

## Comparison of Horizontal Corneal Diameter in Premature Infants and Mature Infants

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### **Abstract:**

**Aim:** To compare horizontal corneal diameter in premature and mature infants.

**Methods:** A prospective cross sectional study was conducted on 122 eyes from 61 infants both premature and mature newborn babies born during the period from January 2014 to June 2014 with a gestational age between 28 weeks to 38 weeks and birth weight ranging from 1100grms to 4500 grms.

**Results:** Corneal diameter was highly associated ( $p < 0.001$ ) with gestational age and birth weight. The corneal diameter was measured in 61 healthy infants 33 premature and 28 mature healthy infants with gestational ages ranging from 28 to 38 weeks, mean gestational age weeks  $33.3 \pm SD 2.98$ , the mean weight in Kilograms  $2.26 \pm SD 1.54$  and mean horizontal corneal diameter in millimeter was  $9.57 \pm SD 0.84$ .

The corneal diameter ranged from 8mm to 10.5 mm. The smallest diameter (8mm) was found in an infant with a gestational age of 28 weeks and having a birth weight of 1100 g. The largest diameter (10.5 mm) was seen in three infants with a gestational age of 36 to 38 weeks and a birth weight of 3000 g to 4500 g

**Conclusions:** These data underline the importance of the corneal size in the diagnosis of developmental glaucoma or megalocornea or microcornea.

**Key words:** Glaucoma, Gestational age, Horizontal corneal diameter, Mature infants, premature.

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### **I. Introduction:**

Horizontal Corneal diameter is very important in the diagnosis of primary infantile glaucoma microcornea and megalocornea.. Increased horizontal corneal diameter with cloudy cornea is the most evident sign of primary infantile glaucoma. The horizontal and vertical diameter at birth are high (approximately 10mm) compared to adult eye and attaining adult size at ages 1-3 yrs. The period of corneal growth is first six months. New born cornea is steeper than the adult cornea and is usually more curved in its periphery than centrally. Infants born prematurely are at higher risk of impaired visual acuity, refractive errors, strabismus and retinopathy of prematurity.<sup>[1]</sup> Normal size of the cornea with cloudiness is often present in many other diseases such as sclerocornea, Peter's anomaly and congenital hereditary endothelial dystrophy<sup>[2]</sup>. Sometimes premature neonates are born with a cloudy cornea and knowing whether this cornea is pathologically enlarged or not, measurement of horizontal corneal diameters may be useful for the diagnosis.

### **II. Methodology:**

The present study was done in the Department of Ophthalmology and Dept of Paediatrics RajaRajeswari medical college and hospital, Bangalore. It was a cross sectional study conducted for the period of six months. The study subjects includes all the premature healthy and mature healthy infants born during the study period with a gestational age between 28 and 38 weeks and birth weight ranging from 1100 grams to 4500 grams.

The author have measured the horizontal corneal diameter of the eyes of 33 premature and 28 mature infants.(N=61) irrespective of gender. The corneal diameter was measured in both eyes but one randomly was selected either right or left from each neonate and were used for statistical calculations. The measurement (horizontal diameter, white to white) was done during the first week of life in both male and female infants.(Table1) Measurement was done with the help of a caliper. (Fig 1) lid retractor was not applied, gentle manipulation was sufficient for the separation of the eye lids. The caliper reading was translated into mm using a set of finely graduated precision rulers. The measurements were approximated to 0.25 mm and virtually all measurements were made by one investigator.

Neonates showing ocular pathology, somatic anomalies, or having uncertain gestational age were excluded from the study.

Data compiled was entered into M S Excel work sheet and analyzed using SPSS version 19. The data were expressed in the form of percentages, mean and standard deviations. Chi - square test was applied to test the test of significance at  $p < 0.001$  which was considered as level of significance.

**III. Results:**

Corneal diameter was highly associated ( $p < 0.001$ ) with gestational age and birth weight. Graphs showing the corneal diameter on gestational age and birth weight together with the 95% confidence limits for our individual values are provided for reference.

