Mal. J. Oral Maxillofac. Surg. 2007; 5: 3–5
Printed in Malaysia. All rights reserved

Malaysian Journal of Oral & Maxillofacial Surgery

Research and clinical papers

The intercanthal and interpupillary distances of three major ethnics in Malaysia

S. Tahirah Al Junid[1], Ngeow W.C[2]
[1] Clinical Specialist in Oral Surgery, Hospital Seremban
[2] Associate Professor, Dept of Oral and Maxillofacial Surgery, Faculty of Dentistry, University Malaya
50603 Kuala Lumpur Malaysia

S. Tahirah Al Junid, Ngeow W.C: The intercanthal and interpupillary distances of three major ethnics in Malaysia. Mal. J. Oral Maxillofac. Surg. 2007; 5: 3–5.

Abstract: The normal range of intercanthal distance (ICD) and interpupillary distance (IPD) have only been reported in one minor ethnics group in Malaysia, the KadazanDusun. The aim of this study was to establish the ICD and IPD in the three major ethnic stocks in Malaysia, namely the Malays, Chinese and Indian. A total of 300 samples consisting of 50 adult males and 50 adult females of each ethnic stock were recruited from the campus of the University of Malaya. ICD was measured between the median angles of the palpebral fissures and IPD was measured between the midpoint of the pupils. Measurements were done twice to the nearest 0.5 mm by one researcher using a caliper and a metal ruler. A mean was taken out of these two measurements. If there were major discrepancies, a third reading was taken and two closest measurements were accepted. In ICD measurement, the means of all three group were highly significantly different from each other. The widest space between inner canthus was recorded in both sexes of the Chinese followed by the Malay and the narrowest space was noted in both sexes of the Indians. Gender variation is statistically significant where the males tend to have a wider intercanthal distance compared to females in all three ethnic groups. There was no significant difference between the mean IPD values among the three ethnics. However highly, statistically significant difference (independent t-test <0.001) was seen when comparing between the two sexes; the male generally had a wider IPD to the female in all the races. The ICD and IPD in this study samples were within the range of those in the KadazanDusun, whites, black and mixed populations.

Key words: Intercanthal distance, interpupillary diatance, anthropometry, ethnic.

Introduction

Intercanthal distance (ICD) and interpupillary distance (IPD) are important measurements in the evaluation of congenital deformities, posttraumatic telecanthus and hypertelorism. The ICD is maintained by the medial canthal ligament, which connects the tarsal plates and palpebral structures to the medial orbital structures. Telecanthus is the term used to describe an increased distance between the median canthi.

Orbital hypertelorism is an increase in distance between the osseous orbits, with an associated lateral shift of the median canthal soft tissue resulting in the "secondary telecanthus", as described by DeMyer[1]. Clinical measurement of hypertelorism has been subjected to controversy. Many of the techniques are dependent on the measurement of the intercanthal distance and are inaccurate in the presence of primary telecanthus or median canthal soft tissue anomalies. Interpupillary distance is traditionally used in the clinical assessment of the bony orbits because it is the most readily identified anatomic marker and a satisfactory mode of evaluation with a cooperative patient.

The normal range of ICD and IPD has been investigated in adult Caucasian, Black or mixed population by various authors[2,3,4]. In Malaysia, there is only one report on the ICD and IPD of a minor ethnic group, the KadazanDusun[5], but not among the adults of the three major ethnics in Malaysia. Thus, the aim of this study was to establish the ICD and IPD in three major ethnic groups in Malaysia, namely the Malays, Chinese and Indians.

Material and Methods

A total of 300 samples consisting of 50 adult male and 50 adult female of three major ethnics in Malaysia, namely the Malays, Chinese and Indian were recruited from the campus of the University of Malaya. The samples recruited were convenient sample; they have to be healthy, do not show any deformities either as a result of birth defect or accidents nor have had undergone any orthognathic or reconstructive surgery to the craniofacial region. ICD was measured between the median angles of the palpebral fissures and IPD was measured between the midpoint of the pupils. Measurements were done once to the nearest 0.5 mm by one researcher (STAJ) using a caliper and metal ruler. A mean was taken out of these two measurements. If there were major discrepancies, a third reading was taken and the two closet measurements were accepted. The data were entered using SPSS version 11.0 and analyzed for significance using ANOVA and pair wise comparison. A significance level of 5% was chosen.

