



FACIAL INDEX OF HARYANVI ADULTS AND SEXUAL DIMORPHISM

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ABSTRACT

Aim: The present study was conducted among Haryana descent individuals to gauge whether there is sexual dimorphism in its population on basis of facial index.

Settings & Design: The study was conducted in a tertiary health care centre and was cross-sectional.

Methods & Materials: Two hundred healthy volunteers were taken and their morphological facial length and facial breadth was measured. Facial index was then calculated.

Statistical analysis: SPSS version 20.0 was used to calculate p-value. The p-value <0.05 was considered significant.

Results: It was observed that the females of Haryana had a broad face (euriprosopic), while, the men had a very long face (hyperleptoprosopic).

Conclusion: It was concluded that the need to store cephalometric data based on sex was the need of the hour. The study emphasised that, the secular and demographic trends should also be incorporated within this database.

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INTRODUCTION

Cephalometry (cephalo= head and metric= measurement) is a sub branch of anthropometry. It includes the measurement of craniofacial parameters. These craniofacial features have anatomical landmarks that are fixed, resistant to decay, well defined and easy to locate.^{1,2}

Cephalometry and its most important measurement, facial index has countless uses. We require the cranio-facial information in case of highly decomposed, dismembered remains, deliberately mutilated, disfigured, pounded, and gouged dead.³ It is also required in medico-legal examinations, when a person has been attacked by wild animals⁴, In case of natural disasters like tsunamis, floods, bomb blasts, car accidents, wars, plane crashes and for legal and humanitarian reasons.

Knowledge of size and shape of the human head is required for the study of human growth, population variation, clinical treatment – dental surgeries, medico-legal identification in forensics, oral and maxillofacial surgery, clinical diagnosis, treatment planning as well as optimisation of the fit of respirators, gas masks, oxygen masks, dust masks and military helmets.⁵ It is also used for design of clothing, eyeglasses, aircraft cockpit design & its layout compatible with local population of the country.⁶

Craniofacial anthropometrics even help genetic counsellors and dysmorphologists in defining dysmorphic syndromes.⁷

They help assess for intersexuality, pseudo-hermaphroditism and maternity and paternity law suits as well.⁸

In case of congenital facial disfigurement, such as cleft lip and palate or craniofacial syndromes (Treacher Collins syndrome, Apert's Syndrome, Achondroplasia etc.), these craniofacial proportions can be used as references to achieve near normal values for establishing the facial aesthetics and structure via reconstruction in plastic surgery.⁹

Facial proportions and relationships provide basis of "facial balance" and is the basis of aesthetic maxillofacial surgery. There are some faces, which are appealing to us at first sight. These faces, according to Greeks, follow a "golden ratio" or "Fibonacci ratio" or "divine proportion" or "phi". This golden ratio (1.618) was used by Leonardo da Vinci in his painting of the "Vitruvian Man." Architects and scientists have been using this ratio since ages in designing buildings and for studying nature.^{10,11,12}

Thus, the present study's objective was to measure facial index, a parameter of cephalometry and compare it with the previous studies done among Haryana's population as well as foreign populations.

MATERIAL AND METHODS

The present study was a cross-sectional study and was carried over a period of one year. Healthy adults between the age group of 18-50 years were recruited. Ethical clearance was taken before the start of the study.

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Inclusion criteria: Healthy volunteers between the age group of 18-50 years with the last two generations having descent of Haryana were taken. Subjects of Haryana taken, were born, bred and lived in the Indian state of Haryana.

Exclusion criteria

1. Craniofacial abnormalities e.g. cleft lip & palate.
2. Previous plastic surgery of face or orthodontic procedures.
3. Previous injury to the face.
4. Mixed ethnicity.
5. Common genetic, neurological and endocrine disorders e.g. Acromegaly, Down’s syndrome, facial palsy.
6. Transgender (self-declared)

Sample size taken was 200. Volunteers were requested to read the patient information sheet and their consent was taken thereafter.

Subjects were examined post lunch from 14:00 to 16:00 hours to eliminate discrepancies due to diurnal variation. Measurements were carried out by the same observer and under the same conditions to avoid errors in methodology and inter-observer bias. All measurements were taken in a well-lit room, repeated thrice and then the mean was entered in the proforma sheet in centi-meters (cm). The mean value was rounded off to one digit after decimal i.e. 0.1cm.

