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Original Research

Analysis of periocular anthropometric characteristics amongst north Indian adults

Dr. Priyanka Gupta[1], Dr. Saurabh Gupta[2], Dr. Harsh Garg[3]

[1]MBBS, MS, DNB (Ophthalmology), Assistant Professor, Department of Ophthalmology, Adesh Institute of Medical Sciences and Research, Bathinda, Punjab, India;

[2]MBBS, MS, MCh (Plastic surgery), Assistant Professor, Department of General Surgery, Adesh Institute of Medical Sciences and Research, Bathinda, Punjab, India;

[3]MBBS, Junior Resident, Department of Ophthalmology, Adesh Institute of Medical Sciences and Research, Bathinda, Punjab, India

ABSTRACT:

Context: Facial appearance is largely governed by the periorbital characteristics. The appearance of periorbital tissues varies with age, sex, and most importantly the region. Ethnic and racial difference in the appearance of eyelids is common. Anthropometric data of various populations has been studied in the past. However, there is little information on various periocular parameters of population of North India,hence our study was conducted to determine the average values of the same in people with North Indian ethnicity. **Methods:** Frontal view photographs were acquired for 200 North Indian adults between the ages 21 and 60 years. Anthropometric measurements done included palpebral fissure width (PFW), palpebral fissure height (PFH), inter pupillary distance (IPD), intercanthal distance (ICD) and outer canthal distance (OCD). Data was categorized by demographic variables and analyzed. **Results:** The mean value obtained were- palpebral fissure width (males:31.17±3.65mm; females:29.54±2.38 mm), palpebral fissure height (males:11.14±1.51mm; females:11.08±1.16 mm), inter pupillary distance (males:67.38±6.51mm; females:65.74±3.50 mm), intercanthal distance (males:35.67±3.20mm; females:34.72±2.65 mm) and outer canthal distance (males:96.26±6.73mm; females:94.37±4.99 mm) in the 21-30 years age group. Higher mean values were obtained in males in PFW,IPD and OCD. Gender based similar values were obtained in PFH and ICD. **Conclusion:** Significant gender based difference in the periocular measurements was found in our study. Our study will help to create a database of these parameters which will be useful to the clinician for evaluation and planning of various aesthetic and post traumatic surgical interventions.

Key words: Periocular anthropometry, palpebral fissure, north Indian adults

Key message: Various surgeries planned in the periocular area should be undertaken after due consideration to the geographically prevalent anthropometric characteristics. This will ensure cosmetically appealing outcomes and better patient acceptability.

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Corresponding Author: Dr. Saurabh Gupta, Department of General Surgery, Adesh institute of medical sciences and research, Bathinda, Punjab, India

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INTRODUCTION

Normal periocular palpebral anthropometric measurements are of great concern clinically and aesthetically.[1] These palpebral measurements vary based on age, gender and race and ethnicity.[2-6] Various congenital conditions like telecanthus, epicanthal folds, lid coloboma, bleharophimosis, congenital ptosis are encountered in clinical practice. Apart from these congenital conditions, lid lacerations, traumatic ptosis, entropion, ectropion are also quite common. Objective and accurate clinical examination is mandatory in all these cases. The aim of surgery is to achieve measurements as close to the reference range in that region as possible. The normative data for periocular measurement, specific for region and gender, can serve as a reference for preoperative assessment and post operative outcomes. The normal database of one ethnic group may not be representative of population of different ethnicity.

Most of the studies published previously have the normal data for the western countries. Farkas[7] studied patients from various races and ages to establish norms. Also there are several articles having normal data of Asian population.

Normal data of 20 – 60 years old people is important as this age group mainly undergo oculoplastic procedures electively or following trauma. The aim of this study is to provide a normal database for anthropometric measurements of North Indian population. Therefore we conducted a population based survey on 20 – 60 year old adults of North India.

