Measurement of Several Profile Angles in Chinese and Deutro- Malayid Populations in Surabaya to Determine Mean Profile Angles (Anthropometric Study for Surgical Guidance)

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Abstract

Any deviation from normal facial proportions and dental relationships is referred to as a dentofacial deformity. This deformity frequently manifests a complex disorder known as dysgnathia, which necessitates a combination of orthodontics and surgery known as orthognathic surgery to correct. After surgery, alterations in the position of the underlying skeletal bones can affect the facial soft tissues. These alterations have an effect on the facial profile of the patient, making the prediction of the patient's facial profile a crucial step in planning orthognathic surgical treatment.

The purpose of this study is to obtain direction on standard profile angle measurements in the Chinese and Deutro-Malayid populations in Surabaya in order to perform surgery in the maxillofacial region that can result in changes in profile angle measurements. Data was collected from 100 Surabaya residents who meet the research criteria. Statistical calculations using the Hotelling's Trace test on ANOVA test results between the Chinese and Deutro-Malayid populations in Surabaya obtained $p=0.363$ ($p>0.05$).

There was only a significant difference in the submental-neck angle among other variables, with $p=0.041$ ($p<0.05$). No significant differences in profile angles were found between the Chinese and Deutro-Malayid populations in Surabaya.

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Introduction

Dentofacial deformity is a multifactorial abnormality that primarily affects the jaw, teeth, or other craniofacial structures [1–3]. The presence of dentofacial deformities can have a psychological impact on individuals, potentially influencing their self-esteem, decision-making in interpersonal relationships, public behavior, and perceptions of physical attractiveness. These effects can significantly impact an individual’s overall quality of life[4]. These deformities can be categorized as either maxillary, mandibular, or combined[5]. One of the dentofacial malformations is hypoplasia of one-third of the face. This deformity frequently manifests a complex disorder known as dysgnathia, which necessitates a combination of orthodontics and maxillofacial surgery known as orthognathic surgery to correct[6,7]. Orthognathic surgery is a surgical intervention that aims to enhance the intermaxillary connection, hence optimizing the functionality and aesthetics of the jaws. It can be performed on either a single jaw or both jaws[8]. This procedure can enhance the stability of the jaw, the masticatory function of the mouth, and the appearance of the face[9]. However, prior to surgical treatment, a comprehensive clinical evaluation must be performed, which includes the determination of facial type. Evaluation of facial type is essential because it entails the formulation of a treatmentplan[10].

After surgery, alterations in the position of the underlying skeletal bones can affect the facial soft tissues[11]. These changes have an impact on the patient's facial profile. A thorough comprehension of the correlation between bone and tissue movements is crucial for accurately predicting the patient's face profile, which is part

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of diagnostic procedures and orthognathic planning procedures[12–14]. This change's magnitude can be predicted by calculating the magnitude of the underlying hard tissue change[15]. Therefore, surgery to correct the location of facial skeletal tissue is always preceded by a calculation of the abnormal anthropometric values obtained, after which the extent of the abnormal findings will be determined[16]. The angular measurement can be used to diagnose the patient's skeletal pattern by comparing it to normal values and then interpreting the findings of the analysis[5].

Due to the extent of the Chinese and Deuto-Malayid populations in Surabaya, it is necessary to collect scientific data on the average facial profile angle size of the two groups in order to determine a standard average soft tissue profile angle size. If the average profile angle has been determined, surgery prediction can be performed accurately, as surgery preparation can be accomplished by performing model surgery and photo simulations using the anthropometric values derived from this study[17,18].

