Three Smile Components on Different Facial Types of Young Adult Population in Makassar

Susilowati Mudjari,[1]* Eka Erwansjah,[1] Rika Damayanti[1], I Gusti Wahju Aju Ardani[2], Rofi Nurdiansyah[2]

1. Department of Orthodontics, Faculty of Dental Medicine, Hasanuddin University, Makassar, Indonesia.
2. Department of Orthodontics, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

Abstract

Indonesia has various ethnics with different types of facial shapes and smiles. The facial shape, the condition of the teeth, and surrounding tissues significantly affect the esthetic smile. The study aimed to assess the three smile components on facial types of Senior High School children in Makassar, Indonesia.

The subjects involved 198 students at three Senior High Schools. Each subject was photographed while smiling from the frontal direction and saying long "cheese". The images were measured with Adobe Photoshop CS6 program to determine the facial type and the lip line, smile arc, and smile symmetry. The data were analyzed using Chi-square statistical test.

There were no significant relationships between the facial type and lip line, smile arc, as well as smile symmetry, but there was a significant relationship between gender and smile arc, as well as smile symmetry.

The highest percentage of the student's facial type was mesofacial and the highest percentage of lip line position found in all facial types was the medium. There was a significant relationship between gender and smile arc, as well as smile symmetry.

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Introduction

Nowadays dental science has grown rapidly and facial appearance has become a great concern. In line with the development of science and technology, dental care will shift from pain relief, improve function, and mastication to improving facial appearance and smile. Creating a beautiful smile is the main purpose of any esthetic dental treatment. Nevertheless, in spite of its importance, the intrinsic characteristics of a smile are not widely evaluated.[1]

Esthetics in dentistry aims to create beauty, attractive faces, and satisfaction with patient care outcomes. The desire for an esthetically satisfying appearance is increasing in today's society. Consequently, many dental patients now seek treatment with a primary concern for esthetic enhancement of their oral condition, and

Corresponding author:
Prof. Dr. Susilowati Mudjari, SU., drg
Department of Orthodontics, Faculty of Dental Medicine,
Hasanuddin University, Makassar, Indonesia.
E-mail: susmudjari@yahoo.co.id

especially their smiles.[2] Physical appearance greatly affects the acceptance of environmental, psychological well-being, and self-confidence of each individual.[3] The goal of an esthetic makeover is to develop a stable masticatory system, teeth, tissue, skeletal structures, muscle, and joints all function in harmony.[4]

Smiling, talking, and facial expressions are part of facial esthetics. There are inter-correlated between an attractive smile with an attractive face. When people talk, the mouth becomes the main concern. Facial expression and appearance are highly dependent on a smile. A smile is a non-verbal communication in expressing feelings and emotions. Many people look for orthodontic treatment because they want to get an attractive smile.[5] A popular saying that: "The smile is our business card" should be appreciated since there is scientific evidence that the smile is the most important thing in dentofacial esthetics.[6]

The facial shape, the condition of the teeth, and surrounding tissues greatly affect the esthetic smile and even the facial esthetic overall. In designing an esthetic smile, there are several components that need to be considered as the orientation i.e.: lip line, smile arc, buccal corridor, front-occlusal plane, upper lip curvature, smile

symmetry, dental components, and gingival components.[7] The display of a person's smile is so important that the results of treatment with very good occlusion will appear unsatisfactory when accompanied by a less attractive smile.[8]

Some of the terminology used to describe the facial pattern are Dolichofacial, mesofacial, or brachyfacial.[9] The human face can be identified by its characteristics, comprised of the eyes, nose, and lips.[10] In previous studies, face recognition can also be classified by ethnic group race, gender, and age.[11]

The lip line is the number of teeth vertically visible when smiling, in other words, the height of the upper lip to the maxillary central incisors.[12] As a general rule, the lip line is optimal when the upper lip reaches the gingival margin, showing the overall maxillary central incisor incisocervically with minimal interproximal gingiva.[13]

