

**“A STUDY ON OCULAR MORBIDITY AMONG SCHOOL GOING  
CHILDREN (6-12 YEARS)”**

**DISSERTATION SUBMITTED TO  
THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY  
CHENNAI**

*in partial fulfillment of  
the requirements for the degree of*

**M.S (OPHTHALMOLOGY)**

**Registration No.: 221713251**

**(BRANCH-III)**



**TIRUNELVELI MEDICAL COLLEGE**

**TIRUNELVELI**

**MAY - 2020**

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Dear Dr.M.CHANDRALEKHA, MBBS., The Tirunelveli Medical College Institutional Ethics Committee (TIREC) reviewed and discussed your application during The IEC meeting held on 15.12.2017.

**THE FOLLOWING DOCUMENTS WERE REVIEWED AND APPROVED**


1. TIREC Application Form
2. Study Protocol
3. Department Research Committee Approval
4. Patient Information Document and Consent Form in English and Vernacular Language
5. Investigator's Brochure
6. Proposed Methods for Patient Accrual Proposed
7. Curriculum Vitae of The Principal Investigator
8. Insurance / Compensation Policy
9. Investigator's Agreement with Sponsor
10. Investigator's Undertaking
11. DCOI/DCPT approval
12. Clinical Trial Agreement (CTA)
13. Memorandum of Understanding (MOU)/Material Transfer Agreement (MTA)
14. Clinical Trials Registry-India (CTRI) Registration

**THE PROTOCOL IS APPROVED IN ITS PRESENTED FORM ON THE FOLLOWING CONDITIONS**

1. The approval is valid for a period of 2 year/s or duration of project whichever is later
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3. A written request should be submitted 3 weeks before for renewal / extension of The validity
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## **1. INTRODUCTION**

School health is an important aspect of any community health program. The school age is a formative period, physically as well as mentally, transforming the child into a promising adult. Poor vision in childhood affects performance in school and has negative influence on the future life of the child. School children are affected by various eye disorders like refractive errors, squint, Vitamin A deficiency and eye infections. Uncorrected refractive errors form one of the important causes of visual impairment and blindness in most developing countries including India. Considering the fact that 30% of India's blind lose their sight before the age of 20 years, the importance of early detection and treatment of ocular morbidity and visual impairment in young children is obvious <sup>1,2</sup>. This warrants early detection and treatment of ocular problems to prevent future blindness.

## **2. EPIDEMIOLOGY**

According to WHO [Globally], Among Adults, there are 39 million people blind and 246 million are visually impaired and among children, there are 1.4 million blind and 18.9 million are visually impaired. Uncorrected refractive errors are the main cause of visual impairment.<sup>3</sup>

According to National Programme for Control of Blindness and Visual Impairment (NPCB&VI) ,Among adults, there are 9 million blind and 45

million are visually impaired and among children ,2.7 lakh are blind and 0.3/1000 are visually impaired.<sup>4,5</sup>

### **3.CLASSIFICATION OF OCULAR DISORDERS IN CHILDREN**

It can be classified according to the Age of onset as

- A.** Intra uterine
- B.** Neonatal
- C.** Between one to five year
- D.** Above five year.

**A. Intra uterine** are generally bilateral, many of them are genetic in nature. Some of them are life threatening. Intra uterine factors that produce ocular malformation can be: Genetic, Transplacental, Mechanical, Traumatic, Neoplastic (rare), Nutritional.

**The genetic factors** can be: Inherited genetic defect, Genetic mutation, Chromosomal aberration, Effect of exogenous factors like, drugs, radiation, diet.

The transplacental factors causing ocular defects are mostly infection, followed by various drugs taken in first trimester. The common infections that cause ocular morbidity are Rubella, toxoplasmosis, syphilis, cytomegalo virus diseases.<sup>6</sup>

#### **B.NEONATAL CAUSES OF OCULAR DISORDERS :**

- A.** Infection.
- B.** Mal developmental.