	Group	N	Mean	Std. Deviation	Std. Error Mean
Glabella-Nasion-Pronasal	Chinese	50	137,7200	7,0219	,9931
	Deutro-Malayid	50	138,000	7,0479	,9967
Pronasal-Subnasal-Superior Labial	Chinese	50	117,4400	6,9903	,9886
	Deutro-Malayid	50	114,2400	8,9797	1,2699
Inferior Labial-Inferior Labial Sulcus-Pogonion	Chinese	50	135,9000	11,0532	1,5632
	Deutro-Malayid	50	134,9600	12,9157	1,8266
Nasofacial	Chinese	50	29,9400	2,9789	,4213
	Deutro-Malayid	50	29,6200	2,9478	,4169
Nasomental	Chinese	50	134,7000	4,7348	,6696
	Deutro-Malayid	50	135,0600	4,7656	,6740
Mentocervical	Chinese	50	96,0600	8,7608	1,2390
	Deutro-Malayid	50	92,8800	10,1953	1,4418
Submental-neck	Chinese	50	123,0800	15,8009	2,2346
	Deutro-Malayid	50	116,6800	15,1111	2,1370
Facial convexity	Chinese	50	9,7000	5,6722	,8022
	Deutro-Malayid	50	9,3000	5,3232	,7528

Table 1. The average profile angle in the Chinese and Deutro-Malayid populations in Surabaya.

Materials and methods

This study is a descriptive cross-sectional research. All Surabaya residents aged 18-25 years who belong to the Chinese and Deutro-Malayid race with the criteria of two generations above are also Deutro-Malayid or Chinese, have Angle Class I occlusion, no history of trauma, no history of orthognathic surgery, no history of surgery in the maxillofacial region, no history of orthodontic treatment, no maxillofacial defects, and no maxillofacial tumors can be the subject of this study. On photographic results printed on 20x25 cm paper, profile angle measurements were taken using facial angles formed and connected by facial anthropometric points. Facial angles that were measured included GNP, PSnLs, LillsPog, nasofacial, nasomental, mentocervical, submental-neck, and facial convexity. The collected data will be analyzed using a multivariate Anova test.

Source	Dependent Variable	Type III Sum of Square	Df	Mean Square	F	Sig.
Group	Glabella-Nasion-Pronasal	1,960	1	1,960	,040	,843
	Pronasal-Subnasal-Superior	256,000	1	256,000	3,954	,050
	Inferior Labial - Inferior Labial Sulcus - Pogonion	22,090	1	22,090	,153	,697
	Nasofacial	2,560	1	2,560	,292	,590
	Nasomental	3,240	1	3,240	,144	,706
	Mentocervical	252,810	1	252,810	2,798	,098
	Submental-neck	1024,000	1	1024,000	4,284	,041
	Facial convexity	4,000	1	4,000	,132	,717

Table 2. The multivariate ANOVA test results between the Chinese and Deutro-Malayid populations in Surabaya.

Effect		Value	F	Hypothesis df.	Error df.	Sig.
Intercept	Pillai's Trace	1,000	149142,3ᵃ	8,000	91,000	,000
	Wilks' Lambda	,000	149142,3ᵃ	8,000	91,000	,000
	Hotelling's Trace	13111,410	149142,3ᵃ	8,000	91,000	,000
	Roy's Largest Root	13111,410	149142,3ᵃ	8,000	91,000	,000
Group	Pillai's Trace	,089	1,112ᵃ	8,000	91,000	,363
	Wilks' Lambda	,911	1,112ᵃ	8,000	91,000	,363
	Hotelling's Trace	,098	1,112ᵃ	8,000	91,000	,363
	Roy's Largest Root	,098	1,112ᵃ	8,000	91,000	,363

Table 3. Different test results for each variable between Chinese and Deutro-Malayid population in Surabaya.

		Chinese	Deutro-Malayid	Caucasoid
Angle	GNP	137,72°	138°	130°
	PSnLs	117,44°	114,24°	100°
	LillsPog	135,9°	134,96°	120°
	Nasofacial	29,94°	29,64°	30-35°
	Nasomental	134,7°	135,06°	120-132°
	Mentocervical	96,06°	92,88°	110-120°
	Submental neck	123,08°	116,68°	121-126°
	Facial convexity	9,7°	9,3°	12°

Table 4. Average profile angle of the Chinese and Deutro-Malayid populations in Surabaya.

Results

The following results were obtained from a research study involving 100 participants, divided into two subject groups: the Chinese and Deutro-Malayid populations in Surabaya.

Statistical calculations using the Hotelling's Trace test obtained p=0.363 (p>0.05). According to the test results, there was no significant difference between the two groups.

