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Anthropometric Measurement of Face Index in Adult Malay Population

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Abstract

Abstract and Aims: Anthropometry is notable for its suggestions in, human anatomy, forensic science, and physical human studies. The purpose is to determine the facial morphologic value differences between ethnic groups and indices among three unique races in Malaysia.

Materials and methods: The cross-sectional study was led on 420 people (80 Malay male, 80 Malay female, 60 Indian male, 70 Indian female, 60 Chinese male and 70 Chinese female) in the age range 18-45 years. In this study digital caliper was utilized to identify the nasal landmarks. This research was conducted that the mean of variables were statistically significant differences in nose measurement scores among adult Malay population. All the average independent variables were measured and compared whether differs at the same time among race.

Results: It was discovered that total face height measurements were remarkably smaller in Chinese compare to Malay and Indian. But there was no significant difference between Malay and Indian for total face height. The measurements of upper face height were smaller in Chinese compare to Indian and Malay. The measurements of upper face height were larger in Malay compare to Indian. The face width was remarkably larger in Chinese compare to Malay and Indian. But there was no major difference in Malay and Indian for face width parameters. Total face height, upper face height and face width measurement are huge larger in male than female.

The face shape of Chinese was hypereuriprosopic which was short and wide while shape of Malay and Indian were intermediate. The face shape of Malay was Euriprosopic and Mesoprosopic. The face shape of Indian was Mesoprosopic and Leptoprosopic. There was not a significant difference in face index between male and female.

Conclusion: The statistically significant difference in facial measurement and face index were found among adult Malay population.

Keywords: Anthropometry, face parameters, face index, ethnic group, Malay population

Introduction

Anthropometry is a fundamental device of organic humanities which includes a progression of normalized estimating procedures that express quantitatively the components of human body. Cephalometry is one of the controls of anthropometry which manages the estimation of the head and face

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of living people and bodies.[1] Cephalometry has been broadly utilized by numerous researchers for age, race and sex assessment. Such examinations are additionally helpful in medicolegal cases and clinical medication, maxillofacial surgery, facial restoration and reconstructive surgery.[2] The face morphology attributes have been presented as predictive value in (OSA) Obstructive Sleep Apnea.[3, 4] Also, the craniofacial attributes have been resolved in various patients like patients with thalassemia, Down syndrome, and so forth.[5, 6, 7]

Information on facial estimations can help researchers in various perspectives, including personal identification of decayed body, and working on the aftereffect of rhinoplasty.[8]

Facial indices were among the most significant cephalometric parameter valuable in between racial furthermore, intra-racial morphological order and classification. To compare and contrast the face shapes and face indices have been presented, like Total Facial Index (TFI), Upper Facial Index (UFI) were the two generally dependable records which were utilized in the facial anthropometric examines.[9]

As per the TFI, there were five types of the face index.

1. Hypereuriproscopic (very wide), facial index was in the scope of 75-79.9.
2. Euriprosopic (wide), individuals in the scope of 80-84.9
3. Mesoprosopic (round), individuals in the scope of 85-89.9
4. Leptoprosopic (long) who were in the scope of 90-94.9
5. Hyperleptoprosopic (very long) who were in the scope of ≥ 95.

An investigation led on two distinct populaces of North India recommended that cephalo-facial measurements enhanced by facial morphological highlights can be utilized in deciding age, sex, height and race in Indian populace.[10, 11]

Materials and Methods

Study design

This was a cross sectional study involving the collection and analysis. The location of the study was Management and Science University in Malaysia located in Shah Alam, Selangor since 2019 to 2021.

Sampling and sample selection

This was a cross-sectional examination with 420 subjects were participated in this research, 200 male and 220 female students: (130 Malaysian Chinese, 160 Malaysian Malay and 130 Malaysian Indian), aged 18±45 years old. Inclusion criteria were Malay, Chinese and Indian. The subjects confirmed their nationality by means of a self-managed survey. The Age was in the range of 18 and 45 years. Normal craniofacial configuration was included. Exclusion criteria were age lower than 18 years, and older than 45 years, blended or dubious unsure group of races, past history of craniofacial injury and history of facial surgical procedure, congenital malformation and craniofacial abnormalities.. The ethical approval was provided from Research Management Centre of Management and Science University. An informed consent was collected from each subject.

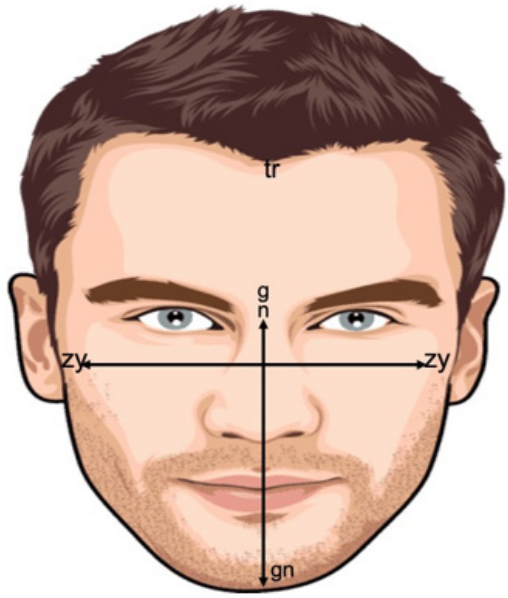

Figure 1. total face height and width of bizygomatic arch

The following landmarks were displayed in figure 1.