SUBJECTS AND METHODS

A cross sectional study was conducted on 200 North Indian adults (100 males and 100 females) in the 21 to 60 years age group. Research and ethical clearance was obtained from institutional research and ethical committee. The subjects were randomly selected healthy adults who accompanied the patients presenting to the department of ophthalmology and plastic surgery. Subjects with history of previous lid surgery, trauma, facial fractures, orbit or eyelid tumour and those with phthisis bulbi were excluded from the study. Also, those who had developmental anomaly or had a history of botox or filler treatment were excluded from the study.

There were 50 subjects allotted to each age groups - 21-30 years, 31-40 years, 41-50 yrs and 51-60 yrs, with males and females equally distributed in each group.

After obtaining written informed consent, a photograph of the subject in frontal view was taken using a smartphone placed on a tripod. Height of the phone was adjusted according to the height of the patient in the axial plane. Subjects were made to sit straight with eyes fixed in primary gaze. A 15 cm transparent plastic ruler was placed alongside the subject in the photograph so that life size measurements can be made from the photograph using a software (ImageMeter). Once positioned, the subjects were instructed not to move the eyes or face. Only the eyes of the subjects were captured in photographs. The measurements were done on the photographs using Imagemeter app on smartphone. These included

- Palpebral fissure width (PFW) – Measured as the distance between medial canthus and lateral canthus
- Palpebral fissure height (PFH) – Measured as the distance between open upper eyelid margin and the lower eyelid margin
- Interpupillary distance (IPD) – Measured as the distance between the centre of pupil of both eyes
- Intercanthal distance (ICD) – Measured as the distance between the medial canthus of both eyes.
- Outercanthal distance (OCD) – Measured as the distance between the lateral canthus of both eyes

After a pilot study on 20 subjects, the study was carried further till the desired sample was achieved. Data was collected and analysed using descriptive statistical analysis

RESULTS

A total of 200 patients were studied. Mean values of palpebral fissure width and palpebral fissure height amongst males and females in the subdivided age groups have been tabulated in Table 1 and mean values of interpupillary distance, intercanthal distance and outer canthal distance have been tabulated in Table 2.

Table 1. Mean value of PFW and PFH

	PFW (in mm)		PFH (in mm)	
AGE (in years)	MALE	FEMALE	MALE	FEMALE
21-30	31.17±3.65	29.54±2.38	11.14±1.51	11.08±1.16
31-40	30.83±3.72	30.25±3.15	11.28±1.93	11.36±1.10
41-50	30.96±2.98	30.30±3.07	11.84±1.26	11.71±2.13
51-60	31.08±3.51	30.45±2.83	11.23±1.73	11.15±1.15

Table 2. Mean value of IPD, ICD and OCD

	IPD (in mm)		ICD (in mm)		OCD (in mm)	
AGE (in years)	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
21-30	67.38±6.51	65.74±3.50	35.67±3.20	34.72±2.65	96.26±6.73	94.37±4.99
31-40	66.33±5.41	65.10±4.76	34.11±2.18	33.82±3.10	95.66±7.10	93.51±5.84
41-50	67.14±3.24	66.73±3.80	35.13±2.77	34.10±1.80	96.37±5.68	93.89±5.17
51-60	67.50±5.78	65.92±4.01	34.50±2.91	34.26±2.50	96.53±5.11	94.42±6.13

DISCUSSION

For the past few years, plastic surgeries like blepharoplasty, ptosis correction and other cosmetic procedures have witnessed an upsurge in India too as that of western countries. Since the normal database of one ethnic group may not represent the others, there is a requirement of an ethnically specific database. So we attempt to establish the normal values of palpebral measurements for Indian population especially of the northern region. This range of normal values helps the surgeons to formulate a preoperative plan for an aesthetic oculoplastic procedure. Furthermore, the normal values of periocular measurements for a specific race and age are useful in surgeries after craniofacial trauma to achieve the desired postoperative outcomes.