The corneal diameter was measured in 61 healthy infants (33 premature and 28 mature infants - Table II) with gestational ages ranging from 28 to 38 weeks. The mean gestational age in weeks  $33.3 \pm SD 2.98$ , the mean weight in Kilograms  $2.26 \pm SD 1.54$  and mean horizontal corneal diameter in millimeter was  $9.57 \pm S D 0.84$ .

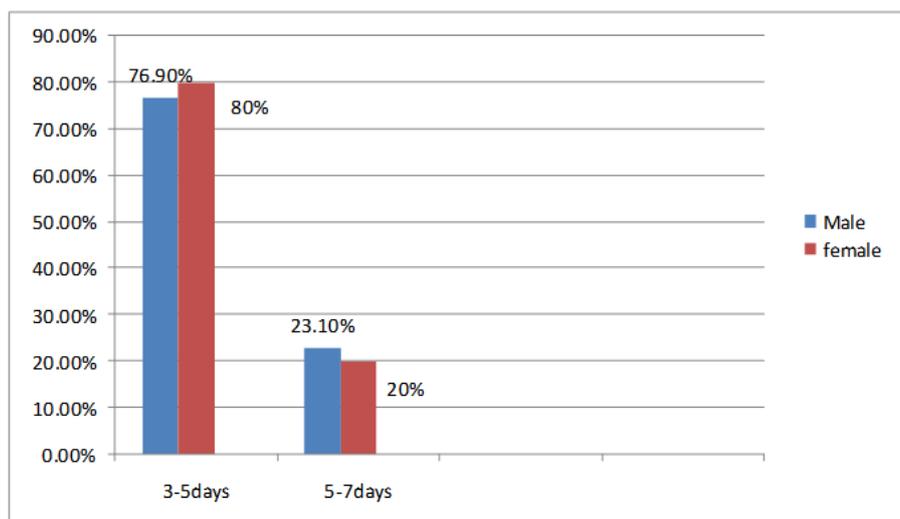
The corneal diameter ranged from 8mm to 10.5 mm. The smallest diameter (8mm) was found in an infant with a gestational age of 28 weeks and having a birth weight of 1100 g. The largest diameter (10.5 mm) was seen in three infants with a gestational age of 36 to 38 weeks and a birth weight of 3000 g to 4500 g. (Table III)



**Fig. 1 Caliper.**

**Table I: Age & gender wise distribution of the study population**

Age in days	Male (%)	Female (%)	Total (%)
3-5	20(76.9)	28(80)	48(78.7)
5-7	06(23.1)	07(20)	13(21.3)
Total	26(42.6)	35(57.4)	61(100)



Out of 61 study subjects, 35 (57.4%) were female infants and 26 (42.6%) were male infants Majority of them were in 3-5 days of age (78.7%).