### C. Effect of pre maturity

The infection can be acquired during delivery or soon after. These infections are gonorrhoea, herpes simplex, chlamydia, inclusion conjunctivitis and other bacterial infections. The congenital infections that cause ocular morbidity but do not manifest always at birth are rubella, toxoplasmosis and syphilis. **Maldevelopmental** causes includes Anophthalmos, microphthalmos, microcornea, limbal dermoids, bluesclera, dysgenesis of anterior chamber, coloboma of uvea, polycoria, aniridia, ectopia lentis, congenital myopia, primary, associated or secondary congenital glaucoma, persistent primary hyperplastic vitreous. The retina may show congenital folds, detachment coloboma<sup>7</sup>.

### **C. OCULAR DISORDERS BETWEEN ONE TO FIVE YEARS AGE**

- A. Sequel of Intrauterine infection, Developmental anomalies, Neonatal infection, Trauma, Dietary Deficiency
- B. Inborn errors of metabolism
- C. Errors of refraction
- D. Strabismus
- E. Glaucoma
- F. Intraocular tumours
- G. Orbital tumours
- H. Allergy — Endogenous  
— Exogenous

I. Autoimmune disease

J. Infection — Local

— Systemic

K. Degeneration and dystrophies

#### **D.OCULAR DISORDERS ABOVE FIVE YEARS AGE GROUP :**

A. Residual or continued effect of above

B. Infections are common, so are allergies

C. Trauma is frequent

D. More children turn up with errors of refraction, squint and amblyopia

#### **4.COMMON OCULAR MORBIDITIES IN SCHOOL CHILDREN**

Refractive error, Ambyopia, Colour blindness, Vitamin A deficiency  
Allergic conjunctivitis, Infectious conjunctivitis, Blepharitis Chalazion, Stye,  
Congenital cataract ,Traumatic cataract, Squint, Ptosis.

#### **5. ETIOLOGICAL FACTORS CAUSING OCULAR MORBIDITIES**

##### **1.Demographic factors**

a.Age -Hyperopia is most prevalent in young children under 6 years of age.<sup>8,9</sup> A

Meta-analysis of multiple smaller studies showed Prevalence of hyperopia drops to 5% by age 7 and 1% by age 15yrs.In contrast, older children found to had higher prevalence of myopia. Only 1-2% Prevalence of myopia by age 6.

Prevalence of myopia increases most from ages 9-14yrs.

b. Sex- No difference between sexes in Hypermetropia.

c. Socioeconomic development : CNS disorders and retinal conditions are more common in High income countries. Corneal scarring due to vit A deficiency, measles, ophthalmia neonatorum, and ,harmful traditional practices are common in Low income countries.

d. Region- Pokhrel et al. and Shrestha et al. showed that children from rural areas are less likely to have refractive error than children from urban areas.

## **2. Biological factors**

a. History of marriage (Consanguinity) –Most congenital diseases common in parents with consanguinity.

b. Birth history -Preterm child have greater risk for ROP and prone to develop myopia of prematurity.

c. Place of birth- Hospital birth can prevent corneal scarring in children by primary health care using essential drugs, clean water and proper hygiene.

**3. Immunization** -Measles immunization Programmes for reducing corneal ulceration and scarring in children and efforts are being taken to control vitamin A deficiency in children by vitA Supplementation.

**4. Trauma - can lead corneal scarring and visual impairment in children.**

**5. Genetic factors** : Numerous studies have shown a higher rate of myopia in children with myopic parents and an even higher risk for children with two myopic parents.<sup>10</sup>

## **6.Environmental factors :**

Lifestyle changes like Extended duration of near work activity, Incorrect reading posture ,Lack of outdoor activities, Excessive television watching and increased duration of computer activity, ambient light exposure at night have their role in myopia and myopia progression.

7.Nutrition : Jyoti et al did a nationwide survey in blind schools, showing that corneal opacity due to Vitamin A deficiency is a major cause of childhood blindness.

## **6. INITIATIVES FOR PREVENTION OF BLINDNESS**

**Definitions** :UNICEF defines a child as an individual aged less than 16 years.

WHO defines Blindness as a corrected visual acuity in the better eye of less than 3/60 or central visual field <10 degrees and severe visual impairment as a corrected acuity in the better eye of less than 6/60.