Sliding calliper was of “Oleander Enterprise” make and was composed of carbon fibre composite unlike a metal one, to cause no discomfort or injury to the patient. It was battery operated and had an LED screen. Reading was in milli-meters and till one digit after the decimal i.e. error was 0.1mm. Spreading calliper was of “Galaxy Retail Inc.” make and brass chrome plated with rounded ends. Its range was from 0-300 milli-meters and the error was 1mm.

Landmarks taken:¹³

1. Nasion(N) – nasal root
2. Gnathion (Gn)- midpoint of lower border of chin
3. Zygomatic prominence (Z)- most lateral point on zygomatic arch

Measurements taken:¹³

1. Morphological Facial length- distance between root of nose (N) to the midpoint of the lower border of the chin (gnathion -Gn), measured by using a sliding caliper. (figure 1)
2. Facial breadth- distance from the most lateral point on the zygomatic arch (zygomatic prominence -Z) to another, measured by using a spreading caliper. (figure 2)
3. Facial index- morphological facial length/ facial breadth x100 was derived by using a calculator

Classification based on facial index:¹⁴

- Hypereuriprosopic/ very broad face <= 79.9
- Euriprosopic/ broad face- 80-84.9
- Mesoprosopic/ round face-85- 89.9
- Leptoprosopic/ long face- 90-94.9
- Hyperleptoprosopic/ very long face- >=95.

RESULTS

Two hundred participants of descent of Haryana volunteered to be included in the study and remained enrolled till the end.

Table 1 Depicts the mean facial index ± SD and the range in males and females of Haryana

SEX	Range	Mean ± SD	t value	SEM	p value
Male (n=100)	72- 109	92.41 ± 7.37	11.62	0.525	0.001
Female (n=100)	72-97.3	82.22 ± 4.75	11.62	0.475	0.001

n= number of healthy volunteers

Table 2 Shows the mean facial index of previous studies

Author	Year & Population	n	Mean Facial Index	
			Males	Females
Zahra Heidari ¹⁶	2006, Iran (Sistani)	400	-----	83.22 +/- 4.02
Zahra Heidari ¹⁶	2006, Iran (Baluch)	400	-----	84.86 +/- 5.15
Z. Heidari ¹⁷	2009, Iran (Sistani)	200	-----	93.9 +/- 2.6
Z. Heidari ¹⁷	2009, Iran (Baluch)	200	-----	92.9 +/- 3.2
D Jeremic ¹⁵	2013, Serbia	700	94.04 +/- 7.0	92.38 +/- 6.7
Omotoso D.R. ²⁰	2011, Nigeria	450	87.98 +/- 2.55	85.88 +/- 2.48
Vaishali R Shetti ²¹	2011, India	100	87.19 +/- 5.2	86.75 +/- 6.3
Vaishali R Shetti ²¹	2011, Malaysia	200	85.72 +/- 5.4	87.71 +/- 5.1
Asma Mostafa ²²	2013, Bangladesh	100	-----	77.222 +/- 4.54
Ashok K Pandey ¹⁸	1987, Andaman & Nicobar, India	53	77.98 +/- 0.63	75.29 +/- 0.83
Prasanna LC ¹⁹	2013, North India	100	101.04 +/- 1.95	107.7 +/- 7.69
Prasanna LC ¹⁹	2013, South India	100	100.28 +/- 1.77	85.39 +/- 6.33
Deepu Singh Kataria ²³	2015, North India	400	86.44 +/- 5.46	85.02 +/- 6.28
Mahesh Kumar ²⁴	2013 Haryana, India	600	86.09 +/- 5.14	84.84 +/- 5.71
Shrutii Gupta ²⁵	2019 Haryana, India	300	87.17 +/- 5.63	85.9 +/- 5.53
Present study	2021 Haryana, India	200	92.41 +/- 7.37	82.22 +/- 4.75

As shown in table 1 and figure 3, the values of facial index in Haryarvi males ranged from 72 to 109 and in females it spanned from 72 to 97.3. The mean values obtained were 92.41 ± 7.37 in males and 82.22 ± 4.75 in females. The p-value was calculated by SPSS version 20.0. and values less than 0.05 were considered significant. It was thus concluded, that the values of facial index were significant for either sex.



