

*Full Length Research Paper*

# Geometric assessment of facial beauty in female participating in beauty pageants of Nepal: Establishing a universal standard in Morphometry

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**A descriptive prospective study was carried with sample size of 100, female participants selected for final round by the panel of judges from various field in beauty pageants “Miss Purbhancal” in Dharan municipality, Sunsari district of Eastern Nepal in the year of 2011 and 2012. Anthropometric measurements were taken from standard anatomical landmarks and various facial geometric proportions were selected. Paired –t test was applied to see the significance between the measured value by using SPSS -11.5 version. The ratio of height of eye (EH) with total facial height (TFH), the ratio of chin length (CL) with total height of face and the ratio of width of mouth with the width of face was significant ( $p = 0.00$ ). Also the ratio of, width of eye (EW) with the facial width measured at eye was significant ( $p < 0.005$ ). The study concluded female faces are judged more attractive when the vertical distance between their eyes and the mouth.**

**Key words:** Morphometry, anthropometric measurements, facial geometrical proportion, facial width, chin length, total facial height.

## INTRODUCTION

Beauty is an impression of beholders following the satisfaction of their eyes. Scientific measurement of face and the impression of beholders both determine the beauty of face. The impression and the scientific fact have been extensively studied abroad. Thus, it is worth studying the physical aspect that contributes to “Beautiful Looking”. Leonardo da Vinci used the parameters of a human body corresponding to the golden section before he created his masterpieces. In biological research carried out in the 70s-90s it was shown that the golden section typical of structural proportions and harmony is found everywhere starting from viruses and flora to a human body. The golden section is recognized as the universal law of living systems (Preston JD 1993). Beauty is that “which gives the highest degree of pleasure to the senses or to the mind and suggests that the object of delight approximates one’s conception of an ideal.” (Webster, 1988).

Many factors influence the perception of beauty, including makeup, clothing, jewellery and facial express-

expressions, though, it has a proportionate relation to our physical features that is the primary factor in determining the perception, conscious or subconscious, of beauty (Cunningham M, 1986).

The Objectives of the study was to evaluate the morphometric dimensions of beautiful faces and to set the criteria and establish universal standard which are considered by lay people to be beautiful.

## MATERIALS AND METHODS

A Descriptive prospective study was carried with sample size of 100, female participants, of age between 17- 23 years, selected for final round by the panel of judges from various field in beauty pageants “Miss Purbhancal” in Dharan municipality, Sunsari district of Eastern Nepal in the year of 2011 and 2012. Anthropometric measurements were taken from standard anatomical landmarks and various facial geometric proportions were selected. All participants were asked to sit on a chair in a relaxed condition with their heads in anatomical position and the following measurements were taken using a spreading calliper using standard anatomical land-

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**Table 1.** Shows the Mean and SD of different measured Parameters.

Parameters (measured)	TFH	FWE	CL	EW	EH	FWM	MW
Mean ± SD	16.68±0.35	12.60±0.42	3.0±0.40	4.13±0.66	2.48±0.38	9.84±0.84	5.02±0.14

All measurement taken in centimeter

**Table 2.** Shows the Mean and SD of calculated ratio of the Parameters.

Parameters (Calculated)	TFH	FWE	CL	EW	EH	FWM	MW
Mean ± SD	16.6 ± 0.23	10.11±0.52	3.33±0.11	3.37±0.16	1.26±0.56	5.73± 0.71	5.73±0.71

All measurement taken in centimeter.

marks. Total facial height (TFH), Eye width (EW), Width of face measured at level of eye (FWE), Eye height (EH), Mouth width (MW), Width of face measured at mouth level (FWM), Chin height (CL). The following geometric proportions were selected between:

Width of eye (EW) and width of face measured at eye level (WFE), Vertical distance from centre of eye (EH) to the bottom of eyebrow and total facial height (TFH), Chin length (CL) and the total facial height, Mouth width (MW) and the width of the face measured at mouth level (WM), Height of protrusion of nose (NP) and the length of upper lip (ULL). Paired *t* test was applied to see the significance between the measured value by using SPSS -11.5 version. A *p* – value of <0.05 at 95 % confidence interval was taken as significant. Written consent was taken from the all participants. Ethical clearance was obtained from IERB, BPKIHS.

## RESULTS

The following proportion was seen, as width of eye (EW) was 1/3 the width of face measured at eye level (WFE), Vertical height from centre of eye (EH) was 1/10<sup>th</sup> of total facial height(TFH).

Chin length (CL) was 1/5<sup>th</sup> total facial height(TFH), Mouth width (MW) was 1/2<sup>th</sup> the width of the face measured at mouth level (WM), Height of protrusion of nose (NP) and the length of upper lip (ULL) was as 1:1.

The eye width (EW) was 40 percent of the total facial width (FWM) and the vertical distance of eye was 52 percent of the total facial height (TFH). The ratio of height of eye (EH) with total facial height (TFH), the ratio of chin length(CL) with total height of face and the ratio of width of mouth with the width of face was significant (*p* =0.00). Also the ratio of, width of eye (EW) with the facial width measured at eye was significant (*p* <0.005).

## DISCUSSION

In a study from University of California, the distance between a woman's eyes and the distance between eyes and mouth are key factors in determining attractiveness (Joyann C, 2009). Similar study tested from Stephen and Kang of the University of Toronto, revealed facial feature arrangement and identified the optimal relation between the eyes, the mouth and the edge of the face for individual physical beauty and established two standard ratio one for length and one for width (Stephen Kang, 2009). The study of Stephan Kang, 2009 also support our finding in which mouth width was 1/2<sup>th</sup> the width of face measured at mouth level (*p* <0.001).

Other study Pamela et al. (2010), San Diego, Psychology suggest that Leonardo Da Vinci used the golden ratio when painting his 'Mona Lisa' which shows that the average distances between the eyes, mouth and face contour form the true golden ratios (Pamela M. P and Stephen L, 2010). Similar finding was seen in our study, the vertical height from centre of eye to total facial height, width of eye to width of face measured at eye level, chin length (CL) to total facial height and ratio of protrusion of nose to the length of upper lip was found to be significant (*p*=0.007) in determining a physical beautiful face in females.

This study reveals the eye width (EW) was 40 percent of the total facial width (FWM) and the vertical distance of eye was 52 percent of the total facial height (TFH) which is similar to the study conducted in University of Toronto which suggested large eyes, found full lips features make a female face attractive. Female faces were judged more attractive when the vertical distance between their eyes and the mouth was approximately 36 percent of the face's length, and the horizontal distance between their eyes was approximately 46 percent of the face's width (Kang Lee, 2009).

## CONCLUSION

This study shows, the relation between face contour and the eyes, mouth and nose contributes to perception of facial physical attractiveness. The perception of physical attractiveness is a result of a cognitive averaging process by which people take in all the faces they see and average them to get an standard width ratio and an standard length ratio. Perception of facial attractiveness is a result of a cognitive averaging process by which people take in all the faces they see and average them to get an ideal width ratio and an ideal length ratio.

## LIMITATION

Female faces from mixed ethnicity were studied in this study. Further studies are needed to know whether there is a different set of golden ratios for faces from other each separate ethnic groups.

## CONFLICT OF INTEREST

There is no conflict of interest among the authors.

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