### **VISION 2020: The Right to Sight**

VISION 2020 is a global drive that aims to eliminate avoidable blindness as a public health problem by the year 2020. This was launched on 18 February 1999 by the WHO together with the more than twenty international NGO.<sup>11</sup>

**VISION 2020 Targets** for the control of blindness in children :

### **Specific disease-control measures :**

Reduce the global prevalence of childhood blindness from 0.75 per 1000 children to 0.4 per 1000 children by the year 2020.



- Eliminate corneal scarring caused by vitamin A deficiency, measles, or ophthalmia neonatorum.
- Eliminate new cases of congenital rubella syndrome.
- Provide appropriate surgery to all children with congenital cataract, with immediate and effective optical correction, in suitably equipped specialist centres.
- Ensure that all babies at risk of ROP have a fundus examination by a trained observer 6–7 weeks after birth. Cryo or laser treatment should be provided for all those with threshold disease.
- See that all school children have a simple vision-screening examination, and that glasses are provided to all who have a significant refractive error. This service should be integrated into the school health programme.<sup>11,12</sup>

### **The Global Childhood Blindness Programme**

The Lions Clubs International Foundation, through their "SightFirst" Initiative is one of the major partners with WHO in addressing the causes of childhood blindness.

**NPCBVI** : National Programme for Control of Blindness & Visual Impairment<sup>10</sup>(NPCBVI) was launched in the year 1976 as a 100% Centrally Sponsored scheme with the goal to reduce the prevalence of blindness from 1.4% to 0.3%.<sup>12</sup>

## 7. REFRACTIVE ERRORS IN CHILDREN

A normally developed eye (by 5 to 6 years of age) acts as a **convex lens** of **+60D**. This power is divided into two major components *i.e.* the **corneal** and **lenticular**. The converging power of **cornea** is **+43D**<sup>13</sup>. This leaves the **lens** with **+17D** of power, normal aqueous and vitreous contribute a negligible converging power.

In an eye with normal refractive (dioptric) power, parallel rays are brought to focus on the retina with accommodation at rest, the parallel rays actually form a **circle of least diffusion**<sup>14</sup>. This refractive status is called **emmetropia**. In contrast to this, if all parallel rays are not brought to focus on the retina in all the meridian with accommodation at rest, the condition is called **ametropia**.<sup>16</sup>

A full term normal child at birth is about +2 to +3D hypermetropic. This is due to shorter axial length of the new born's eyeball. As the child grows, this power is neutralised by corresponding lengthening of the eyeball up to 5-7 years when all eyes should become emmetropic. However, if the increase in length does not stop at this point, the eye becomes **myopic** and if the eye fails to reach the emmetropic length (24 mm) the eye becomes **hypermetropic**.<sup>15</sup>

The ametropia eye can be :

1. Myopic
2. Hypermetropic

### 3. Astigmatic

#### MYOPIA :

Myopia is the commonest cause of gradually developing painless diminished vision in children. It is equally common among **boys** and **girls**. **It has strong heredity**. Fifty percent of myopic children have myopia in both the parents, about a quarter of myopic children have one parent with myopia, and rest are sporadic. Both the hereditary and sporadic cases can transmit myopia in the next generation.<sup>18</sup>

Myopia is the error of refraction in which rays from far point are focussed **in front** of photo sensitive layer of retina when accommodation is at rest.<sup>11,12,13</sup> Myopia is also known as **short sightedness** or **near sightedness** as the patient finds it difficult to see beyond a certain distance that may be very short.<sup>15</sup>

The word myopia represents the phrase "*I shut the eye*" in Greek<sup>16</sup>. This is because a myopic child narrows the inter-palpebral fissure so much as to make it like a slit. This gives a **pin hole effect** that improves vision by few lines on Snellen's chart

#### **MECHANISM OF PRODUCTION OF MYOPIA**

In myopia, the image is formed in front of the retina, nearer the nodal point of the eye. This gives the large blurred view of the object. This enlarged view of the object partially compensates for diminished vision. As the image is formed in front of retina ,any amount of accomodation shifts the image farther

from the retina, making it more blurred. Thus the myopic eye is conditioned not to accommodate.

The far point of myopic eye is a finite point in front of the eye. An uncorrected myope of moderate dioptre keeps a near object between the myopic far point and the eye. The eye need not accommodate to focus it on the retina. Keeping an object near the eye gives slight enlargement of the image. These two phenomenon makes the child to keep the reading material close to the eyes.

