

Use of Facial Indicator for Choosing Anterior Teeth (Female Arabs and Persians Students)

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Abstract

Background: The maxillary anterior teeth are important in achieving pleasing dental aesthetics. The size of the maxillary central incisors is important for they are the most prominent teeth in arch as individual is viewed from frontal position. Various methods are used to measure the size of them, including the size of the face determined from two points, zygoma and chin to estimate the width and height by using "facial indicator". The average width of the maxillary central incisor is estimated to be one sixteenth of the face measured between the zygoma.

Objectives: The purpose of this study is to investigate the accuracy of a new device called "facial indicator" in choosing anterior teeth in edentulous patients of two different ethnic groups, Female Arabs & Non-Arabs (Persians) by attempting to prove the existence of a direct relationship between the facial sizes and the size of the natural maxillary central incisor.

Methods: Dental casts of the maxillary arches were made in this cross-sectional study from AUST university college students who met the inclusion criteria. The 90 female participants represented the Arabs and NonArabs (Persians) population main ethnics. The width and height dimensions of the maxillary central incisors were measured using digital caliper. Then Facial Indicator Device used to decide the width and height of face in an attempt to prove the existence of a direct relationship between the facial sizes and the size of the natural maxillary central incisor.

Results: Comparison of the width and height of maxillary central incisor on the casts and the width and height dimensions of faces by using facial indicator, revealed that there was a significant statistical difference ($p > 0.05$).

Conclusion: A direct relationship between the facial width and the widths of the natural maxillary central incisors was found, while there is no relation between the lengths of the face with the length of the central incisors. Ethnic variation has no association with the use of facial indicator.

Keywords: Facial Indicator; Arabs Ethnics; Persian Ethnics; Aesthetics; Anterior Teeth

Introduction

Selecting and arranging artificial anterior teeth for edentulous patients is difficult when pre-extraction records are not available. Errors at this stage can often result in patient rejection of otherwise well-constructed, comfortable and efficient dentures [1]. In an effort to solve this problem, various aesthetics guidelines have been suggested for selecting artificial teeth for edentulous patients and maximizing the likelihood of an attractive outcome. The first theory ever introduced for artificial anterior teeth selection was the temporomental theory [2]. Afterwards, Williams [3,4] suggested that a correlation

existed between the upside-down facial shape and the shape of the upper central incisors. Frush and Fisher [5-7] introduced the dentogenic theory on the basis of sex, personality and age (SPA) of each individual. Nelson and Lowery [8,9] proposed that a close relationship existed between face, tooth and tooth arch form (hard palate form). Williams [4] also suggested that a correlation existed between the facial sizes and size of the natural maxillary central incisor. The objective of the present study was conducted to investigate the accuracy of the new device called "facial indicator" in choosing anterior teeth in edentulous patients of two different ethnic groups, Arabs & Non-Arabs (Persians) by attempting to prove the existence of a

direct relationship between the facial sizes and the size of the natural maxillary central incisor. The null hypotheses were that there is difference between the dimensions of the facial sizes and the size of the natural maxillary central incisor in Arabs & Non-Arabs (Persians) population.

Materials & Methods

Selection criteria

A cross sectional study was conducted over a period of 4 months for female students of AUST University College in Ajman/ UAE.

The participants are selected according to the following criteria's:

1. Female students.
2. Complete maxillary and mandibular anterior teeth.
3. No periodontal diseases.
4. No spacing and crowding in anterior maxillary teeth.
5. No history of orthodontic treatments.
6. No intruded, extruded or rotated teeth in the anterior region

Study sample

Using these criteria, 90 female students from Ajman University for Science & Technology were selected for evaluation represented the population main ethnics (45 Arabs and 45 Persians). Their mean average age was 18 – 28 years.

Clinical protocols

All volunteers participated in the research signed clarifies consent form prior to their participation which included the nature of the project and declared the confidentiality of all information. Ethical approval for the study was obtained from Ajman University of Science & Technology, Human Research Ethics Committee.