Palpebral fissure height (PFH)

In the present study, palpebral fissure height was found to be similar in both males and females, mean values being 11.14 mm and 11.08 mm respectively (age group 21-30 years). The similarity of PFH measurements between males and females were also found in study done by Patil et al[8] (males-12.3 mm; females-11.7 mm), Vasanthakumar et al[9] (males-11.3 mm; females-11.58 mm), Eze et al[6] (males-10.6 mm; females-10.6 mm) and Faruk et al[10] (males-9.7 mm; females-9.9 mm). Park et al[11] reported mean values of 8mm and 8.2 mm in males and females respectively. Cho et al [12] reported mean values of 8.2 mm and 8.5 mm in males and females respectively.

Palpebral fissure width (PFW)

In the current study, the width of palpebral aperture was higher in males as compared to females, mean values being 31.17 mm and 29.54 mm respectively in 21-30 age group. This correlates closely to the study done on South Indian adults by Vasanthakumar et al[9] which reported mean values of 31.08 mm and 29.9 mm in males and females respectively. However, our results are in contrast to the study done by Patil et al[8] on Indian population where the mean reported values were 32.3mm and 33.7 mm in males n females respectively, being higher in females as compared to males. Similar study conducted on Korean population by Park et al[11] reported mean values of 29.7 mm in men and 28.4 mm in women. Cho et al[12] conducted study on Asian population and reported values of 34.2 mm in men and 33.4 mm in women. Eze et al [6] reported values of 32.8 mm and 32.6 mm in males and females in Nigerian population. Study done by Faruk et al[10] on Turkish population reported mean value of 30 mm and 30 mm in males and females respectively.

Intercanthal distance (ICD)

In the present study, mean values of ICD were found to be equal between both genders (males-35.67 mm; females- 34.72 mm in 21-30 years age group). Vasanthakumar et al[9] reported mean values of 34.27 mm and 33.41 mm in males and females respectively. Patil et al[8] reported values of 32.8 and 32.7 mm in males n females respectively. Park et al[11] reported mean values of 36.3 mm in men and 33.4 mm in women. Cho et al[12] reported values of 35.3 mm in men and 35.5 mm in women. Study done by Faruk et al[10] on Turkish population reported mean value of 30.7mm and 30.2 mm in males and females respectively.

Interpupillary distance (IPD)

In the current study, interpupillary distance was found to be higher in males as compared to males. The mean values of IPD in the 21-30 years age group were 67.38 mm and 65.74 mm in males and females respectively. Vasanthakumar et al[9] also reported higher IPD values for males as compared to females, 66.72 mm and 62.59 respectively. Patil et al[8] reported values of 64.2 and 63.1 mm in males n females respectively. Park et al[11] reported mean values of 64.4 mm in men and 63.6 mm in women. Cho et al[12] reported values of 69.4 mm in men and 66.6 mm in women. Study done by Faruk et al[10] on Turkish population reported mean value of 60.6 mm and 60.1 mm in males and females respectively.

Outer canthal distance (OCD)

The mean value of outer canthal distance was found to be higher in males as compared to females in our study (Males-96.26 mm; Females-94.37 mm, in the 21-30 years age group). Patil et al[8] reported mean OCD values of 95.55 mm and 92.44 mm in males and females respectively. Vasanthakumar et al[9] reported mean values of 95.55 mm and 92.44 mm in males and females respectively. Study done by Faruk et al[10] on

Turkish population reported mean value of 91.3mm and 90.1 mm in males and females respectively.

CONCLUSION

The oculopalpebral dimensions of north Indian adults was measured in our study. There were variations amongst males and females, with higher values obtained in males in Palpebral fissure width, Inter pupillary distance and Outer canthal distance. The measurements of Palpebral fissure height and Inter canthal distance were almost similar in both the genders. Better knowledge of oculopalpebral measurements prevailing in the local area can help in achieving better outcomes in cases of reconstructive and aesthetic surgeries.

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