### **Classification of myopia**

- 1. Congenital myopia.** This is a rare form of myopia. The child is born with eyes longer than 24 mm, may be as long as 27 to 28 mm. It is mostly unilateral, occasionally both eyes may be involved. The condition is not diagnosed at birth. It may take as much as two to three years for parents to be aware of the condition.

**Unilateral larger eye, squint or nystagmus maybe the early signs to draw attention of the parents.** Generally the child is brought for unilateral squint and on examination presence of myopia is revealed, which is generally 10 diopter and generally **does not progress**.<sup>19</sup> Congenital myopia is more common in pre-term babies. It may be associated with other congenital anomalies of the globe i.e. microphthalmos, aniridia, megalocornea, cataract and retinal separation.

**Management** consists of early detection of myopia and optical correction either by spectacles or contact lenses after refraction under cycloplegia. Contact lenses are generally prescribed when the child is grown enough to manage the contact lenses.

**2.Simple myopia.** <sup>20</sup>This is the commonest form of myopia in children. It is also known as **developmental** myopia. The exact etiology is not known. It is considered to be derangement of physiology of the developing eye. It is inherited as **autosomal dominant** or autosomal recessive inheritance. Boys and girls are equally effected. There is a strong hereditary tendency. Simple myopia is common among siblings.

Commonest type of simple myopia is **axial myopia**, where the eye is too long for its refractive status. Role of excessive near work and diet and general health also plays a minor role.

Simple myopia is generally **progressive** but not pathological . About one third children have stationary myopia, only 15% have progressive increase in power. Even in progressive form, the vision can be **corrected to normal**.

The children at birth are not myopic. Simple myopia is generally detected between five to seven years of age and continues to grow up to late teens. Hence called **school myopia** which may start as  $-1.00$  D or less but does not exceed  $-5$ D or  $-8$ D when fully developed. **Associated astigmatism is common**.

As the **punctum remotum** of a myopic eye is always finite, the myopic eye need not accommodate. Accommodation worsens the vision. Hence

accommodation in simple myopic eye remains unused. Convergence is within normal range, or may be in excess. The results in dissociation between accommodation and convergence leading to **exophoria** which may break into **exotropia**.<sup>21</sup> However excess convergence may lead to **esotropia** as well. A negative angle alpha in myopia leads to **pseudo convergent squint**.

**Symptoms.** Most frequent and striking symptom is diminished distant vision. They find it difficult to see the writings on the black board in the school, or read the sign boards. These children do not see the television from usual distance. They have tendency to move nearer to the TV set for better view. These children prefer to keep books closer to eyes than other children.

As the child has poor distant vision that he takes for granted, the child concentrates on near work like reading, writing and other indoor activities with less interest in outdoor sports. They become introvert. They generally do well in studies. Other symptoms are **glare**, and **asthenopia**.

**Signs.** The child actually may narrow the inter palpebral fissure for better vision. This phenomena is mistaken as squint by parents. However eyes with more than three diopters may look larger than normal eye due to axial increase in length. Higher degree of myopia may present with **pseudoproptosis**.

The **cornea** is relatively **larger** and **anterior chamber is deeper** than normal. **The pupil is larger than normal**, may look sluggish on torch light examination but brisk on slitlamp. **Fundus** is within normal range. After few years temporal crescent and peripheral retinal changes in the form of **lattice**

**degeneration** may take place putting the child on higher risk of retinal detachment<sup>22</sup>.

**Diagnosis.** Diagnosis is simple on the basis of diminished distant vision, good near vision, positive family history and improvement of vision by three four lines with PH. The diagnosis should be confirmed by retinoscopy under cycloplegia. Subjective test with minus glasses that improve vision.