To increase accuracy, an intra-examiner calibration exercise was done at the Department of Oral and Maxillofacial Surgery prior to this field study. No pilot study was performed as the selected method of measurement was based on the standard method adopted worldwide by researcher in this area of study.

Results

Intercanthal Distances (ICD)

The mean, minimum and maximum measurement of IPD is shown in Table 1, with the one-way ANOVA procedure and all pair-wise comparisons giving a p-value of less than 0.001. Thus, all three group means were highly significantly different from each other (Figure 1). The widest space between the inner canthus was recorded in both sexes of the Chinese followed by the Malay and the narrowest space was noted in both sexes of the Indians.

Gender variation is statistically significant where the males tend to have a wider intercanthal distance compared to females. However, the difference is highly significant ($p<0.001$) in the Chinese and moderately significant in the Indian race. In the Malay, the difference was mild (<0.05). The Chinese male has the widest intercanthal distance compared to the narrowest recorded in the Indian female (Table 2)

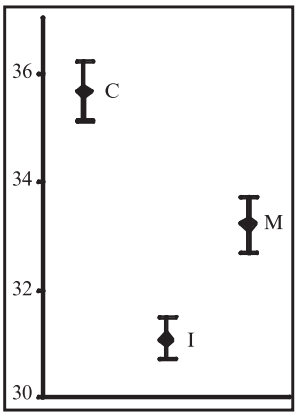
Interpupillary Distance (IPD)

The mean, minimum and maximum measurement of IPD is shown in Table 3a, with the one-way ANOVA procedure giving p-value of 0.203. The p-values for all pair-wise comparisons of means are more than 0.05 (Table 3b) and the 95% confidence intervals for mean overlap with each other (Figure 2). Therefore the differences in IPD among the three races were not significant.

However highly statistically difference (independent t-test, p-<0.001) was seen when comparing the two sexes, with the male generally having a wider IPD compared to the female in all the races (Table 4)

Table 1. *Comparison of ICD between three major ethnics*

Race	Mean ± SD (mm)	Min (mm)	Max (mm)	p-value
Chinese	35.7 ± 2.8	30.0	42.5	
Indian	31.1 ± 1.9	26.7	36.2	0.000
Malay	33.2 ± 2.7	28.0	41.5	



M = Malay; C = Chinese; I = Indian

Figure 1. *The graph shows the 95% confidence intervals for ICD means values.*

Table 2. *Gender comparison of ICD between three major ethnics*

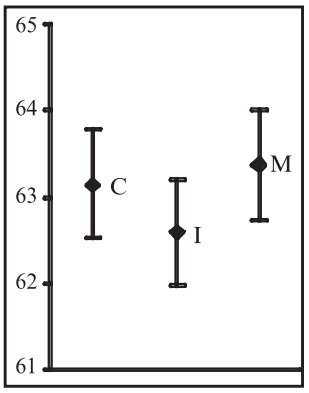
Race	Gender	Mean ± SD (mm)	Min (mm)	Max (mm)	p-value
Chinese	Male	36.6 ± 2.8	30.0	39.9	0.000
	Female	34.7 ± 2.5	30.0	42.5	
Indian	Male	31.7 ± 1.9	28.0	36.2	0.002
	Female	30.5 ± 1.7	26.7	34.6	
Malay	Male	33.9 ± 1.9	28.0	36.2	0.007
	Female	32.5 ± 1.7	26.7	34.6	

Table 3a. *Comparison of IPD between three major ethnics*

Race	Mean ± SD (mm)	Min (mm)	Max (mm)	p-value
Chinese	63.1 ± 3.2	54.1	70.6	
Indian	62.6 ± 3.1	55.6	70.8	0.203
Malay	63.4 ± 3.3	57.0	72.0	2

