

Upper Eyelid and Eyebrow Dimensions in Malays

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Summary

The upper eyelid crease height, pretarsal skin and eyebrow height were studied in 305 Malay subjects (146 males and 159 females) varying in age from 2 - 80 years, who were randomly selected from the residents of Kota Bharu, Kelantan. In females, from the age of 11 years the mean pretarsal skin height increased progressively with age. In males, however, it decreased with age up to 60 years. In both sexes, subjects more than 60 years old showed highest values for pretarsal skin height. The mean eyelid crease height increased progressively with age from 11 years onwards in males but not in females. The mean eyebrow height increased with age in females but not in males. Eyebrow and eyelid measurements seem to show a definite racial variation. Besides establishing normal values for eyelid and eyebrow measurements in Malays, our findings indicate that age and sex should be taken into consideration to achieve satisfactory results in cosmetic eyelid surgery in Malays.

Key Words: Eye, Upper eyelid, Eyelid crease, Eyebrow, Physical anthropology, Anthropometry

Introduction

In addition to the orbital rims, eyebrows, peripheral soft tissues and eyelids serve to protect the anterior surface of the eyes. Their unique anatomical structure, complex physiology and constant reflex and voluntary movements provide essential defensive and protective mechanisms against glare, foreign bodies, dessication, trauma and infection¹. Moreover, the eyebrow, eyelid crease and pretarsal skin are distinctive facial landmarks that are important in human appearance². In cosmetic, corrective and restorative surgical procedures, maintaining the anatomic relationship of the eyelid landmarks ensures a normal postoperative appearance. The values for average lengths of the eyelids, palpebral fissures, etc. are important in computing the percentage of a lid defect to be reconstructed³. These values, however, vary with age and race⁴. While the upper eyelid and eyebrow dimensions are well documented in healthy White individuals^{2,5,6} no such data is

available for Malays. Hence this study was undertaken to document the above data in Malay population.

Materials and Methods

The sample consisted of 305 Malay subjects (146 males and 159 females) from Kota Bharu, Kelantan, who volunteered to participate in this study. The age of the subjects varied from 2 to 78 years in males and from 2 to 80 years in females. The subjects were randomly selected from patients and accompanying relatives attending the Community Medicine Clinic of Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan. Subjects with a history of craniofacial anomalies, previous ocular or peri-ocular surgery or other conditions which could affect eyelid and eyebrow measurements such as contact lens wear were excluded from this study. In each subject the upper eyelid crease height, amount of visible pretarsal skin and eyebrow height were measured bilaterally to the

nearest 0.5 mm using a 30 mm metric ruler. All measurements were performed by the same observer. Measurements were taken according to the method of Cartwright *et al*², with the eye in primary position, and the subject and the observer sitting at the same level. The ruler was held about 5 mm in front of the cornea exactly parallel to the pupillary axis. To measure the pretarsal skin and eyebrow height the subject was asked to look straight ahead and fixate on the letters on the eye chart on the wall. Pretarsal skin was measured as the skin visible between the upper eyelid lash line and the skin fold (Fig. 1). If no skin fold was present, it was measured to the eyelid crease. The eyebrow height was measured as the distance from the upper eyelid lash line to the front row of mature eyebrow hairs at the inferior eyebrow margin. The eyelid crease height was

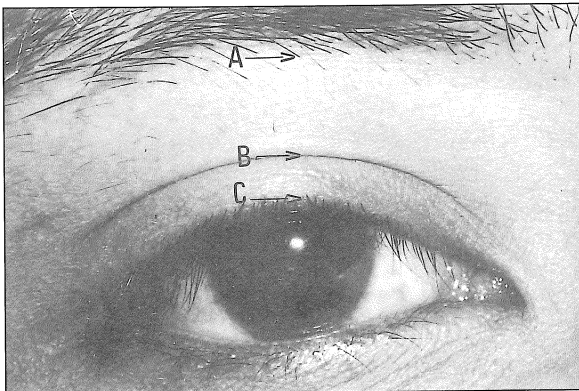


Fig. 1: Position of the eye for measuring visible pretarsal skin (B to C) and eyebrow height (A to C)