In Orthodontics, lip lines are classified into three categories: high, medium, and low. High lip line, showing 75%-100% of the maxillary anterior teeth or all of the clinical crown with the adjacent gingival tissue. Medium lip line, showing 1-3 mm gingiva of the most apical point of the free gingival margin to the inferior border of the upper lip; while the lower lip line shows less than 75% of the maxillary anterior teeth.[14]

Smile arc is the alignment of the anterior maxillary incisor curve or the relationship between the imaginary line formed by the incisal end of the maxillary anterior teeth and the inner contour of the lower lip when smiling. The smile arc is "consonant" when the incisal curve of the anterior maxillary teeth touches or parallels the lower lip when smiling so that it shows a youthful smile. It is considered "nonconsonant" when the maxillary incisal edges are either flat or reversed relative to the curvature of the lower lip.[15]

Smile symmetry is the relative position of the angle of the mouth in the vertical plane, which can be assessed by aligning the commercial line and the papilla line. An aesthetic smile usually shows symmetry, and proportion between teeth, gingiva, and lips. The position of the corners of the mouth or lip commissure also affects the symmetry of a smile. The midline of the face must be the same as the midline of the maxillary, mandibular, and central incisors, or at least this line of girdle must be parallel. A small difference ranging from 1.5 to 2 mm is still acceptable, insofar as it gives a natural impression on the teeth.[13]

The population of Indonesia reached approximately 260 million, consisting of 360 tribes. They inhabit the island and have their own customs and culture. Each tribe has its special characteristics to a certain tribe, so it cannot be used as a standard for other tribes. The Minang and Mentawai tribes who live in West Sumatra mostly have mesofacial and brachyfacial types. Mesofacial type has usually been owned by Javanese (Deutro-Malay) and Naulu/Moluccas people (Proto-Malay).[16] Makassarnese, Buginese and Torajanese are three tribes who inhabited the region of South Sulawesi. Makassarnese is the largest tribe residing in South Sulawesi. It is estimated that the population of Makassarnese ± 2 million people.

Based on the above description then arises a problem that makes researchers interested in assessing the three smile components (lip line, smile arch, and smile symmetry) on different facial shapes of the young adult population in Makassar.

Materials and methods

This descriptive cross-sectional study was conducted at various Senior High School in Makassar, who met the following criteria: (1) never undergone orthodontic and prosthodontic treatments, (2) never performed surgery, (3) the permanent teeth have erupted entirely up to the second molar, (4) shape of the anterior and posterior tooth anatomy intact and normal, and (5) do not have facial abnormalities and oral cavity disorders. The number of subjects was 198 students.

The photograph of subjects (while smiling) was taken from the frontal direction by using a digital camera mounted on a tripod, a distance of 50 cm from the front of the lens to nose without zoom. The subject was sitting with head and face positioned in front of the of lenses with the FHP field parallel to the floor. Subjects photographed by holding a whiteboard (serves as a benchmark measurement scale) on the right side at shoulder height. Subjects were instructed to do social smile while spelling "cheese" for 2 minutes.

To determine the facial type, it was used Adobe Photoshop CS6 program and measured the top of the head (TH) to soft tissue menton (ME) The ideal proportion a / b = 1.618, based on the golden proportion by Jefferson.[17]

In this study, the range of ratios to

determine the criteria for facial type is determined as follows:

    a. dolichofacial = > 1.693
    b. mesofacial = 1.693 to 1.543
    c. brachyfacial = <1.543

The lip line was determined whether it was high, medium, or low.

    The resulted data was analysed using chi-square statistical method and presented in tables to describe the type of facial forms, gender, the lip lines, smile arc, and smile symmetry.

Results

    Table 1 shows that of the 198 subjects, the percentage of medium (moderate) lip lines was most common in all facial types and sexes compared to high and low percentages. Based on statistical tests, it was obtained that $p = 0.762$ (> 0.05) means that there was no significant relationship between the facial type and the lip line. In a group of gender, the value of $p = 0.74$ (> 0.05) means that there was no significant relationship between sex and lip line.

