

## Original Article



# Wider Inner Intercanthal Distance is a Predisposing Factor for Chronic Dacryocystitis in Adults

Most Morsheda Khatun<sup>1</sup>, Mohd Rafiqul Islam<sup>2</sup>, Rashed Mustafa<sup>3</sup>, Shahin Sharmin<sup>4</sup>, Mostarina Islam<sup>5</sup>

### Abstract

**Background:** Many adult women of low socio-economic condition have been suffering from chronic dacryocystitis (CDC). Wider inner intercanthal distance (IICD) is a proposed risk factor for developing chronic dacryocystitis. A few studies have been undertaken in this regard.

**Objective:** To find out the relationship between wider inner intercanthal distance and chronic dacryocystitis in adults.

**Materials and Methods:** This cross-sectional comparative study was conducted in the department of Anatomy, Rajshahi Medical College, Rajshahi, Bangladesh from July 2016 to June 2017. A total number of 460 subjects were enrolled for this study. Among them, 154 were patients of chronic dacryocystitis (CDC) and 306 were healthy controls. Their IICD were measured.

**Results:** The mean IICD of CDC group was  $30.71 \pm 2.26$  mm whereas the mean IICD of control group was  $29.20 \pm 2.08$  mm. The IICD of CDC patients were observed to be higher ( $p < 0.001$ ) compared to healthy controls.

**Conclusion:** Those who had wider inner intercanthal distance were more predisposed to develop chronic dacryocystitis. So, wider IICD can be regarded as a risk factor for developing chronic dacryocystitis.

**Key words:** Inner Intercanthal Distance (IICD), Chronic Dacryocystitis (CDC)

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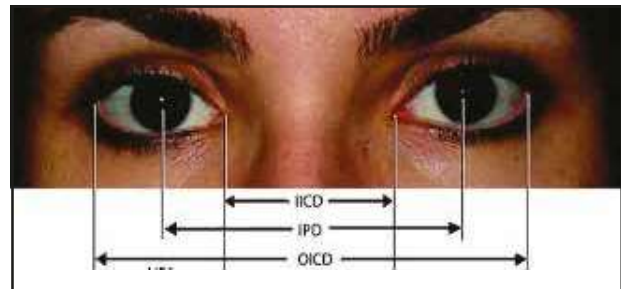
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### Introduction

The canthi are angles or ends of palpebral fissures, which are elliptical spaces between the upper and lower eyelids. The inner intercanthal distance (IICD) is the horizontal distance between medial canthi of left and right eye of an individual. The IICD is one of the important periocular measurements of human. Periocular measurements are of value in several clinical specialities including ophthalmology especially in oculoplastic surgery and optometry.

Chronic dacryocystitis (CDC) is a periocular disease characterized by inflammation of the lacrimal sac. Its prevalence rate is quite high in our country (1.9%).<sup>1</sup> Many adult women of low socio-economic condition have been suffering from this disease. There are several well established risk factors for the development CDC. Increasing age and female sex have been described as main risk factors. The CDC is more common with increasing age among patients with nasolacrimal duct obstruction.<sup>2,3</sup>

Higher rates of CDC has been reported among women.<sup>4,5</sup>



**Figure 1:** Showing inner intercanthal distance (IICD), outer intercanthal distance (OICD) & interpupillary distance (IPD).

Moreover, nasal pathologies have a crucial role in development of CDC. Bale<sup>2</sup> reported 28.6% cases of dacryocystitis having an underlying nasal abnormality, the most common findings were deviation of nasal septum (DNS), rhinitis and hypertrophy of inferior turbinate (HIT) on the same side. Lastly, the presence of

1. Assistant Professor, Department of Anatomy, Satkhira Medical College, Satkhira, Bangladesh.
2. Lecturer, Department of Pharmacology, Satkhira Medical College, Satkhira, Bangladesh.
3. Associate Professor, Department of Anatomy, Khwaja Yunus Ali Medical College, Sirajganj, Bangladesh.
4. Associate Professor, Department of Anatomy, Rajshahi Medical College, Rajshahi, Bangladesh.
5. Assistant Professor, Department of Anatomy, Pabna Medical College, Pabna, Bangladesh.

