

REFRACTIVE ERRORS IN PRETERM BABIES

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ABSTRACT

Fifty preterm neonates were followed up at the age of 6 months and 1 year. In addition to developmental assessment, a complete ophthalmological examination was done on both visits. The largest (62%) gestational age group was of 34-36 weeks. At 6 months, none of the infants had normal vision. At 1 year of age, 64% of the babies had normal vision while incidence of myopia and hypermetropia was 16% and 20%, respectively. There was an inverse relationship noted between gestation and incidence of refractive errors. It was also noted that with decreasing weight, the incidence of myopia increased. Myopia was seen exclusively among infants of birth weight of 2000 g or less. Birth weight had a significant positive correlation with astigmatism. No correlation of asphyxia with refractive errors was observed. It is recommended that all preterm babies should have an ophthalmological examination at one year of age with follow up later on.

Key words: Preterms, Refractive errors.

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The neuro-developmental handicaps secondary to complications of prematurity are well known(1). Amongst the visual problems associated with immaturity, retinopathy of prematurity (ROP) has been widely studied and is known to be the most handicapping(2,3). Other visual problems likely to affect a significant number of preterm newborns are those of refractive errors. Myopia of prematurity was first described by Fletcher and Brandon(4). A higher incidence of myopia and astigmatism among preterms as compared to term babies was noted by Dobson, *et al.*(5). Hungerford *et al.* also observed refractive errors to be the commonest ocular problem in preterms(3). In order to improve the quality of survival of these neonates, it is important that such visual errors are dealt with at the earliest. The aim of the present study was to assess the status of refraction at the age of one year in preterm babies.

Material and Methods

Fifty preterm neonates born at Christian Medical College, Ludhiana were included. The gestation was calculated from the last menstrual period of the mother and confirmed by clinical examination(6). The birth weight and Apgar score of the babies were recorded. These babies were examined at 6 months and 1 year of age for ocular morbidity in addition to developmental assessment. The developmental assessment was done by the Denver Development Screening test(7).

The ocular examination of all babies was confirmed by an ophthalmologist. Visual acuity, visual axis and ocular movements were examined with a torch. If the visual axis was not parallel, cover/uncover test was done. The pupils were dilated with 1% cyclopentolate drops. Retinoscopy was done under cycloplegia with a plain retinoscope in a dark room to detect refrac-

tive errors. Light was reflected in the eye at a distance of 1 meter. The fundal glow was seen and retinoscopy mirror moved vertically and horizontally to see the movement of the shadow. When the shadow moved against the mirror, myopia of >1 Dioptre was diagnosed. If the shadow moved with the mirror the possibilities were hypermetropia, myopia of <1 Dioptre or emmetropia. These were differentiated with introduction of different lenses. Fundus examination was done with direct ophthalmoscope. No sedation was required in any child. The data was analyzed using Chi square test.

Results

Out of the fifty neonates, 58% were males. Majority (52%) of the babies weighed between 1501-2000 g at birth. The largest gestational age group was of 34-36 weeks (62%). Infants were screened for refractive errors at 6 months and one year of age. Presence of refractive errors was correlated with birth weight and gestational age. At 6 months, none of the infants had normal vision. Hypermetropia was seen in 66.6% of the 31-33 weeks gestation group and 70% of 34-36 weeks group. There was only one baby of 28 weeks gestation and he had myopia. Anisometropia was seen in 26% of total

infants and the incidence increased with decreasing gestation (*Table I*).

At one year of age, the number of babies with normal vision increased among all gestational groups except for 28 weeks. The main change was from hypermetropia to emmetropia. Myopia was seen in 16% with an inverse relationship with gestation which was statistically significant ($p < 0.05$). A similar trend was seen for anisometropia as well (*Table I*).

Table II shows the correlation of birth weight with refractive errors. It was observed with decreasing weight, the incidence of myopia increased while hypermetropia decreased. This relationship was seen at 6 months as well as at one year of age and was statistically significant ($p < 0.05$) at one year. Myopia was seen exclusively among infants with birth weight of 2000 g or less. Anisometropia was also seen in this weight group only.

Astigmatism at 6 months and one year of age was correlated with birth weight. It was noted that at both ages, birth weight had a significant positive correlation with astigmatism ($p < 0.05$) (*Table II*). There was no correlation of asphyxia with presence or absence of refractive errors.

TABLE I—Correlation of Gestation and Refraction

Gestation (weeks)	Emmetropia		Myopia		Hypermetropia		Anisometropia	
	6 mo	1 yr	6 mo	1 yr	6 mo	1 yr	6 mo	1 yr
28-30	0	0	1	1	0	0	1	1
31-33	0	10	6	3	12	5	8	5
34-36	0	22	9	4	22	5	4	1
Total	0	32	16	8	34	10	13	7

TABLE II—Correlation of Birth Weight and Refraction

Birth weight (g)	Emmetropia		Myopia		Hypermetropia		Anisometropia		Astigmatism	
	6 mo	1 yr	6 mo	1 yr	6 mo	1 yr	6 mo	1 yr	6 mo	1 yr
1000-1500	0	6	9	6	5	3	4	2	8	3
1501-2000	0	20	6	2	20	4	9	5	10	6
2001-2500	0	5	1	0	8	3	0	0	7	4
3001-3500	0	1	0	0	1	0	0	0	0	0
Total	0	32	16	8	34	10	13	7	25	13

Discussion

Visual defects are but one of the many handicaps likely to affect preterm babies. Besides the serious disorder like ROP, squint and refractive errors are the other common problems. Refractive errors, if allowed to persist uncorrected, can lead to amblyopia. The incidence of refractive error in preterms has been reported to vary from 0 to 100% depending on the age of examination(3,4,8,9). In the present study, at 6 months, none of the babies had normal vision but by one year of age, 64% had emmetropia. The main change was from hypermetropia to emmetropia. This is consistent with the reports of normalization of vision noted by Fabian in normal children(10). Ingram and Barr in contrast observed no decrease in the incidence of hypermetropia among children from age 1 to 3^{1/2} years(11). In the current study, myopia was seen to have an inverse relationship with gestation and birth weight and was seen to vary little with age. Fletcher and Brandon noted fluctuation of myopia in their study group and commented that they may take one year before stabilizing. Various reasons have been put forward to explain the fluctuation in refraction of

immature eyes. Changes occurring in the corneal curvature, lens, media or axial length of the eye could be responsible. One of the most common association has been of ROP and myopia. It has been suggested that without ROP there may be no myopia(12,13). On the other hand, myopia without ROP has also been reported(14). In this study all cases of myopia occurred without ROP. The inverse correlation of gestation and myopia was also noted by Dobson *et al.* (5). In contrast, Shapiro *et al.* observed that refraction of prematurely born children was similar to that found in children at full term(8).

Anisometropia was significantly correlated with decreasing gestation and birth weight. Findings of Dobson *et al.* were also similar(5). Astigmatism can be a major obstacle to development of normal binocular vision. We found that low birth weight had a significant correlation with astigmatism. Dobson *et al.* also found that infants with shorter gestational period had more astigmatism(5). There has been a report that hypoxic ischemic damage to the immature brain may be associated with ROP and possibly delayed visual maturation(3). We attempted to correlate the occurrence of

refractive errors with asphyxia in preterm babies but no correlation could be established.

In conclusion, refractive errors especially myopia are common in preterm babies. They can occur without ROP and may hinder development of normal binocular vision. In order to prevent significant visual handicap, all preterms should have an ophthalmological examination at one year of age and later.

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