Measurement Tools

Impression

Irreversible hydrocolloid impression of the maxillary arches were made in stock trays and poured with type IV dental stone

Digital Caliper

Measurement of widths and heights of the maxillary right central incisors were made on the casts using a precise digital caliper manufactured form Egamaster company in Spain (Figures 1-4) read to the nearest 0.01 mm precision. All the measurements were obtained by one person.



Figure 1: Digital Caliper.

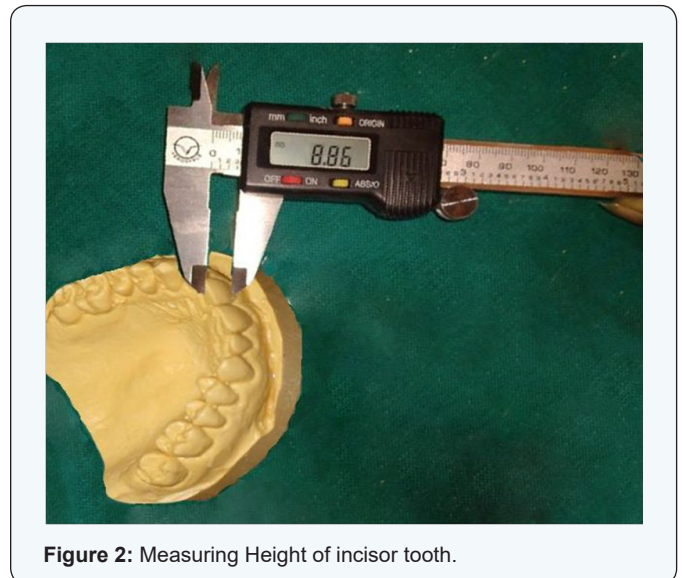


Figure 2: Measuring Height of incisor tooth.

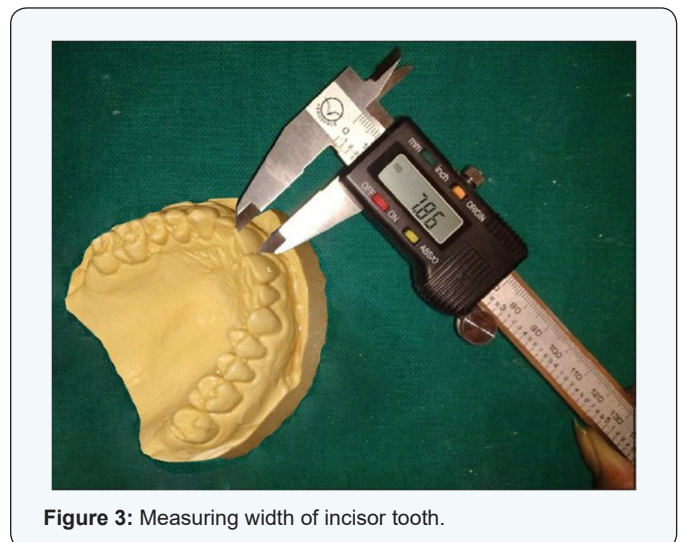


Figure 3: Measuring width of incisor tooth.

Facial Indicator

Measurements of widths and heights were made directly on participants using the facial indicator (Figure 4).

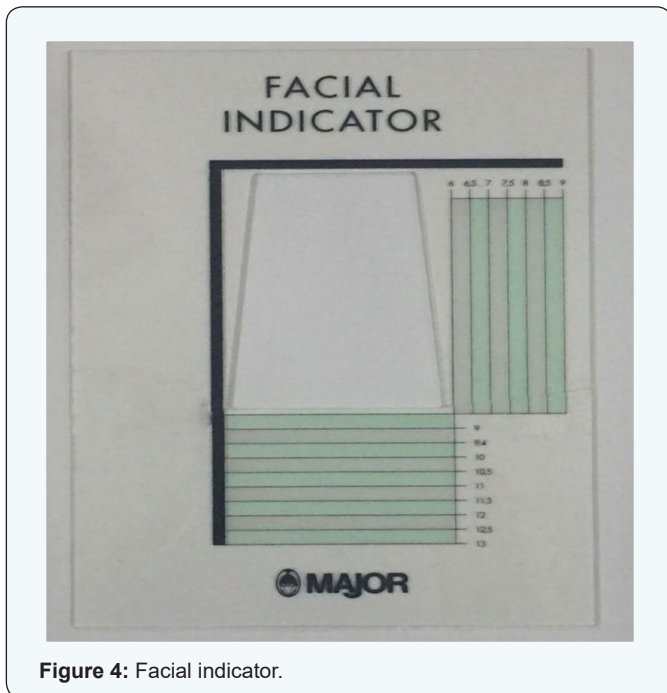


Figure 4: Facial indicator.