**Corresponding author:** Rashed Mustafa, Associate Professor, Department of Anatomy, Khwaja Yunus Ali Medical College, Sirajganj, Bangladesh. Cell Phone: +880 1704-678439, Email: [ynor1825@gmail.com](mailto:ynor1825@gmail.com)

dacryoliths at various levels of the lacrimal drainage system is a known risk factor for the development of CDC.<sup>6</sup> In one study, a relationship was observed that those who had been suffering from CDC usually had wider IICD.<sup>7</sup> But there was no such other study in Bangladesh. In this study wider IICD has been identified as a predisposing factor in the development of chronic dacryocystitis.

**Materials and Methods**

This cross-sectional comparative study was carried out in the department of Anatomy, Rajshahi Medical College (RMC) in collaboration with the department Ophthalmology and the outpatient department (OPD) of Rajshahi Medical College Hospital (RMCH). Two groups of people within the age of 30-70 years were randomly selected. One group (154) of patients who were suffering from chronic dacryocystitis (CDC group) attending Ophthalmology department and another group (306) of normal individuals without ocular disease (control group) within the same age attending outpatient department of RMCH during the study period of one year July 2016 to June 2017. Cases of chronic dacryocystitis were diagnosed by history, clinical sign and symptoms by the help of an ophthalmologist. Control group were included if they had no ophthalmological problem. The study was approved by the Institutional Review Board (IRB) and the Ethical Review Committee (ERC) of RMC. Data were collected by observation and measuring, then recorded on data collection form. After completion of data collection, they were checked, verified and edited for consistency and validity. Data were processed and analyzed with the help of a computer based SPSS software program. After entry into computer, results were analyzed according to the objectives and variables of the study.

**Measurement of Inner Intercanthal distance**

A Vernier caliper was used to measure inner intercanthal distance.(Figure-2) After informed consent had been obtained from the subjects, the measurement was performed.

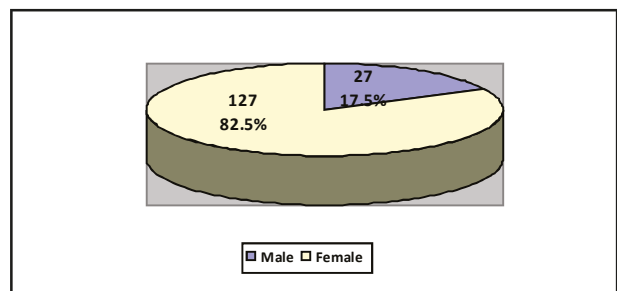


**Figure 2:** Measurement of inner intercanthal distance by Vernier caliper.

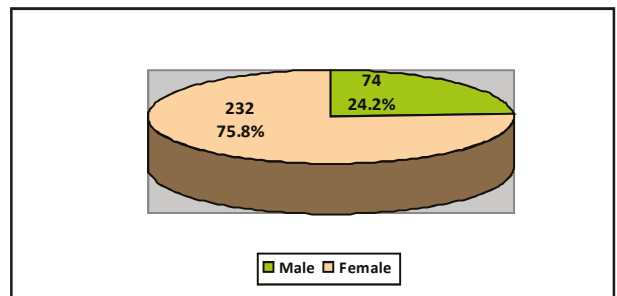
Each subject was seated comfortably in a chair with the subject's head at the same level as and 40 cm in front of the examiner's head. The subject's face was well illuminated. A Vernier caliper was used against the bridge of the nose of the subject. Each measurement was carried thrice to ensure accuracy. If three or two values were same then the same value was taken. If the three values were different then the average of the three values was taken. The inner intercanthal distance was measured by having the subject look straight at the examiner (measurement between medial angles of two eyes).

**Results**

In this study female participants were higher than male. In CDC group 82.5% were female where male were 17.5% (Fig.3). In control group female were 75.8% where male were 24.2% (Fig. 4).



**Figure 3:** Distribution of CDC group by their sex (n = 154).



**Figure 4:** Distribution of control group by their sex (n = 306).

The maximum population of CDC group (35.7%) and control group (47.1%) were within the age of 30-40 years. The mean age of CDC group was 46.7±12.8 years and that of control group was 41.7±9.6 years respectively (Table I).