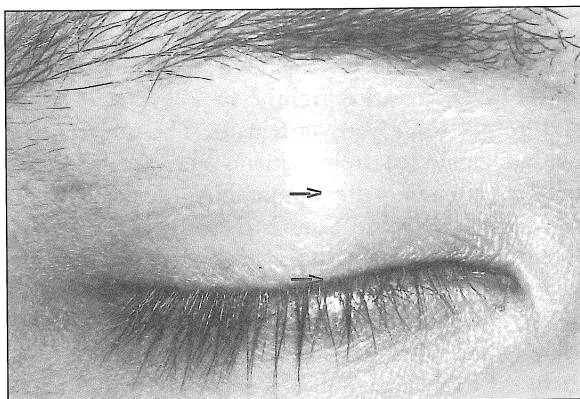


Fig. 2: Eyelid crease height (arrows) in a gently closed eye

measured as the distance from the upper eyelid lash line to the eyelid crease with the eyes closed (Fig. 2). If a fold of skin covered and masked the eyelid crease, this skin was elevated by light upward traction on the eyebrow taking care to avoid displacing the eyelid crease upwards and the measurement was taken. Each measurement was performed three times and the average was noted. The age and sex of subjects were also noted. For analysis, the results of right and left eye of each subject were averaged, and the average reading was used as the representative measurement.

Results

To determine age related associations and to compare data with White individuals, the subjects were distributed into five age groups. The number of subjects and sex distribution in each age group are shown in Table I. The mean pretarsal skin height ranged from 2.7 to 3.7 mm in males and 1.7 to 3.3 mm in females (Table II). There was a significant difference in the pretarsal skin height between males and females in the age groups of 2 - 40 years, but not in the older age groups. An age effect was observed in females, the pretarsal skin height increasing progressively with age from 11 years onwards. In males, however, the opposite was seen i.e. the pretarsal skin height decreased progressively till the age of 60 years. Subjects more than 60 years old, however, showed the highest values for pretarsal skin height among all the age groups. Eyelid crease measurements varied from 5.9 to 6.8 mm in males and from 4.6 to 6.5 mm in females (Table III). They showed a significantly greater difference in the age groups of 1-20 years and in subjects more than 60 years old. The mean eyelid crease height increased progressively from the age of 11 years in males. In females, however, it increased up to the age of 40 years, but decreased progressively thereafter. Mean eyebrow height measurements varied from 11.7 to 14.7 mm in males and from 9.3 to 16.8 mm in females (Table IV). They were significantly greater in males than in females in 21 - 40 years age group. However, in the remaining age groups eyebrow height measurements were significantly larger in females than in males. In females an age effect was observed between the eyebrow height measurements and increasing age. Such an age related effect was not seen in males.

Table I
Age and sex distribution

Age (Yr)	Sex		Total
	Male	Female	
1 - 10	19	33	52
11 - 20	18	33	51
21 - 40	48	33	81
41 - 60	33	33	66
> 60	28	27	55
Total	146	159	305

Table II
Measurements of pretarsal skin height (mm) by age and sex

Age (Yr)	Male			Female		
	No.	Mean	S.D.	No.	Mean	S.D.
1 - 10	19	3.3	1.9	33	2.1	0.9
11 - 20	18	3.0	1.2	33	1.7	1.3
21 - 40	48	2.9	1.8	33	3.0	1.6
41 - 60	33	2.7	2.1	33	3.0	1.5
> 60	28	3.7	2.1	27	3.3	2.0

Table III
Measurements of eyelid crease height (mm) by age and sex

Age (Yr)	Male			Female		
	No.	Mean	S.D.	No.	Mean	S.D.
1 - 10	19	6.2	2.1	33	4.6	1.4
11 - 20	18	5.9	1.4	33	4.8	1.2
21 - 40	48	6.1	1.9	33	6.5	1.8
41 - 60	33	6.2	1.8	33	6.0	1.9
> 60	28	6.8	2.8	27	5.4	3.3

Table IV
Measurements of eyebrow height (mm) by age and sex

Age (Yr)	Male			Female		
	No.	Mean	S.D.	No.	Mean	S.D.
1 - 10	19	12.0	2.6	33	9.3	2.3
11 - 20	18	13.0	2.3	33	9.9	1.8
21 - 40	48	11.7	3.0	33	11.0	2.9
41 - 60	33	12.3	3.3	33	14.4	4.0
> 60	28	14.7	3.4	27	16.8	3.4

