

## Refractive Error among Healthy Infants in Tertiary Eye Care Centre of Nepal

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**1. Abstract**

**1.1. Introduction:** Refractive errors occurs when the shape of the eye prevents light from focusing and forming image on the retina. The main objective of the study was to screen and determine the refractive error in Infants which can reduce the delay in effective therapy.

**1.2. Methods:** This Retrospective observational study was conducted among healthy infants attending Departments of Pediatric Ophthalmology department in Kedia Eye Hospital, Birgunj, Nepal. Informed consent from the infant's parents were taken. Cycloplegic refraction was performed using retinoscopy to diagnose refractive error. Hyperopia of  $> +4.00$  D Myopia of  $> -1.50$  D and Astigmatism of  $> -1.75$  D were included in the study.

**1.3. Results:** A Total of 966 infants (0-12 months) were enrolled in the study. Number of male and female infants were 594 (61.5%) and 372 (38.5%) respectively (Table 1). The mean age was 6 months. Prevalence of Refractive error in infants was 21.5%. Astigmatism was found in 92 infants (9.5%), Myopia in 62 infants (6.4%) and Hyperopia in 52 infants (5.6%).

**1.4. Conclusion:** Astigmatism and Myopia are major cause of Refractive Error in Infants. Detecting Refractive error in infancy is an advantage to the children education and quality of life.

**Table 1:** Frequency distribution of Gender

Gender	Frequency(n)	Percentage (%)
Male	594	61.5
Female	372	38.5

**2. Introduction**

Refractive errors occurs when the shape of the eye prevents light from focusing and forming image on the retina and if remains uncorrected leads to permanent vision loss. Corrective Spectacles, Contact lenses, Refractive surgeries are the modalities of treatment for errors of refraction. Timely intervention remains the key factor for the management of Refractive Error. Diagnosing early during infancy might enhance quality of children's life and future carrier. If left uncorrected children may develop amblyopia, disparity in binocular vision, strabismus leading to visual impairment and blindness in children [1].

Refractive Error is the second leading cause of preventable visual loss and first cause of visual impairment. Refractive Error accounts for 43 % visual impairment worldwide [2,4]. World Health Organization approximates that 19 million children and adolescents 5 to 15 years of age are having Visual Impairment among which 12.8 million cases are due to Uncorrected Refractive Error. Consequences of Uncorrected refractive error may be harmful for children in their educational opportunities, productivity, and overall quality of life since vision develops during infancy [3].

Many studies are conducted and published on Prevalence of Refractive Error in Children in Nepal and worldwide but very few studies on the refractive error in infants. For effective treatment of Refractive error early detection might be helpful. The main objective of this study was to screen and determine the refractive error in Infants which can reduce the delay in effective therapy.

### 3. Method

This Retrospective observational study was conducted among healthy infants attending Departments of Pediatric Ophthalmology department in Kedia Eye Hospital, Birgunj, Nepal from January to December 2023. Informed consent from the infant’s parents were taken and recorded .Ethical clearance was provided by the ethical clearance committee of the hospital. All the Infants attending the hospital for any symptoms were screened for Refractive Error. Ocular motility examination was done using torch light .Gross eye examination. adnexa and anterior segment inspection was done using direct ophthalmoscope. Fundus evaluation was completed with indirect ophthalmoscopy and cycloplegic refraction was done using Retinoscope. All infants received 2 drops of 0.5 % of cyclopentolate and refraction was done 40 minutes after installation. This cycloplegic retinoscopy procedure is the gold standard for all children.

#### 3.1. Inclusion Criteria

All infants attending the hospital, Infants with Refractive Error.

#### 3.2. Exclusion Criteria

Physiological Refractive Error, Children above 1 year old, Hyperopia of less than + 4.00 D, Myopia of less than -1.50 D. Astigmatism of less than -1.75 D, Premature and low birth weight newborn. Statistical Analysis was done using SPSS software. Systematic sampling method was applied in this study.

#### 3.3. Sample Size Calculation

Sample size in this study was 966 which is more than the calculated ample size of 384.