The facial indicator is an analogic instrument that allows to carry the choice out following the method found starting from Williams JL [4] up to E Pound, which method is part of scientific literature. Facial indicator is made by an Italian company called MAJOR PRODOTTI DENTARI S.p.A [10].

Position of the Facial Indicator

1. Put the indicator on the patient face anteriorly, the patient's nose should lean on the hole of the indicator (Figure 5,6).



Figure 5: Position of facial indicator on the volunteer face.

2. Center the upper horizontal black draw in lie with hair junction or first wrinkle in case of bald patient. Pay

attention in case of hair loss in the front area as it can deceive .

3. Place the vertical lateral black line draw in line with the patient's right zygoma.
4. The facial indicator is rightly positioned, pay attention in order not to lose the position during the controls and data research.

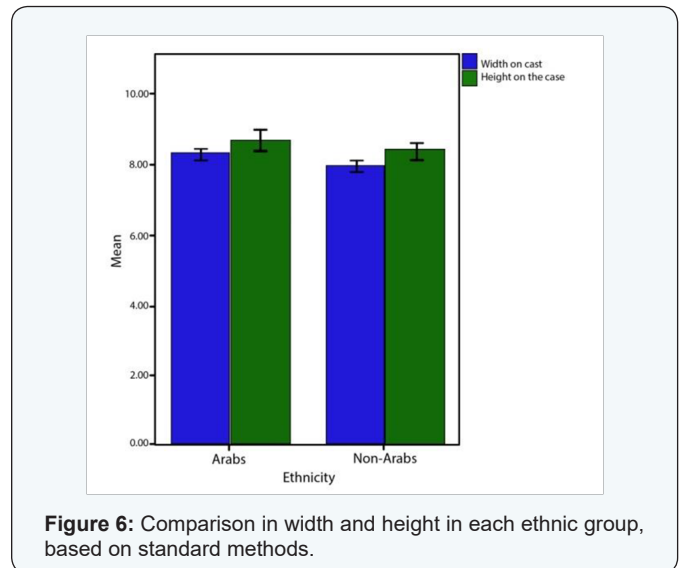


Figure 6: Comparison in width and height in each ethnic group, based on standard methods.

Data Collection & Statistical Analysis

Statistical analysis were carried out using Statistical Package for Social Sciences (SPSS 16.0) with the level of Significance $\alpha = 0.05$ and Degree of confidence $d = 0.95$. Descriptive statistics was done for the dimensions of width and height of maxillary central incisor. Descriptive statistics was done for the dimensions of width and height of face. One sample t-test was used to test the significance of the differences between the obtained values of two different groups. Independent samples test was used to compare width between Arabs and Non-Arabs and Height as well for both. A level of significance was set at 95%.

Results

Comparison of the dimensions of maxillary central incisor and the dimension of the faces by using facial indicator, revealed that there was a significant statistical difference ($p > 0.05$). The Interclass Correlation Coefficient is shown in Table 1. One-way ANOVA was used to analyze the comparison between a device and casts for the widths and height dimensions in both ethnics detailing mean values and standard deviations obtained by two different methods in total samples and presented in Table 2. One-sample t-test statistics was used for the assessment of widths and height of maxillary central incisor in both ethnics. There were significant difference in width ($P = 0.019 > 0.05$) while there was no significant differences in height ($P = 0.138 < 0.05$) among Arabs

and Non- Arabs included in this study . Data is shown in Table 3. Table 4,5 sequentially. Table 6 shows mean values and standard deviations for the widths and heights dimensions obtained by two different methods in each ethnic group.

