip of Malaysian Malay female was set to be more protruded than male. Dental arch dimensions were established in normal occlusion for Malaysian Malay ethnic group in this study. No significant difference was observed in arch dimensions between male and female of Malaysian Malay. The conclusion of this study is that the facial features and dental arch dimensions of Malaysian Malay are notably different from that of Caucasian and other populations. These ethnic differences may be considered during treatment, especially in orthodontics and prosthodontics where facial features and arch dimension can be modified appreciably.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANDIDATE'S DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>ix</td>
</tr>
<tr>
<td>LIST OF FIGURE</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF ABBREVIATION</td>
<td>xii</td>
</tr>
</tbody>
</table>

## Chapter 1: Introduction

*Background of the Study*  
*Statement of Problem*  
*Justification of Study*  
*General Objectives*  
*Research Hypothesis*  

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

## Chapter 2: Literature Review

*Dental Cast*  
*Introduction*  
*Dental cast analysis.*  

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Arch dimensions. 8

Cephalometry 19

Introduction. 19

Cephalometric points and reference plane. 19

Lateral cephalometric analysis. 23

Norms in various races. 35

Facial Profile 46

Introduction. 46

Facial profile analysis 46

Chapter 3: Research Methods

Materials and Methods 52

Ethical approval. 52

Sample and population. 52

Inclusion criteria of the sample. 53

Data collection. 54

Dental cast analysis. 54

Cephalometric radiograph analysis. 58

Statistical analysis. 66

Control of error of measurement and analysis. 67

Reliability of measurements. 67