**Table I:** Frequency distribution of ages of CDC and Control group.

Age (years)	Group	
	CDC (n = 154)(%)	Control (n = 306) (%)
30 – 40	55(35.7)	144(47.1)
40 – 50	31(20.1)	90(29.4)
50 – 60	31(20.1)	50(16.3)
≥ 60	37(24.0)	22(7.2)
Mean ± SD	46.7 ± 12.8	41.7 ± 9.6

Inner Intercanthal distance (IICD) related statistics of CDC and control groups are given in Table II. The mean IICD of CDC group was  $30.71 \pm 2.26$  mm with the range between 26.28 to 36.65 mm whereas the mean IICD of control group was  $29.20 \pm 2.08$  mm with the range between 23.75 to 36.63 mm.

**Table II:** Inner Intercanthal distance (IICD) related statistics of CDC and control group.

Statistics of IICD	Group	
	CDC (n = 154)	Control (n = 306)
Mean (mm)	30.71	29.20
Median (mm)	30.51	29.39
Standard deviation (SD) (mm)	2.26	2.08
Standard error of mean (mm)	0.18	0.12
Minimum (mm)	26.28	23.75
Maximum (mm)	36.65	36.63

The result of the present study had similarities with the studies done by Hoque E in 2009 ( $p > 0.05$ ) and Mohammad Etezzad Razavi, MD & Samira Jalalifar, MD in 2008 ( $p > 0.05$ ) (Table III).

**Table III:** Comparison of various studies with the present study.

Study	Sample size	Mean IICD	*p-value
Etezzad-Razavi M and Jalalifar S <sup>8</sup> in 2008	419	$29.19 \pm 3.36$ mm	$> 0.05$
Hoque E <sup>7</sup> in 2009	130 (control)	$3.1 \pm 0.27$ cm	$> 0.05$
Present study	306 (control)	$29.20 \pm 2.08$ mm	

\*Data were analysed using z-test and were presented as mean $\pm$ SD

The inner intercanthal distance of CDC group was observed to be higher compared to control group that was highly significant ( $p < 0.001$ ) which are given in Table IV.

**Table IV:** Comparison between inner intercanthal distances of CDC and control group.

Variable	Group		*p-value
	CDC (n = 154)	Control (n = 306)	
IICD (mm)	$30.7 \pm 2.2$	$29.2 \pm 2.1$	$< 0.001$

\*Data were analysed using z-test and were presented as mean  $\pm$  SD.

## Discussion

In this study, maximum participants of both CDC and control group were within the age of 30-40 years. In a study Bharathi et al.<sup>4</sup> reported that chronic dacryocystitis to be more common in the age group above 30 years. In another study, Badhu et al.<sup>9</sup> reported as the premenopausal women were the predominant age group in chronic dacryocystitis. In this study, female participants were more than male. Bharathi et al.<sup>4</sup> reported chronic dacryocystitis much more in female than male. In another study, done by Iliff in 1996 reported female predominance in chronic dacryocystitis.<sup>10</sup> So the age and sex distribution of the present study were well correlated with the previous studies.

In the present study, the mean inner intercanthal distance of control group were  $29.20 \pm 2.08$ mm. Hoque found the inner intercanthal distance of normal Bangladeshi people was  $3.1 \pm 0.27$  cm. The inner intercanthal distances of both studies were similar and had no significant differences ( $p > 0.05$ ). Etezzad-Razavi and Jalalifar worked on Iranian people in 2008.<sup>8</sup> Their mean inner intercanthal distance was  $29.19 \pm 3.36$ mm. The inner intercanthal distance of that study was similar ( $p > 0.05$ ) to the present study.

In this study, the mean inner intercanthal distance of CDC group was  $30.71 \pm 2.26$ mm. In comparison to control group the inner intercanthal distance ( $29.2 \pm 2.08$ mm) was observed significantly higher in CDC group ( $p < 0.001$ ). So, people who were suffering from chronic dacryocystitis had wider inner intercanthal distance. Hoque also observed significantly higher inner intercanthal distance in CDC group in comparison to control group.

The exact mechanism why those people with wider inner intercanthal distance were suffering more from chronic dacryocystitis was not clear. Some anatomical factors might be responsible for developing chronic dacryocystitis. The valve of Rosenmuller which cover the internal common canaliculus and valve of Hasner of nasolacrimal duct which normally ensure the unidirectional flow and inhibit the retrograde flow might be disturbed in wide inner intercanthal distance.

## Conclusion

Those who had wider inner intercanthal distance were more predisposed to develop chronic dacryocystitis. As the present study was conducted in a limited territory, further large-scale study is recommended.

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