Figure 1 Depicts measurement of the morphological facial length by a sliding caliper



Figure 2 Shows measurement of the facial breadth by a spreading caliper

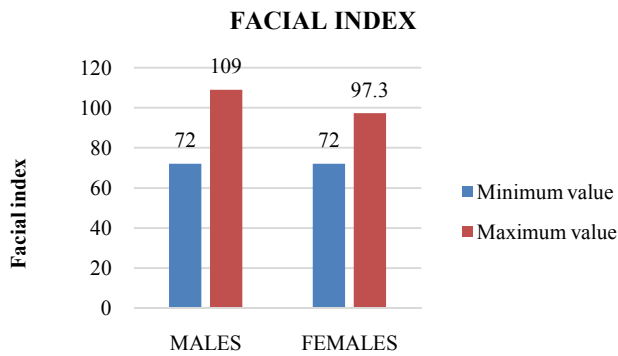


Figure 3 Showing the extreme values of facial index obtained from the present study.

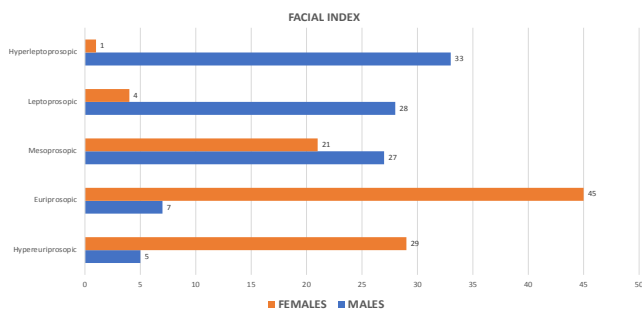


Figure 4 Representation of facial index in the present study population

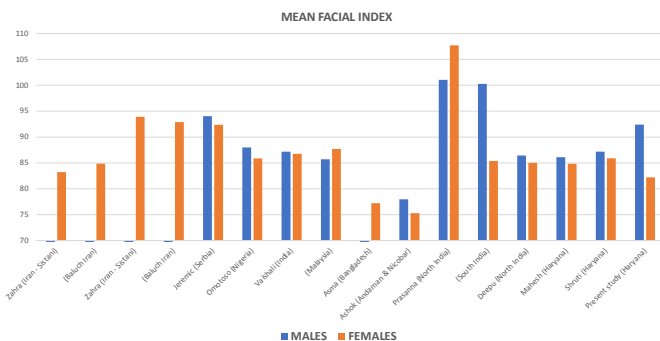


Figure 5 Mean facial index calculated in other study populations

Thus, according to the present study and figure 4:

Out of 100 females of Haryana (n=100), 45% had a Euriprosopic face, 29% had a hypereuriprosopic face, 21% a mesoprosopic face, 4% a leptoprosopic face and the remainder 1% had a hyperleptoprosopic face.

On the other hand, in males (n=100), 33% had a hyperleptoprosopic face, 28% a leptoprosopic face, 27% a mesoprosopic face, 7% a euriprosopic face and the remainder, minority had a hypereuriprosopic face.

DISCUSSION

In the present study based on facial index, majority of females of Haryana, have euriprosopic or broad face and males have a hyperleptoprosopic or a very long face.

Similar studies have been carried out in various populations belonging to Iran, Serbia, Nigeria, Malaysia and Bangladesh. There have been quite a few studies done on facial index in India as well. Table 2 and figure 5 show the comparison of facial index of the present study with that of previous studies.

The values closest to the present study, were depicted in males of Serbia.¹⁵ In females, the study with the closest results was

that of Z. Heidari's study on Sistani Iranians.^{16,17} The drawback of Z. Heidari's studies was that they considered only females and males were not assessed.

The present study reveals that the minimum mean facial index values, in both males as well as females, were derived in a study done on Andaman and Nicobar population by Ashok K Pandey.¹⁸ The maximum mean facial index in both sexes, was found out in a study done on North Indians by Prasanna L.C.¹⁹ It can be concluded that the mean facial index values vary to a great extent in most north Indian populations.

CONCLUSION

The present study, thus emphasizes the need for database preparation of different populations based on the different sexes and their facial indexes, such that it incorporates their ethnic diversity. It emphasizes that secular and demographic trends play a crucial role in formulating the facial indexes of these populations. Also the diverse ethnicity and colonisations of the past, have led to a vast range of facial index for the north Indian population of Haryana.

This data should thus be revised often, as it is necessary for anthropological research, forensics, facial recognition technology, reconstructive surgery, genetic dysmorphology and countless other ways.

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