Variables	Lip line				
	High N (%)	Medium N (%)	Low N (%)	Total N (%)	
Facial types:					
Dolichofacial	14 (19.6)	34 (49.2)	21 (30.2)	69 (100)	
Mesofacial	31 (25.2)	58 (47.8)	32 (27.0)	121 (100)	p=0.762
Brachyfacial	0	5 (58.8)	3 (41.2)	8 (100)	
Gender:					
Male	17 (25.6)	30 (46.2)	11 (17.2)	65 (100)	P=0.74
Female	25 (18.8)	65 (48.7)	43 (32.5)	133 (100)	

Table 1. Proportion of the subject numbers based on the position of lip line in the group of facial types and gender.

Variables	Smile Arc			
	Consonant N (%)	Non consonant	Total	
Facial types:				
Dolichofacial	29 (43.2)	40 (57.8)	69 (100)	
Mesofacial	59 (48.8)	62 (51.2)	121 (100)	p=0.730
Brachyfacial	2 (25.0)	6 (75.0)	8 (100)	
Gender:				
Male	38 (59.0)	27 (41.0)	65 (100)	
Female	50 (37.8)	83 (62.2)	133 (100)	p=0.007

Table 2. The proportion of subject numbers based on the position of smile arc in the group of facial types and gender.

    Table 2 shows that the subjects with non-consonant smiles were more than those with consonant smiles in all facial types. In men, the consonant smile arc was more than the non-consonant. In women, the non-consonant smile arc was more than the consonant one. Based on statistical tests, the value of $p = 0.371$ (> 0.05) means that there was no significant relationship between the facial types and the smile arc. In the gender group, the value of $p = 0.006$ ($p <0.05$) means that there was a significant relationship between gender and the smile arc.

Variables	Smile Symmetry			
	Symmetrical N (%)	Not symmetrical N (%)	Total N (%)	
Facial types:				
Dolicofacial	39 (56.2)	30 (43.8)	69 (100)	
Mesofacial	93 (77.0)	28 (23.0)	121 (100)	p=0.735
Brachyfacial	5 (62)	3 (38.0)	8 (100)	
Gender:				
Male	35 (54.0)	30 (46.0)	65 (100)	p=0.02
Female	100 (75.0)	33 (25.0)	133 (100)	

Table 3. The proportion os subject numbers based on smile symmetry in the group of facial types and gender.

    Table 3 shows that the percentage of symmetrical smiles was more than asymmetrical smiles in the group of all facial types. Based on the statistical test, the value of $p = 0.070$ ($p> 0.05$) means that there was no significant relationship between facial types and smile symmetry. In the gender group, p-value = 0.028 ($p <0.05$) means that there was a significant relationship between the gender with smile symmetry.

Discussion

    In this study, photography was used to record the lip line positions and facial forms of the subjects. Three of the most frequently used photographs are profile photos, frontal photos of lips, and frontal photos when smiling. Facial photography, is effective in giving the right direction to analyze the esthetic face [18]

    In this current study, we divided the subjects into female and male groups. Different faces and sexes have a difference in the esthetic values of a smile. The attractiveness of a smile as an indispensable unity of the face. Facial types can affect the aesthetic of a smile and vice versa smile aestheticcan affect the face.[19]

    There are eight components to make an ideal frontal smile: lip line, smile arc, upper lip curve, buccal corridor, symmetry of the smile, occlusal plane, and dental and gingival components. In this study, only three smile components (lip line, smile arc, and smile symmetry) were examined. There is an

undesirable condition in cases where a high lip line and excessive gingival display (gummy smile) was quite apparent.[18]

