

Evaluation of Golden Proportions of face in Ethnic Himachali Population

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Citation of this Article: Jain S, Mehra A, Singh S, Christy, Kaur J, Dadwal R, “Evaluation of Golden Proportions of face in Ethnic Himachali Population”, IJDSIR- June - 2021, Vol. – 4, Issue - 3, P. No. 385 – 389.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aim: To evaluate Golden Proportions of face in Ethnic Himachali Population

Materials and Methodology: 200 subjects were selected and were divided into 2 groups (Males and females). The photographic procedure was carried out and photographs were analysed for facial measurements in Adobe photoshop.

Observation and results: Both groups showed deviation from divine proportions in vertical proportions whereas

transverse proportions were more close to silver ratio in both groups.

Keywords: Digital Influencers, Vertical Proportions, Transverse Proportions

Introduction

In our current society, aesthetics is overvalued and primarily related to how well individuals are accepted in social groups. People are routinely exposed to countless amounts of information and methods to achieve the beauty standard found in celebrities or digital influencers. According to Schubert¹, the pursuit of beauty is as ancient

as human kind. Many cultures over time have shown their preferences and tastes through their beauty standards. The ancient Egyptians were possibly among the first to deal with harmonious proportions of the face and body. Various norms and standards have been proposed to describe the attractiveness of face, out of which, one of the most famous axiom is facial golden proportion. Divine proportion, golden proportion, and phi are the synonymous terms and geometrically found to be equal to 1:1.618.²

The golden ratio was introduced in several fields of study and in Dentistry it was no different. The first apparition in aesthetic dentistry was in the 70's, through Lombardi³ Levin⁴ wrote about some of the many forms that the golden ratio appears in nature and how it applies to aesthetic dentistry. In the field of facial analysis, Ricketts⁵ had great prominence by measuring some attractiveness parameters against the golden ratio. The values of measured proportions in beautiful faces are likely to approximate the divine proportion and also the divine proportion is considered as an important factor in facial esthetics. Hence, there was a need to evaluate the relationship between facial esthetics and the divine proportions. Hence, the aim of this study was to evaluate various facial divine proportions in ethnic Himachali population.

Material And Methods

We selected the patients who visited to the Department of Orthodontics and Dentofacial Orthopaedics, Himachal Institute of Dental Sciences, Paonta Sahib. 200 subjects were selected the inclusion criteria were age between 18-30 yrs, subjects whose four ancestral generations are resident from district Sirmour of Himachal Pradesh, healthy and without any syndromes, with full complement of permanent teeth(excluding third molars), no plastic or

reconstructive surgery, no congenital anomalies, no Facial cleft or kind of facial asymmetry.

Armamentarium

1. Digital single Lens Reflex (DSLR) camera (Nikon D5300)
2. Macrolens (Nikon 105mm)
3. Tripod stand (Yunteng VCT-600 AV)
4. Secondary light source (umbrella flash with wireless remote trigger)
5. Plum line
6. Adobe photoshop

We Assessed Golden Proportions of face by taking frontal Photographs of the subjects

Photographic Procedure

In order to take the records in NHP by Cooke and Wei⁶, the subjects were asked to walk a few steps, stand at rest facing the camera, and place their arms at their side. Each subject was made to stand on line marked on the floor 1.6 meters away from the tripod on which camera was pre-adjusted. The photographs were recorded with the subjects standing against a white background. The subjects were asked to look directly into the camera with their lips relaxed, adopting the position they normally show during the day. Glasses were removed and hair was piled high on the head which ensured that the patient's forehead, neck and ears were clearly visible during the photographic procedure. The following points are located on each frontal facial photograph according to definitions given by Ricketts³ and Mizumoto et al⁷ Trichion (TR), the point at the top of the forehead at the junction (hairline) of the face and skull fascia; TS, the width of the head at the temporal soft tissue above the ears at the level of the supraorbital ridges; LC, the point at the lateral canthus of the eyes; LN, the point at the lateral rim of the nose; cheilion (CH), the point at the corner of the mouth; ME, soft-tissue menton.

Seven measurements of vertical facial proportion and three measurements of transverse facial proportion were taken based on previous studies.^{8,9}

Vertical facial proportions were - TR-ME: LC-ME; TR-LC: LC-ME; LN-ME: TR-LN; LC-LN: LN-ME; CH-ME: LC-CH; LN-CH: LC-LN; and LN-CH: CH-ME [Figure 1]. Transverse facial proportions were: LN(right) r-(left) l: CHr-l; LCr-l: CHr-l; and TSr-l: LCr-l [Figure 2] Mean measurements were converted to percentages, assuming that the divine proportion 1.618 was 100%. Another ratio, known as a silver ratio (1:1.414) was also used in this study as a measure of balanced facial proportion.

Updated version of Adobe photoshop was used to take measurements and analyze the photographs. For each photograph, the scale was set in the on the left while taking photographs, the ruler incorporated in the photograph, keeping the unit of length as centimeter. This enabled direct and highly accurate measurements of the photographs. The data so obtained were subjected to statistical analysis. Results were expressed as the mean (standard error of mean). Data were summarized as mean \pm standard deviation from the values obtained from at least three independent experiments, in each of which triplicate samples were used. Groups were compared by unpaired Student's t-test. A two-tailed $P < 0.05$ was considered statistically significant. Analyses were performed on SPSS software (Windows version 17.0, IBM Corporation, New York, US).