**Management of simple myopia.** The aim of treatment is to bring the image back on the retina from its forward position. This is achieved by placing concave glasses in front of the eye either as **spectacles** or **contact Lens**<sup>23</sup>. The next alternative available is a group of surgeries that flatten the cornea. **These surgeries are not indicated in children.**

In an attempt to form the image on the retina, the aim should be to give **minimum** minus power that gives **maximum and comfortable vision.**

In children under 7 to 8 years, with low to moderate degree of myopia (up to -6D), myopia is fully corrected by spectacle. The child is instructed to use the glasses constantly. This gives a bright image on retina for maximum waking hours. This prevents development of squint and helps develop normal accommodation convergence reflex. The child should be encouraged to use the glasses for both distant and near work to develop a proper reading habit.

The spectacles are the most practical form of device to correct myopia, they are easy to handle. The spectacles give good and comfortable vision. They are cheap and the power can be changed with ease. The disadvantages of

spectacle correction of myopia consist of minification of image. A child who was accustomed to larger image, finds a smaller image unacceptable and too bright. The other disadvantage is unacceptability of glasses in teens for cosmetic purpose. The field is also restricted

The next alternative is to prescribe contact lenses. They are not suitable for children under ten years who can not manage to wear and remove them. The first advantage of contact lens is its invisibility that removes the cosmetic blemish of spectacle. Other advantages are optical. They give larger image, improved field all around, aniseikonia can be minimised when present. Greatest disadvantage of contact lens is child's inability to handle the contact lens and maintain its sterility. They are expensive and may require frequent change.<sup>24</sup>

**3.Pathological myopia.** This type of myopia is also known as **progressive** or **degenerative** myopia. It begins as simple myopia but increases relentlessly and always associated with extensive vitreoretinal degeneration. Macular involvement is common. The refraction may increase by -3D to -4D every year in contrast to simple myopia that increases by 1D to 1.5D yearly and get stabilised before the end of first decade.

The exact cause of pathological myopia is not well understood. **Heredity** seems to play a definite role. It runs in families, **female** are more prone to develop pathological myopia.

**Symptoms.** Most prominent symptom is diminished distant vision, which is very poor. Next common symptom is seeing fine **black spots** in front of eyes.



These opacities move with movement of the eyes. They are called **muscae-volitantes**. They are due to degeneration of vitreous. They do not require any treatment. Children with pathological myopia have **poor dark adaptation**<sup>25</sup>. This is due to extensive peripheral chorioretinal degeneration. Squint mostly esotropia is common in pathological myopia due to excess of convergence and under action of lateral rectus. Sudden **profound loss of vision, photopsia, loss of field** always means **myopicretinal detachment**. Other cause of sudden painless loss of vision are **haemorrhage in front of the macula** or **large vitreous haemorrhage**<sup>26</sup>

**Signs.** The signs are similar to those seen in simple myopia. However prominence of eyeball is more due to stretching of the globe mostly beyond the equator giving an impression of **pseudo proptosis**. Cornea is larger but not as large as in megalocornea or buphthalmos. AC is deep and pupil larger and sluggish.

On **retinoscopy** the retinal glow looks dull and moves slowly against the movement of the retinoscope, as more and more minus lenses are added, the glow looks brighter. A **concavemirror retinoscope** is helpful in retinoscopy in progressive myopia.

**Fundus examination.** Most striking features of pathological myopia is seen with ophthalmoscope. To have a good view of whole of the retina, fundus should be examined by **indirect ophthalmoscope** under full mydriasis.

The fundus changes are seen on **optic disc, macula, choroid** and **retina**.

The fundus changes increase with duration of myopia and not always directly proportional to degree of myopia.

**The early changes** develop in first and second decade<sup>20</sup> consisting of diffuse atrophic changes in the retina and choroid in the posterior pole, which include pale retina through which prominent choroidal vessels are seen. The retina gradually gets atrophic, soon a **myopic crescent** develops mostly on temporal side of the disc .

**The late changes are** **Optic disc** is **pale** and **large**. The disc has prominent myopic crescent. **Peripapillary crescent** is more frequent in late stages. There may be super traction of retina over the disc. The cup is proportionately large **but cup disc ratio is within normal limits**.

**Choroid.** In early stages—The choroidal vessels are visible through the pale retina. In late stages there is atrophy of choriocapillaries and retinal pigment epithelium.

**The macula.** The macula develops a dark red circular patch surrounded by a pale ring. This is **called Foster-Fuch's spot of Fuch's fleck**. This is due to choroidal thrombosis<sup>27</sup> and choroidal neovascularisation.