Table 1: ANOVA table for Interclass Correlation Coefficient of Width and Height.

		Interclass Correlation	95 % Confidence Interval		F test with True Value 0			
			Lower Bound	Upper bound	Value	df 1	df 2	Sig
width	Single Measures	0.044	-0.163	0.248	1.092	89	89	0.339
	Average Measures	0.085	-0.391	0.397	1.092	89	89	0.339
		Interclass Correlation	95 % Confidence Interval		F test with True Value 0			
			Lower Bound	Upper bound	Value	df 1	df 2	Sig
Height	Single Measures	-.152b	-0.348	55	0.736	89	89	0.925
	Average Measures	-.360c	-1.066	0.105	0.736	89	89	0.925

Table 2: ANOVA table for Mean of width and height of two different methods in total sample.

Width	Method	Ethnicity	N	Mean (millimeter)	95 % Confidence Interval		SD
					Lower Bound	Upper Bound	
	Facial Indicator	Arabs & Non-Arabs	90	6.8444	6.7575	6.9313	0.41492
	Upper Cast	Arabs & Non-Arabs	90	8.2149	8.1081	8.3216	0.50972
Height	Method	Ethnicity	N	Mean (millimeter)	95 % Confidence Interval		SD
					Lower Bound	Upper Bound	
	Facial Indicator	Arabs & Non-Arabs	90	10.6833	10.5637	10.8029	0.57107
	Upper Cast	Arabs & Non-Arabs	90	8.6411	8.4465	8.8358	0.92935

Table 3: ANOVA table for Comparison of width and height of maxillary central incisor in both ethnics.

t-test for equality of Means							
	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference	95 % Confidence Interval of the Difference	
						Lower Bound	Upper Bound
Width on cast	2.389	88	0.19	.25022	.10472	.02411	.45834
Width on cast	2.389	87.043	0.19	.25022	.10472	.02411	.45834
Height on cast	1.496	88	.138	.29111	.19458	-.09557	.67779
Height on cast	1.496	84.515	.138	.29111	.19458	-.09579	.67801

Table 4: Interclass Correlation Coefficient (width) in each ethnic group.

		Interclass Correlation	95 % Confidence Interval		F test with True Value 0			
			Lower Bound	Upper bound	Value	df 1	df 2	Sig
Arabs	Single Measures	-.101b	-.380	.196	.817	44	44	.747
	Average Measures	-.224c	-1.226	.328	.817	44	44	.747
Non arabs	Single Measures	.066b	-.230	.350	1.140	44	44	.333
	Average Measures	.123c	-.596	.518	1.140	44	44	.333

Table 5: Interclass Correlation Coefficient (Height) in each ethnic group.

		Interclass Correlation	95 % Confidence Interval		F test with True Value 0			
			Lower Bound	Upper bound	Value	df 1	df 2	Sig
Arabs	Single Measures	-.296b	-.540	-.006	.543	44	44	.977
	Average Measures	-.842c	-2.352	-.012	.543	44	44	.977
Non Arabs	Single Measures	.003b	-.288	.293	1.006	44	44	.492
	Average Measures	.006c	-.809	.454	1.006	44	44	.492

Table 6: ANOVA table for Mean of Width and Height in each ethnic group.

	Method	Ethnicity	N	Mean (millimeter)	95 % Confidence Interval		SD
					Lower Bound	Upper Bound	
Width	Facial Indicator	Arabs &	45	6.9444	6.8372	7.0517	.35711
		Non-Arabs	45	6.7444	6.6100	6.8789	.44750
	Upper Cast	Arabs &	45	6.7444	6.6100	6.8789	.44750
		Non-Arabs	45	8.4956	7.9486	8.2310	.46999
Height	Method	Ethnicity	N	Mean (millimeter)	95 % Confidence Interval		SD
					Lower Bound	Upper Bound	
	Facial Indicator	Arabs &	45	10.7400	70..5656	10.91400	.50528
		Arabs	45	10.6267	70.4578	10.7956	.56222
		Upper Cast	Arabs & Non-Arabs	45	10.6267	70.4578	10.7956