Results

There were a total of 200 participants in this study, out of which 116 (58%) were males and 84 (42%) were females Table 1 Shows the gender-wise distribution of study parameters and their comparison with golden proportion. One out of seven vertical proportion TRLN:LNME was very close to divine proportions with percentage value of

99.51% for males and 97.65% for females. All other parameters were deviated from divine proportion. Similarly, transverse facial proportions (CHCH:LNLN, LCLC:CHCH, TSTS:LCLC) were deviated more from divine proportion in both males and females.

Discussion

The ancient Egyptians were possibly among the first to deal with harmonious proportions of the face and body. Various norms and standards have been proposed to describe the attractiveness of face, out of which, one of the most famous axiom is facial golden proportion. Divine proportion, golden proportion, and phi are the synonymous terms and geometrically it was found to be equal to 1:1.618.⁵ This golden proportion has been considered as the ratio most attractive to the human eye and mind.

Ricketts⁵ was the first Orthodontist to apply divine proportion to the composition of facial hard and soft tissues. He showed that faces that are generally considered beautiful are having proportions related to golden ratio. The size difference in facial dimensions, with the men, sized larger than the women, has been proposed by Peck and Peck⁸ and Ferrario et al.¹⁰ Therefore, both male and female subjects were considered in this study.

Table 1 showed that among the seven vertical proportions only one (TRLN:LNME) was close to golden proportion in both the groups. Kawakami et al¹¹ also reported the similar findings in his study. Similarly, transverse proportions were deviated more from divine proportion in both the groups. The value of CHCH:LNLN and TSTS:LCLC were smaller than golden ratio but more closure to silver ratio(1.414). Silver ratio introduced by Yanagi¹² He reported about a historical Japanese painting and temple built in 607 AD designed with both golden (1:1.618) and silver (1: 1.414) ratios. Mizumoto et al⁷ also found the same result of transverse facial proportion for

Japanese women. The findings of the present study partially agree with previous studies ^{2,5} who believed that the facial beauty is directly related to the divine proportion however, the results of our investigation showed that a little relationship exists between the divine proportion and the perception of beauty. Among different states in India, Himachal Pradesh can be segregated due to their distinct morphological features which can be discerned clearly. This could be due to distinct genetic and environmental effects on the morphology, due to difficult terrain and rare migration of people from other states. This has prompted

us to carry out the current study on Ethnic Himachali Population to assess norms and the standards that could be used to plan cases requiring orthodontic treatments.

Conclusion

The present study showed that most of the facial proportions were deviated from divine proportion. Thus, divine proportions could not be an important factor in the perception of facial beauty for Ethnic Himachali Population. Transverse proportion was closer to silver ratio (1.414) rather than divine proportion both the groups.

Table 1: Gender-wise distribution of study parameters and their comparison with golden proportion for Ethnic Himachali Population

Parameter	Gender	N	Mean	Std. Deviation	% Value (Considering Golden Proportion as 100%)	P -value
TRME_LCME	Male	116	1.74	.13	107.54	0.783
	Female	84	1.73	.13	106.92	
LCME_TRLC	Male	116	1.35	.21	83.44	0.001*
	Female	84	1.46	.25	90.23	
TRLN_LNME	Male	116	1.61	.33	99.51	0.428
	Female	84	1.58	.32	97.65	
LNME_LCLN	Male	116	1.97	.55	121.76	0.939
	Female	84	1.97	.51	121.76	
LCCH_CHME	Male	116	1.47	.30	90.85	0.471
	Female	84	1.44	.32	89	
LCLN_LNCH	Male	116	1.35	.33	83.44	0.745
	Female	84	1.33	.29	82.2	
CHME_LNCH	Male	116	1.52	.30	93.94	0.990
	Female	84	1.52	.32	93.94	
CHCH_LNLN	Male	116	1.26	.12	77.87	0.805
	Female	84	1.26	.12	77.87	
LCLC_CHCH	Male	116	2.10	.25	129.79	0.043*
	Female	84	2.19	.34	135.35	
TSTS_LCLC	Male	116	1.25	.14	77.26	0.125
	Female	84	1.29	.19	79.73	

*Statistically significant (Independent t-test, $p < 0.05$)



Fig.1: Landmarks and measurements for vertical facial proportions 1. TR-ME:LC: ME, 2. TR-LC:LC-ME; 3. LN-ME:TR-LN; 4. LC-LN:LN-ME; 5. CH-ME:LC-CH; 6. LN-CH:CH-ME; 7. LN-CH:LC-LN (Using Adobe Photoshop)



Fig. 2: Landmarks and measurements transverse facial proportions 1: TS (r)-TS (l) (head width at the temple); 2: LC (r)-LC (l) (face width between both eyes); 3: LN (r)-LN (l) (width of nose); 4: CH (r)-CH (l) (width of mouth).

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