In this study, the medium lip line got the highest percentage of all facial types. The medium lip line shows 1-3 mm of gingival, measured from the top point of the free gingival margin to the inferior line of the upper lip or 75% of teeth were apparent. Lip line can be affected by age and sex in which the female average of 1.5 mm higher than those in males i.e. 1-2 mm. The older the person, the greater the tendency to the lower lip line. The starting point of a smile is a lip line at rest position, with an average of maxillary incisors seen at 1.91 mm in men, and 3.40 mm in women.1 According to Miron et al, the mean maxillary central incisor display at rest was 1.78 mm greater in women than in men.[20] A high smile line was 2.5 times more prevalent in women.18 Mokhtar et al in their research concluded that the lower lip line pattern is more common in women and men, while a high lip line is not too common in women and men.[21]

The study results conducted by Al-Khawaja of 54 women samples showed that the high lip line got the highest percentage (20.4%), while the low lip line in men got the highest percentage (22,1%), however, between men and women, there was no significant difference. It was described that the woman usually showed upper teeth twice bigger than those in men.[22] Anwar and Fida who examined the lip line preferences for different facial types concluded that the 100 assessors agreed that lip line only shows the maxillary incisors preferably in the dolichofacial and mesofacial types in men and women while the height of the lip line that shows gum 2 mm was more preferably for brachyfacial type for both sexes.[19]

A previous study concluded that the most attractive face is mesofacial rather than dolichofacial and brachyfacial faces. The smile might influence the esthetics perception of the facial type, so the facial type should not be looked at separately from the smile.[23] Moreover, to achieve an enhanced esthetic smile it is necessary to observe the patient's facial type.[24]

In this study about the smile arc, the results showed there was no relationship between facial type with the smile arc. However, there was a significant correlation between smile arc and gender (Table 2). A previous study stated that people who were treated orthodontically had flatter smile arcs compared with the untreated group with normal occlusion. The patients had a higher esthetic score if the lower lips touched or did not touch the incisal edges then those whose incisal edges were slightly covered In a "non-consonant" smile arc, the maxillary incisal edges are either flat or reversed relative to the curvature of the lower lip. Smile arc flattening during orthodontic treatment can be caused by a loss of the curvature of the maxillary incisors relative to the lower lip curvature due to normal orthodontic alignment of maxillary and mandibular arches.[25]

Table 3 informed that a symmetrical smile is obtained on all face shapes and sexes, but there was no significant difference statistically between facial types and smile symmetry. In contrast, there was a relationship between gender and smile symmetry. This study also showed that a more number of symmetrical subjects had been found than asymmetrical subjects. The tooth median line is the focal point of a smile and an attractive smile tends to display a great degree of symmetry. An aesthetic smile examines how teeth fit within the framework of the lips, which relate to each other and align the face with the median line of the body.[26]

Orthodontic treatment is related to the aesthetics of the teeth and face, therefore when diagnosing and making a treatment plan there must be known asymmetries on the teeth and face so that the treatment results are symmetrical with the median line of the maxillary and mandibular teeth and the median face. This is important because the goal of the patient is to improve the appearance of the teeth or face. One of the mini aesthetic components of dentofacial analyses is smiled symmetry. A symmetric smile is considered more attractive and the presence of a skeletal asymmetry may cause an asymmetric smile. An assessment of smile symmetry before orthodontic treatment or orthognathic surgery is considered important for evaluating treatment outcome If during orthodontic treatment we do not realize from the beginning of the asymmetry, it will make the treatment period longer because it has to make changes to the treatment plan. A symmetrical smile leads to a symmetrical placement from the corner of the mouth on a vertical plane which is a meeting of the commissure and pupillary lines. The commissure oblique smile is asymmetrical and can give the illusion of a transverse slope in

the maxilla or skeletal symmetry.[7] A study from Ozono on the differences between Japanese and American cultures concluded that there was no influence between the cultural symmetry of smiles.[27]

Conclusions

The highest percentage of facial type in young adult Makassarese was mesofacial, followed by dolichofacial and then brachyfacial.

The highest percentage of lip line position of the three facial types was the medium, followed by low and then high lip line

There was a relationship between gender and smile arc.

There was a relationship between gender and smile symmetry.

Declaration of Interest

The authors report no conflict of interest.

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