Trichion (tr)	junction point of the upper part of the forehead (hairline)
Glabella or nasal eminence (g)	The most prominent point on the frontal bone in the midsagittal plane between the eyebrow ridges
Nasion (n)	Deepest concavity point on the nasofrontal suture
Gnathion (gn)	Midpoint on the lower border of the mandible
Zygion (zy)	The most lateral extents of zygomatic arches
face height (n-gn)	straight distance from the nasal root (nasion) to the lowest point on the lower border of mandible
Face breadth (zy-zy)	measured as the maximum distance between the most lateral points on the zygomatic arches (distance between two Zygions).

The following linear measurement definition using landmarks were assessed.

Total face height	n-gn
Upper face height	tr -g
Face width	zy-zy

Face index was the ratio of the morphological facial height to face width and multiplied by 100.

$$Face\ index\ (FI) = \frac{total\ face\ height}{face\ width} \times 100$$

$$(FI) = \frac{n - gn}{zy - zy} \times 100$$

Statistical analysis

These data were analyzed by utilizing Statistical Package for the Social Sciences (SPSS) version 25.0. The data were investigated to be normality assumption by histograms and Q-Q plots. Independent t Test was used to determine whether there was a significant difference among races and gender. It was also to find out the correlation between dependent and each of the independent variables of ethnicity and gender. Significance was considered as p values smaller than 0.05 and the confidence interval was considered as 95%. The investigation, one way ANOVA was completed utilizing the log-changed information to explore contrasts among races and gender. The analysis demonstrated the mean, standard deviation, and mean differences, as well as the comparison of the variables among ethnics and gender. The clinically critical contrasts, a cut-off minimum value of 3mm was set.

Results

The histograms for face measurement revealed normal distribution curve for ethnics. The normality assumption of face phenotypes was conducted by Q-Q plots and box plots for race. There was statistically significant in a person correlation of concerned calculation of mean scores of face among three ethnic groups and gender.

The independent T test revealed there were statistically significant differences ($p<.001$) among races for face height and face width. Table 1 exhibited statistics for race including mean and standard deviation. Table 2, 3, and 4 exhibited the mean differences, 95% confidence interval of the differences and significant difference ($p<.001$) in concerned variables among Malay, Indian and Chinese.

Table 1: Statistics of race group

Descriptive									
						95% Confidence Interval for Mean			
		N	Mean	SD	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Total Face height	Malay	160	115.59	6.983	.552	114.50	116.68	101	126
	Indian	130	114.01	3.236	.284	113.45	114.57	110	120
	Chinese	130	106.45	3.385	.297	105.87	107.04	100	110
	Total	420	112.27	6.396	.312	111.66	112.89	100	126
Forehead height	Malay	160	77.24	6.082	.481	76.29	78.19	66	90
	Indian	130	70.54	7.480	.656	69.24	71.84	57	87
	Chinese	130	62.52	2.740	.240	62.05	63.00	58	68
	Total	420	70.61	8.407	.410	69.81	71.42	57	90
Upper face height	Malay	160	74.06	5.833	.461	73.15	74.97	63	85
	Indian	130	68.25	7.652	.671	66.93	69.58	54	85
	Chinese	130	59.50	2.706	.237	59.03	59.97	55	65
	Total	420	67.75	8.341	.407	66.95	68.55	54	85
Face width	Malay	160	134.32	7.628	.603	133.13	135.51	119	148
	Indian	130	132.89	7.635	.670	131.57	134.22	119	148
	Chinese	130	145.43	3.060	.268	144.90	145.96	140	150
	Total	420	137.32	8.535	.416	136.50	138.14	119	150

N= Number of respondents in each group, mean =Mean of group (race) of respondent,

SD=standard deviation, Std. Error=Standard error

Table 2: Independent sample T test for Indian and Chinese

						Standard Error	95% Confidence Interval of the Difference	
		t	df	Sig.	Mean Difference	Difference	Lower	Upper
Total Face height	Equal variances assumed	18.391	258	.000	7.554	.411	6.745	8.363
Upper face height	Equal variances assumed	12.298	258	.000	8.754	.712	7.352	10.156
Face width	Equal variances assumed	-17.380	258	.000	-12.538	.721	-13.959	-11.118

Sig. = significance

As per table 1 and 2, for total face height, there was a significant difference in the scores for Indian (M=114.04, SD=3.236)) and Chinese (M=106.45, SD=3.385); t (258) = 18.391, p= .000 (p<0.05). The confidence interval of the difference did not include zero as lower and upper values were positive.

For upper face height, there was a significant difference in the scores for Indian (M=68.25, SD=7.652)) and Chinese (M=59.50, SD=2.706); t (258) = 12.298, p= .000 (p<0.05). The confidence interval of the difference did not include zero as lower and upper values were positive.