**Bruch's membrane** develops breaks due to over-stretching which look like **fine yellow irregular lines that may branch**. They are more common in young myopes. They are called **lacquer cracks**<sup>24</sup>.

**Peripheral retinal degeneration** in the form of **lattice, snail-track** or **cystoid degeneration** are common.

**Posterior staphyloma** is unique to pathological myopia. It is due to thinning and stretching of sclera in the posterior pole

**Vitreous changes are very common.** They are degenerative that include **posterior vitreous detachment**, formation of large **vitreous opacities**, **liquefaction** of vitreous. Peripheral fields also shows constriction.

**Management.** Management of pathological myopia is same as in simple myopia except that pathological myopia does not improve to 6/6 with best correction. The second problem is more frequent change in power, the yearly change may be as much as  $-3D$  to  $-4D$ . It is better to under correct high myopia by  $-1$  to  $-2D$  for more comfortable distant as well as near vision .

Use of glasses is neither going to stop progress of myopia nor reduce the power of myopia. It should also be impressed that the glasses are not specific for reading but should be used for near work to keep balance of accommodation and convergence.

The next alternative is contact lens. Contact lenses are preferred in high myopia because they do not cause minification of images as seen in spectacles. They reduce peripheral distortion that is common with high myopia glasses. Peripheral field also improves with contact lens.<sup>28</sup>

**Bifocals and Progressive lenses** :The effect of decreasing accommodation in myopic patients using single vision, bifocal and multifocal lenses.

**Atropine and Pirenzepine** :Accommodation can be inhibited by using an eyedrop that contains a muscarinic receptor antagonist.A 50% reduction in myopic

progression was shown in patients that used 2% pirenzepine gel in 2005 by Tan et al. and again in 2008 by Siatkowski et al.

**Overnight Contact lenses** :A highly controversial treatment modality for retarding myopic progression is the use of overnight rigid contact lenses (orthokeratology).

**Outdoor activity** :Physical activity, sports, and low accommodation has a protective effect on myopia progression. Light intensity in outdoors will increase depth of field and decreasing image blur. And also light induces release of dopamine from the retina which is an eye growth inhibitor.

**Surgical procedures for correction of myopia** : They can be divided into following groups :

**Common surgical procedures on cornea are :**

.Radial keratotomy (RK},Photo refractive keratectomy (PRK), Lasik (Laser in situ keratomileusis)<sup>26</sup>,Lasek (Laser sub epithelial keratomileusis), Intracorneal ring.

**Surgical procedures on lens :**

1. Clear lens extraction
2. Phakic intraocular lenses

**Other forms of myopia :**

1. **Curvature myopia**—Corneal—Keratoconus

Lenticular—Lenticonus

2. **Index myopia.** This is more common in adults beyond fourth decade as nuclear sclerosis. However any condition that increases refractive index of lens in children can also result in myopia *i.e.* diabetes, concussion injury.
3. **Positional myopia.** This infrequent condition occurs due to forward displacement of lens.
4. **Pseudophakic myopia.** This is common following IOL implant in congenital cataract where the power of the IOL may be too strong for the eye.
5. **Pseudomyopia.** This is common in hypermetropic children who accommodate too much and make the eye myopic. Pseudomyopia may occur due to spasm of accommodation that may follow blunt injury to the globe, iridocyclitis or due to instillation of miotics.
6. **Myopia of prematurity**<sup>26</sup>. This type of myopia is commonly seen in children with birth weight of 1250 gm or less (a birth weight that predisposed retinopathy of prematurity). There is a fluctuation of myopia that may range between 10D to 20D. The myopia is reduced to 2 to 6D by 6 months and is altogether disappears by 1 year. The cause of the condition is not known.
7. **Drug induced myopia.** Some of the drugs taken orally can cause transient low degree of myopia. Commonest example is acetazolamide induced myopia.