Table V
Comparison of the means of pretarsal skin height (mm), eyelid crease height (mm) and eyebrow height (mm) in healthy White* (W) and Malay** (M) individuals

Age (Yr)	Pretarsal skin height (mm)				Eyelid crease (mm)				Eyebrow height (mm)			
	Male		Female		Male		Female		Male		Female	
	W	M	W	M	W	M	W	M	W	M	W	M
1 - 10	1.5	3.3	2.0	2.1	4.5	6.2	5.3	4.6	6.1	12.0	6.5	9.3
11 - 20	1.5	3.0	2.4	1.7	5.8	5.9	6.5	4.8	6.5	13.0	7.1	9.9
21 - 40	1.6	2.9	2.8	3.0	6.9	6.1	7.3	6.5	6.4	11.7	7.6	11.0
41 - 60	1.3	2.7	1.4	3.0	7.0	6.2	6.2	6.0	6.2	12.3	6.4	14.4
> 60	0.9	3.7	2.7	3.3	6.7	6.8	7.5	5.4	6.6	14.7	7.6	16.8

* Cartwright et al. 1994

** Present study

Discussion

Procedures to correct malposition and reconstruction of the eyelid presuppose an awareness of the essential anatomic elements of the lids³. Reconstruction procedures on Asian children and adults require preoperative measurements that will properly identify the optimal location of the postoperative lid crease and fold to avoid significant cosmetic deformity^{4,7}. The eyebrow height, eyelid crease height and pretarsal skin are of paramount importance in functional and cosmetic surgery involving the upper eyelid and eyebrows as

deviations from normal values may have undesirable effect on a patient's appearance and self-esteem². We studied the mean values for eyebrow height, eyelid crease height and pretarsal skin height in healthy Malay subjects and evaluated the relative effects of age and sex on them. The eyebrow height was a more subjective measurement as compared to the other two because of the difficulty in deciding the exact limit of lowest mature eyebrow hair, which can vary considerably, especially in women who pluck their eyebrows for cosmetic reasons. As was expected, therefore, the standard deviation of mean eyebrow height

measurements was higher. This differs from the observations in normal Whites by Cartwright *et al*². Like these investigators we also observed the greatest degree of variation in the older age groups (Table IV). The eyelid crease height plays a significant role in pretarsal skin height which in turn affects the symmetry and general appearance of the upper eyelids. The upper eyelid crease represents an indentation caused by superficial insertion of levator palpebrae superioris muscle fibres⁸. The eyelid crease in the Oriental is only several millimeters from the eyelid margin because the superior orbital septum inserts on the levator aponeurosis at this low level, thus preventing the higher cutaneous insertion seen in the Occidental⁹. This tallies with our finding that Malay subjects have lower eyelid crease height when compared to White individuals². In Malays the eyelid crease height showed a significant sex difference in the youngest and oldest age groups (Table III). Comparison of normal values for eyebrow height between Malay subjects and White subjects (Table V) showed higher values in Malays than in Whites. This could either be due to racial variation or due to our technique of measuring eyebrow height, especially due to difficulty in denoting the lower limit of eyebrow hair. Mean eyebrow height was greater in males than in females through the 21 - 40 year range. The converse was observed in the remaining two age groups in which females showed greater eyebrow height values than males. Moreover, in female subjects an age effect was seen in eyebrow height values which was not seen

in males. Pretarsal skin showed significantly higher values in Malay subjects than in Whites (Table V). This appears to be a racial variation. The amount of visible pretarsal skin in Malays was higher in males than in females, which is opposite to the observation of Cartwright *et al*² in Whites. The eyelid crease height is known to influence the pretarsal skin height. Malay males have higher values for eyelid crease height than Malay females (Table III) which probably explains higher values for pretarsal skin in males in our study.

Conclusion

Our observations in this study indicate that in Malays, the influence of age and sex should be taken into consideration in cosmetic eyelid surgery to achieve satisfactory results. The distinct variation in the measurements of anatomical landmarks of eyelids and eyebrows between Malays and Whites also indicates the need for similar studies in other racial groups.

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