Different test results between each variable are provided in Table 3. There was only a significant difference in the submental-neck angle, with p=0.041 (p<0.05)

Discussion

Anthropometric values from the profile of the Chinese and Deutro-Malayid population in Surabaya show different results from the Caucasoid population, which is widely used as a standard guideline for facial profile angle analysis. However, the Anova multivariate test shows the absence of significant differences between each of the measured profile angle. This can be because the population of Chinese and Deutro-Malayid in Indonesia comes from the same main population, Mongoloid. The Deutro-Malayid population is a secondary Mongoloid sub-population, while the Chinese population is a primary Mongoloid sub-population. Both populations have lived in Surabaya since two previous generations, with the same diet, culture, and environment. Both also show the same pattern of class I Angle occlusion. The significant difference is only obtained at the submental-neck angle, which can be caused by differences in fat thickness, which is much influenced by heredity.

The average glabella-nasion-pronasal angle in the Caucasoid population is 130°, whereas it is 137,72° and 138° in the Chinese and Deutro-Malayid populations in Surabaya, respectively. The Chinese and Deutro-Malayid populations in Surabaya have a more blunt glabella-nasion-pronasal angle than the Caucasoid population, resulting in a more gentle noseprofile.

The average pronasal-subnasal-superior labial angle in the Caucasoid population is 100°, whereas it is 117,44° and 114,24° in the Chinese and Deutro-Malayid populations in Surabaya, respectively. The average angle inChinese and Deutro-Malayid populations in Surabaya is more blunt than in the Caucasoid population, resulting in a flatter upper lip profile.

The average inferior labial-inferior labial sulcus-pogonion angle in the Caucasoid population is 120°, whereas it is 135,9° and 134,96° in the Chinese and Deutro-Malayid populations in Surabaya, respectively. The average angle in Chinese and Deutro-Malayid populations in Surabaya is more blunt than in the Caucasoid population, resulting in a flatter chin profile.

The average nasofacial angle in the Caucasoid populations in 30-35°, whereas in the Chinese and Deutro-Malayid populations in Surabaya is 29.94° and 29.64°. The average nasomental angle in the Caucasoid population is 120-132°, whereas in the Chinese and Deutro-Malayid populations in Surabaya are 134.7° and 135.06°. The average mentocervical angle in the Caucasoid population is 110-120°, whereas in the Chinese and Deutro-Malayid populations in Surabaya are 96.06° and 92.88°. The average submental-neck angle in the Caucasoid population is 121-126°, whereas in the Chinese and Deutro-Malayid populations in Surabaya are 123.08° and 116.68°. The average facial convex angle in the Caucasoid population is 12°, whereas in the Chinese and Deutro-Malayid population in Surabaya is 9.7°and 9.3°.

Differences in anthropometric values between the Caucasoid, Chinese, and Deutro-Malayid populations in Surabaya are caused by anatomical differences between populations. Furthermore, the position of the maxillary and mandibular anterior teeth, which is affected by heredity, diet, and environment, has a significant influence on the profile angle. Angle class II occlusion patterns are more common in the Caucasian population, whereas Angle class I occlusion patterns are more common in the Chinese and Deutro-Malayid populations.

Despite the absence of significant differences in profile angle anthropometry values between the Chinese and Deutro-Malayid populations in Surabaya, the findings of these anthropometric values will be very useful in making predictions in surgical planning involving facial hard tissue, which has implications for changes in facial soft tissue. These anthropometric values, combined with the findings of Walford and Field, can be used to guide changes in the location of facial hard and soft tissues.

The findings of the profile angle anthropometric values of the Chinese and Deutro- Malayid populations in Surabaya can be used as a reference in planning surgical procedures, which should always consider the ideal facial profile according to race, particularly in the Chinese and Deutro-Malayid populations in Surabaya.

Conclusions

No significant differences in profile angles were found between the Chinese and Deutro-Malayid populations in Surabaya. Anthropometric values on the profile angles of the Chinese and Deutro-Malayid populations in Suarabaya can be used as reference standards in manipulating facial skeletal bones.

Declaration of Interest

The authors report no conflict of interest.

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