### 4. Results

A Total of 966 infants (0-12 months) were enrolled in the study. Number of male and female infants were 594 (61.5%) and 372 (38.5%) respectively (Table 1) .The mean age was 6 months. Refractive error was diagnosed in 208 infants (21.5%) (Table 2). Astigmatism was found in 92 infants (9.5%), Myopia in 62 infants (6.4%) and Hyperopia in 52 infants (5.6%) (Table 3). Among 208 infants infants with Refractive Error 150 infants were male (25.2 %) and 58 infants (15.6%) were female. The results showed that There was significant association between gender and refractive Error ( $p<0.001$ ). in Infants with Refractive Error Astigmatism was found in 72 male (78.3%) and 20 female (21.7%) infants .Myopia was detected in 42 male (67.7%)and 20 female(31/3%) infants . Hyperopia was the refractive error in 36 (66.6%) male and 18 female (33.7%) infants. There was insignificant association between types of refractive error and gender of patients( $p=0.185$ ) thought the results showed that all types of refractive error were found mostly in male patients as compared to female patients (Table 4 and 5).

**Table 2:** Prevalence of Refractive Error

Refractive Error	Frequency(n)	Percentage (%)
Yes	208	21.5
No	758	78.5

**Table 3:** Frequency distribution of types of Refractive Error

Refractive Error	Frequency(n)	Percentage (%)
Hyperopia	54	5.6
Myopia	62	6.4
Astigmatism	92	9.5

**Table 4:** Association between Refractive Error and Gender

Gender	Refractive Error		Total	P value
	Yes, n (%)	No, n (%)		
Male	150(25.2)	444(74.8)	594	<0.001
Female	58(15.6)	314(84.4)	372	

**Table 5:** Association between Types of Refractive Error and Gender of patients

Refractive error	Male, n (%)	Female, n (%)	Total	P value
Myopia	42(67.7)	20(32.3)	62	0.185
Hyperopia	36(66.6)	18(33.7)	54	
Astigmatism	72(78.3)	20(21.7)	92	

### 5. Discussion

Timely diagnosis and intervention remains the first priority in the treatment modality of all the types of Refractive Error. The major objective of the study was detection of Refractive Error in first year of life which can prevent visual impairment and visual loss. In a Meta-analysis done by Jeewnanand Bist et al in Nepalese children Prevalence of Refractive Error in Nepalese children was estimated to be 8.4 % [5]. However In our study Refractive Error was found in 21.5 % of 966 infants. So this study compared to the meta- analysis done by Jeewanand et al showed that majority of refractive error might be since birth.

Astigmatism was the major type of refractive error in this study. Among 966 infants 9.5 % had Astigmatism. In a study of changes in Astigmatism between age of 1 and 4 years of age done by Abrahamsson et al all children (299) had Astigmatism of 1 D and concluded that there was significant decrease within 4years of age [6]. Considering the changes in magnitude of Astigmatism in first and second semester of infants Astigmatism of <1.75 D was excluded in our study.

Myopia (near sightedness) is a condition in which images are formed in front of retina which causes blurring of vision for far objects and as the eye grows it becomes elongated and more near-sighted .If untreated Myopia leads to serious eye issues later in life

. In this study Myopia was found in 6.4 % of 966 infants which resembles the study done by Lu Huo et al where Myopia was detected in 5.1 % of 583 infants [7]. In our study the age taken was 0- 12 months whereas in the study done by Huo et al infants of age 1-18 months were included. Also the infants with low birth weight and premature newborns were excluded in this study so the results of Myopia in infants in this study does not coincide with the results of Quinin et al which concluded that myopia can be strongly predicted by low birth weight and retinopathy of prematurity [8].

Eyeballs at birth are Hyperopic due to shorter axial length and this condition resolves as eye grows which is known as Physiological farsightedness. In the study done by Semeraro et al values between  $+0.50 \leq D \leq +4.00$  was considered as physiological refraction at birth and they concluded that 88.03 % of 12427 newborn were in this range [1]. In our study the infants with Hyperopia of less than  $+4.00$  D was excluded. Prevalence of Hyperopia in our study was 5.6 % of 966 infants of age = -12 months .In the study done by Yahya et al in Malaysia prevalence of Hyperopia was 12 .7 %. However the age range involved in the study of Yahya et al were 6- 36 months and the number of children were 151 [9].

Refractive error prevalence in boys and girls were 25.2 % and 15.6 % respectively with p- value of  $< 0.001$  .In this study of 966 only 38.5% girls were screened which might be the reason for higher prevalence in boys. This also explains that parents are more concerned about health aspects of boys more than girls.

Small sample size , unable to convince many parents for cyclo-pegic refraction , lack of co-ordination with other hospitals and pediatrician are the limitation of our study. Larger sample size with involvement of other districts of Nepal would have added accuracy in data and results which might have motivated national level health concerns.

## 6. Conclusion

Astigmatism and Myopia are the major causes of Refractive Error in Infants. Diagnosing refractive error in Infancy is an advantage to all the parents who are always concerned about their child's future objectives. Parents should be motivated for routine eye screening during Infancy.

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