**Table II: Horizontal corneal diameter among premature and mature infants.**

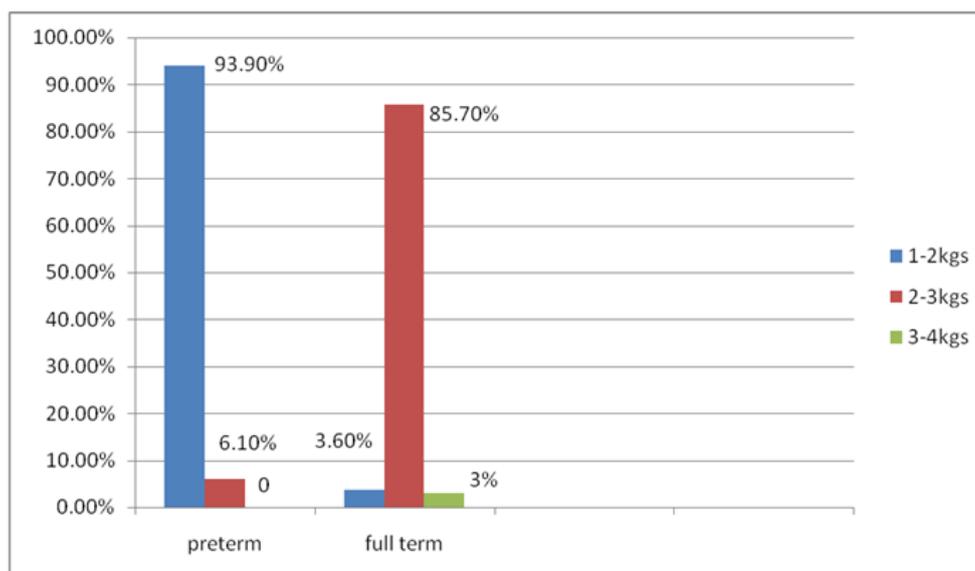
Term	Horizontal corneal diameter in millimetre		Total (%)
	8-9.9(%)	≥ 10mm (%)	
Pre term	31(93.3)	02 (06.1)	33(54.1)
Full term	14(50.0)	14(50.0)	28(45.9)
Total	45(73.8)	16(26.2)	61(100)

X<sup>2</sup>=7.5, df=1, p<0.001

The proportion of pre term infants was 33(54.1%) and full term 28(45.9%). Among the pre term infants 31(93.3%) of them had the horizontal corneal diameter of 8- 9.9mm and only 02(06.1%) with horizontal corneal diameter of more than or equal to 10mm. In full term infants there was equal distribution of study subjects in both the groups. The observed difference was statistically highly significant at p<0.001

**Table III: Gestational age and Birth weight of the study subjects**

Term	Birth weight in Kilograms			Total (%)
	1-2(%)	2-3 (%)	≥3-4(%)	
Pre term infants	31(93.9)	02(6.1)	--	33(54.1)
Full term infants	01( 3.6)	24(85.7)	03(10.7)	28(45.9)
Total	32(52.5)	26(42.6)	03(4.9)	61(100)



Out of 33 pre term infants, 93.9% had their birth weight ranging with 1-2kgs, 6.1% with 2-3kgs. While among 28 full term infants, 85.7% had their birth weight ranging from 2-3kgs, 10.7% had more than or equal to 3-4kgs and only 3.6% had their birth weight ranging between 1-2kgs.

#### IV. Discussion

The mean horizontal diameter of human cornea at birth is reported to be 10.0mm [3] With regard to the corneal diameter of premature infants no data are available in the literature. According to this study in 33 premature babies and 28 mature babies with gestational ages between 28 to 38 weeks the corneal diameter ranged from a minimum of 8.0 mm to a maximum of 10.5 mm. There was an association between corneal diameter and gestational age which is statistically highly significant.

The walls of neonatal eyes, especially fetal eyes, are distended by an increased intraocular pressure because the corneal and sclera collagen has not yet sufficiently hardened[4] Before the age of 6 months the rigidity of the corneal is less than that of the sclera; consequently the cornea enlarges more rapidly under the influence of an increased IOP.[3] Secretion of aqueous humor presumably begins before birth as suggested by the findings of some degree of aqueous drainage effective by 17-18 weeks of fetal life.[6] Fetal facility of outflow correlates directly with the diameter of the cornea.[7] The existence of a fetal aqueous humor circulation has recently been corroborated by a scanning electron microscopy study showing that by 18-22 weeks of development the presence of a well formed gap system connecting the anterior chamber with the developing inter -trabecular spaces.[6] These data underline the importance of the corneal size in the diagnosis of developmental glaucoma in premature neonates. Since the data are relatively few, an effort was made with an objective to compare the horizontal corneal diameter in premature and mature infants.

## **V. Conclusion**

There was association between corneal diameter, gestational age and birth weight which is statistically highly significant. Knowing the normal corneal diameter in these children at different gestational age and birth weight is of special interest in rural and semi urban where the disease is more common and often evident already at birth.

## **Acknowledgement**

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