Table 3b. *Pair-wise comparison of IPD between three major ethnics*

	Chinese	Indian
Chinese	–	0.218
Indian	0.218	–
Malay	0.613	0.083



M = Malay; C = Chinese; I = Indian

Figure 2. *The graph shows the 95% confidence intervals for IPD means values.*

Table 4. *Gender comparison of IPD between three major ethnics*

Race	Gender	Mean ± SD (mm)	Min (mm)	Max (mm)	p-value
Chinese	Male	64.8 ± 2.6	58.2	70.6	0.000
	Female	61.4 ± 2.8	54.1	69.5	
Indian	Male	64.1 ± 3.1	56.3	70.8	0.000
	Female	61.1 ± 2.3	55.6	66.5	
Malay	Male	64.5 ± 3.3	57.6	72.0	0.001
	Female	62.3 ± 2.9	57.0	67.4	

Discussion

Murphy & Laskin[6] in their study on the ICD and IPD of the Blacks reviewed some previous findings. They cited some studies on Caucasians, Japanese, Oriental and mixed populations and came to a conclusion that the average ICD and IPD of all these populations were 32±3 mm and 63±3.0 mm respectively.

In their study on the ICD for the black population, Murphy & Laskin[6] found the Black's average to be 33.9 ± 3.0mm which was slightly higher than the average calculated for Caucasian, Japanese, Oriental and mixed populations (32±3mm). The mean ICD of KadazanDusun[5] was reported to be 33.0±2.3mm which fell within the range reported by the western literatures. Current study showed that the Chinese had an even larger measurements as compared to the Blacks. The Malays have as ICD measurement comparable to that of the KadazanDusun while the Indian record the lowest measurement at 31.1±1.9mm.

As for the IPD, Murphy & Laskin[6] found the average for the Blacks population to be 63.7 ± 3.7 mm. This was close to the IPD average calculated for Caucasian, Japanese, Oriental and mixed populations of 63±3.0mm. The mean IPD of KadazanDusun[5] was reported to be 63.2 ± 3.3mm which fell within the range reported by the Western literatures. In general the IPD measurement of the three major ethnics were quite close to each other and were within the range of that reported in the western literature and among KadazanDusun[5]. As with ICD the Indians again recorded a lower measurements of IPD even though this was not statistically significant (p=0.203)

When comparing current findings with an earlier report on a minor ethnic, the KadazanDusun[5] in Malaysia, it can be noted that the Malays recorded mean ICD measurements close to that of the KadazanDusun. Even when compared gender-wise, Malays samples again produced mean measurements very close to that of the KadazanDusun male's of 33.3±2.1mm females of 32.6±2.6 mm. Interestingly the IPD of three major ethnics were within the range of measurements reported in KadazanDusun and western literatures. This confirms the long-accepted believe that the interpupillary distances in human subjects are rather constant.

One interesting finding of this study is the fact that the measurements of ICD and IPD were statistically significant between the male and female in all three major ethnics. This has not been reported in previous studies, except for the report on the KadazanDusun in which only ICD showed statistically significant differences between gender.

Conclusion

Current study showed that the Chinese has a larger ICD measurement as compared to the Blacks. The Malays have an ICD measurement comparable to that of the KadazanDusun while the Indian record the lowest measurement. In general the IPD measurements of the three major ethnics were quite close to each other and were within the range of that reported in the Western literature and among KadazanDusun.

Acknowledgement

The data for this article is taken from data compiled for a master dissertation by the first author undertaken between 2004 and 2005.

References

1. DeMeyer W. The median cleft face syndrome. Neurology 1967; 12: 961-71.
2. Pryor HB. Objective measurements of the interpupillary distance. Pediatrics 1969; 44: 973-7.
3. Freihofer HPM. Inner intercanthal and interorbital distances. J Max-fac Surg 1980; 8: 324-6.
4. Laestadius, ND. Aase JM, Smith DW. Normal inner canthal and outer orbital dimensions. J Pediatr 1979; 74: 465-8.
5. Ngeow WC, Akan A, George JM. Intercanthal and interpupillary distance in Kadazan Dusun in Malaysia. Mal J Oral Maxfac Surg 2006; 1: 8-11.
6. Murphy WK, Laskin DM. Intercanthal and interpupillary distance in the black population Oral Surg Oral Med Pathol 1990; 69: 676-80.