UNIVERSITI TEKNOLOGI MARA

GEOMETRIC MORPHOMETRIC ANALYSIS OF HARD TISSUE AND SOFT TISSUE IN DIFFERENT SKELETAL PATTERNS OF MALAYSIAN MALAY ADULTS

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ABSTRACT

Geometric morphometric is a new method used by anthropologists in examining shape analysis. The traditional measurement of malocclusion relies on cephalometric techniques. Nowadays, the geometric morphometrics method (GMM) for shape analysis could provide better perception and capabilities of measuring the size and shape variations of malocclusion in 2D and 3D dimensions.

This study aims to investigate the size and shape and its variations of hard and /soft tissue patterns in different skeletal relations in adult Malays using the 2-dimensional (2D) geometric morphometrics method from lateral cephalograms. In this study, a total of 188 lateral cephalograms of Malaysian Malay (age18–40 years) were collected and comprised of Class I, Class II, and Class III skeletal relations with 117 females and 71 males. A total of 21 2D-dimensional hard tissue and soft tissue landmarks were applied on lateral cephalograms using tpsDig2 software version 2.31. The MorphoJ software version 1.07a was used for the data and shape analysis. The data were analysed for shape variation according to skeletal relations and gender groups. As a result, 18 shape variations for soft tissue and 16 principal components (PC) for hard tissue variations were produced. Centroid size was significantly different in genders and skeletal relations by Procrustes ANOVA ($P < 0.01$). Canonical variate analysis (CVA) showed the highest Mahalanobis distances and Procrustes distances between Class II and III among skeletal relations and between males and females ($P < 0.0001$). Discriminant function analysis (DFA) among skeletal relations showed the classification was mostly accurate, especially for Class II and Class III with success rates of 92.1% and 88.3%, respectively, after cross-validation. The highest percentages of success rates were 85.4% for females and 87.3% for males after cross-validation among skeletal relations.

In conclusion, there were different ANB angles in different skeletal relations. Class III showed the most protrusive upper and lower lips, while class II demonstrated the most retrusive lower lip. The result of this study could be used to develop an artificial intelligence system for predicting the skeletal and facial morphology of Malay subjects as a guide in diagnosis and treatment planning for orthodontists and maxillofacial surgeons.

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TABLE OF CONTENTS

		Page
CONFIRMATION BY PANEL OF EXAMINERS		**ii**
AUTHOR'S DECLARATION		**iii**
ABSTRACT		**iv**
ACKNOWLEDGEMENT		**v**
TABLE OF CONTENTS		**vi**
LIST OF TABLES		**x**
LIST OF FIGURES		**xiii**
LIST OF ABBREVIATIONS		**xvii**
CHAPTER ONE INTRODUCTION		**1**
1.1	Research Background	1
1.2	Conceptual Framework	4
1.3	Motivation	5
1.4	Problem Statement	5
1.5	Scope and Limitation of the Study	6
1.6	Research Questions	7
1.7	Objectives	7
	1.7.1 General Objective	7
	1.7.2 Specific Objectives	7
1.8	Null Hypothesis	7
1.9	Research Hypothesis	8
1.10	Significance of Study	8
CHAPTER TWO LITERATURE REVIEW		**10**
2.1	Prevalence of Malocclusion	10
2.2	Correlation of Hard and Soft Tissue Patterns	11
2.3	Studies of Previous Cephalometric Norms in Different Populations	14
2.4	A Review on Cephalometric Method and Geometric Morphometric Method	19
	2.4.1 Landmark Application in GMM	25

2.4.2 The Procedures for Calculating Average Shape and Shape Variability in GMM 25
2.4.3 Statistical Analysis 28
2.5 Usage of Geometric Morphometric Method in Different Science Fields and Research Studies 30

CHAPTER THREE RESEARCH METHODOLOGY 34
3.1 Research Design 34
3.2 Study Period and Study Population 34
3.2.1 Inclusion Criteria 34
3.2.2 Exclusion Criteria 34
3.3 Sample Size 35
3.4 Sampling Method 36
3.5 Materials 36
3.5.1 Subject Socio-Demographic Data 36
3.6 Methods 36
3.6.1 Study Conduct 36
3.6.2 Landmarking Application 37
3.6.3 Observational Error Analysis 42
3.6.4 Shape Analysis and Statistical Analysis 42
3.7 Other Statistical Analysis 49

CHAPTER FOUR RESULTS 53
4.1 Data Analysis 53
4.1.1 Outliers 53
4.1.2 Observer Error 54
4.2 Shape Analysis Between Class I, Class II, and Class III Skeletal Relations 55
4.2.1 Generalized Procrustes Analysis (GPA) 55
4.2.2 Principal Component Analysis (PCA) for Class I, Class II, and Class III Skeletal Relations 56
4.2.3 Procrustes ANOVA for Class I, Class II, and Class III Skeletal Relations 60
4.2.4 Canonical Variate Analysis (CVA) Between Class I, Class II, and Class