Discussion

Different authors from Pound as regards the definition method of teeth dimension till more recent confirmation Michigan University 1985 Dr. Brobelth, Maroscutis, Ricci who showed the correctness of the method in more than 80% of examined cases, confirmed the existence of direct relationship among some individual facial sizes and the size of the natural maxillary central incisor (11/12). It means that even in edentulous case, it is possible to trace on the patient's face, the data relevant to original shape of the natural teeth, especially for the central incisor. The size choosing, according to E. Pound's method, is based on 2 parameters: the height, measured from hair junction or from first wrinkle to bone symphysis, the natural tooth widths is equal 1/6 of the face width, measured between the two cheek bones (Figure 7). One sample t-test statistics was used for the assessment of width and height of maxillary central incisor in both ethnics. There were significant differences in width ($P=0.019 > 0.05$) while there was no significant differences in height ($P = 0.138 < 0.05$) among Arabs and Non Arabs included in this study.

Ahmed A and et al. [11] did same experiment on Arabs male sample concluding different result. The data distribution in Table 6 shows mean of ethnics revealed that Non-Arabs have more square shaped central incisors (μ of widths = 8.4 mm, μ of Heights = 8.4 mm) compared to Arabs (μ of widths = 8.3 mm, μ of Heights = 8.7 mm). Results were close showing more reliability into two ethnic groups. Data of mean in a research article by Ahmed A and et al. [11] shows $\mu=8.2$ for widths of males and $\mu=$

9.1 for heights, which means arab male sample has high central incisors than arab female sample. This study revealed a fact, in which the dimensions of the face is not reflecting the dimensions of the anterior teeth, for example in some volunteers, the face was wide but the width of central incisor was too narrow and vice versa. In the present study limitations such as Time constraints and the exclusion criteria restricted the number of volunteers who could be recruited into the study.

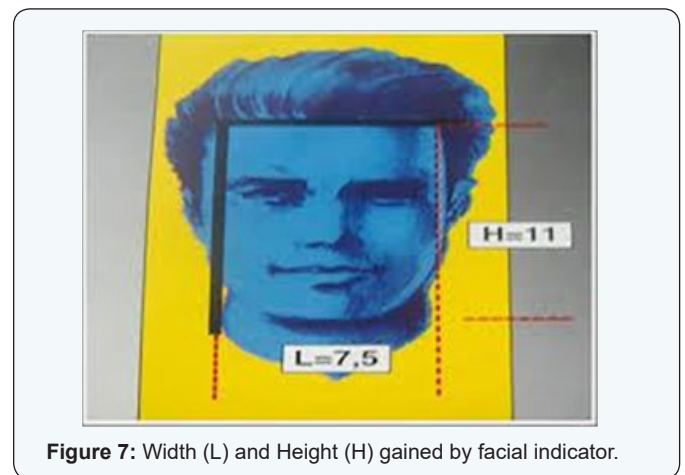


Figure 7: Width (L) and Height (H) gained by facial indicator.

Conclusion

Based on the results of this study, the following conclusions can be made:

- a. There is no a highly defined correlation between the size of central incisor and the size of the face ($p > 0.05$).

- b. A direct relationship between the facial width and the widths of the natural maxillary central incisors was found, while there is no relation between the lengths of the face with the length of the central incisors.
- c. Ethnic Variation has no association with the use of the facial indicator.
- d. Dimensions of the face is not reflecting the dimensions of the anterior teeth.
- e. Modifications on the facial indicator are necessary to give more accurate readings in future according to selecting sizes of anterior teeth in edentulous patients.
- f. We authors believe that any experimental instrument including this study device is designed to give a close result to an instructor about use of it , although there is no fabricated instrument can give 100% precise and accurate readings but it can reach a very close and proximate results, regarding making work easier for both instructors and populations.

Further Works

The suggesting of future works and improvements that may be in account for this project is to increase sample size, involve more population and ethnics , compare our methodology to other similar researches of recording of length and width .

Acknowledgment

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