For face width, there was a significant difference in the scores for Indian (M=132.89, SD=7.635)) and Chinese (M=145.43, SD=3.060); t (258) = -17.380,

p= .000 (p<0.05). The confidence interval of the difference did not include zero as lower and upper values were negative.

Table 3: Independent T test for Malay and Chinese

		t	df	Sig.	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Total Face height	Equal variances assumed	13.673	288	.000	9.140	.668	7.824	10.456
Upper face height	Equal variances assumed	26.243	288	.000	14.556	.555	13.465	15.648
Face width	Equal variances assumed	-15.617	288	.000	-11.112	.712	-12.513	-9.712

Sig.=Significance

As per table 1 and 3, for total face height, there was a significant difference in the scores for Malay (M=115.59, SD=6.983)) and Chinese (M=106.45, SD=3.385; t (288) = 13.673, p= .000 (p<0.05). The confidence interval of the difference did not include zero as lower and upper values were positive.

For upper face height, there was a significant difference in the scores for Malay (M=74.06, SD=5.833)) and Chinese (M=59.50, SD=2.706); t (288) = 26.243, p= .000 (p<0.05). The confidence interval of the difference does not include zero as lower and upper values were positive.

For face width, there was a significant difference in the scores for Malay (M=134.32, SD=7.628)) and Chinese (M=145.43, SD=3.060); t (288) = -15.617, p= .000 (p<0.05). The confidence interval of the difference did not include zero as lower and upper values were negative.

Table 4: Independent T test for Malay and Indian

		t	df	Sig.	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Total Face height	Equal variances assumed	2.389	288	.018	1.586	.664	.279	2.893
Upper face height	Equal variances assumed	7.325	288	.000	5.802	.792	4.243	7.362
Face width	Equal variances assumed	1.583	288	.115	1.426	.901	-.347	3.200

Sig.=Significance

As per 1 and 4, for upper face height, there was a significant difference in the scores for Malay (M=74.06, SD=5.833) and Indian (M=68.25, SD=7.652); t (288) = 7.325, p= .000 (p<0.05). The confidence interval of the difference was not include zero as upper and lower values were positive.

But for total face height, there was no major difference between Malay and Indian.

For face width, there was not a significant difference as at the level of p=.115 (p> 0.05) for mean values between Malay and Indian. The confidence interval of the difference included zero as upper values were positive and lower values were negative.

For total face height, there was a significant difference in the scores for male (M=114.37, SD=7.437)) and female (M=110.37, SD=4.510); t (418) = 6.735, p= .000 (p<0.05).

For upper face height, there was a significant difference in the scores for male (M=10.85, SD=1.156)) and female (M=6.66, SD=1.858); t (288) = 23.476, p= .000 (p<0.05).

For face width, there was a significant difference in the scores for male (M=139.88, SD=75.269)) and female (M=134.99, SD=8.941); t (418) = 6.106, p= .000 (p<0.05).

The confidence interval of the difference did not include zero as upper and lower values were positive.

The face shape of Chinese were short and wide (Face index <78.9) and they were hypereuriprosopic group (FI = 75-79.9) among both genders. The face shape of Malay and Indian were intermediate (Face index between 79-92.9) among both genders. The face shape of Malay was Euriprosopic (FI=80-84.9) and Mesoprosopic (85-89.9) and the face shape of Indian was Mesoprosopic (85-89.9) and Leptoprosopic (90-94.9) among genders. There was not a significant difference in face index among gender.

Discussion

The discoveries of the current investigation for face height were contrasted and the discoveries of the examinations completed by different researchers. Likeness and uniqueness have been found with the discoveries of different analysts.

Othman revealed that all facial estimations were bigger in men than female, with the exception of the facial profile angle which was bigger in ladies.[12]

Bayat discovered that the mean measurements of trichion–gnathion, were statistically greater in Iranian males than females. The comparing Iranian anthropometric norms with North American Whites, Malays, Turkish and African American women were demonstrated that there were statistically significant differences in most anthropometric measurements between Iranians and other populations.[13]

Alireza found a significant variation in face index between in genders. The facial index in men was higher than women. The investigation of face index between female and male students were Leptoprosopic and Mesoprosopic type.[14]

Williams reviewed that Philippine guys had taller facial height and longer mandible height than the women. There was likewise a huge facial tissue profile distinction between young people from Nigeria, Ghana and Senegal contrasted with Caucasian youths.[15]

Moninuola discovered that the men had dominatingly Euryproscopic faces yet the ladies had prevalently Mesoproscopic faces. The wide range of various measurements were higher in men than women.[16]

Dodangheh demonstrated that the most regular face type among the Iranian populace was connected to Hyperleptoprosopic. The most widely recognized kinds of face were Hyperleptoprosopic and Hyperleptene in total face index and upper face index, separately.[17]

Jaberi identified with the face measurement were higher in male than females. These discoveries affirmed the presence of sexual dimorphism in facial attributes of clinical students in the Iranian populace. In an investigation, the facial parameters of males and females were contrasted and that of Shiraz University of Medical Sciences students of Iranian populace. [18]

Conclusion

There was significant difference between facial measurements in which upper face height was strong correlation among Malay, Indian and Chinese.

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