### **Hypermetropia (Hyperopia):**

Hypermetropia is commonest form of error of refraction seen in children under five years.<sup>13</sup> The condition draws attention less compared to myopia

.Hypermetropia is a state of refraction where parallel rays are brought to focus behind the photo sensitive layer of the retina and the image formed on the retina is blurred ,when accommodation is at rest.<sup>22</sup>

At birth almost all eyes are hypermetropic by 2 to 3 diopters which gradually gets neutralised due to growth of the eyeball and theoretically the eye should be emmetrope at puberty .children who do not reach emmetropia remain hypermetropic at five years of age

Hypermetropia is considered to be a state of underdeveloped eye. The eye is shorter than emmetropic eye. As a rule the shortening is not too much in contrast to myopia where the lengthening is generally in higher order. In hypermetropia, the **shortening is rarely more than 2 mm.**<sup>29</sup>

Etiologically hypermetropia can be :

1. Axial
2. Curvature
3. Index
4. Displacement of lens

Out of all, the **axial hypermetropia** is the commonest form. This can be part of a shortened length or the sclera may be pushed forward by a retrobulbar mass or the detached retina may come forward. The later two are pathological causes of hypermetropia. Other causes are **microphthalmos** and **nanophthalmos**.

**Curvature hypermetropia** occurs when curvature of either cornea or lens is smaller than normal. Reduced curvature of cornea is more probable cause of curvature hypermetropia than lens. A flattening of curvature by 1 mm results in hypermetropia of 6 diopter. Astigmatism is more common in curvature hypermetropia than axial hypermetropia. The causes of flattening of cornea are : **Cornea plana, micro cornea, microphthalmos, post trauma** and **post surgical status**<sup>30</sup>. The lens is flattened in buphthalmos.

**Index hypermetropia** is least common cause of hypermetropia in children. This is commonly seen in diabetic children under treatment. Displacement of lens posteriorly causes hypermetropia that could be congenital or following trauma. Absence of lens from pupillary area (**aphakia**) causes highest amount of hypermetropia.

**Optical status of a hypermetropic eye:** The parallel rays are focussed behind the retina. The rays arising from the retina going out of the eye are divergent and seem to meet behind the globe. As the retina is nearer the nodal point, the hypermetropic image is smaller than emmetropic.

**Accommodation in hypermetropia:** Accommodation plays an important role in correcting part of hypermetropia as against myopia where accommodation worsens the myopia. A child has stronger accommodation than an adult. Hence a child is in advantageous position in correcting hypermetropia without glasses than an adult.

According to available accommodation, hypermetropia can be divided into two main groups *i.e.*

1. **Latent hypermetropia** and
2. **Manifest hypermetropia.**

The sum total of the two is called **total hypermetropia**<sup>31</sup>.

Latent hypermetropia is that part of hypermetropia that is corrected by physiological tone of ciliary muscles. This ranges between 0.5D to 1.0D. This is measurable only following paralysis of accommodation by cycloplegia. Latent hypermetropia is the difference between total hypermetropia and manifest hypermetropia.

The manifest hypermetropia is divided into :

1. **Facultative hypermetropia** and
2. **Absolute hypermetropia.**

1. **Facultative hypermetropia.**<sup>31</sup>This is corrected by available accommodation over and above the latent hypermetropia. Most of the children have more facultative hypermetropia and less absolute hypermetropia. With age, amount of facultative hypermetropia gets reduced and replaced by absolute hypermetropia.

2. **Absolute hypermetropia** is that part of manifest hypermetropia that is not corrected by accommodation.

**Symptoms of hypermetropia.** Symptoms of hypermetropia depends upon amount of accommodation available.



1. **No symptoms:** Children with low degree of hypermetropia may have no symptoms and hypermetropia may be unmasked only when cycloplegic is used.

2. **Asthenopia:** Develops when moderate hypermetropia is fully corrected by accommodation, resulting in normal or near normal distant vision. This accommodation has to be exerted throughout the day to maintain normal vision.

This sustained action of ciliary body leads to asthenopic symptoms of

1. Headache - generally frontal.

2. Tiredness of the eye

3. Mild photophobia and watering.

The asthenopic symptoms worsen by evening or after prolonged near work. These children generally complain of headache after coming from school and do not complain on holidays.

3. **Asthenopia with diminished vision:** When the hypermetropia is not corrected by accommodation, the child complains of diminished vision, first in the form of difficulty in near work and then diminished distant work.

4. **Defective vision:** If hypermetropia is high between 4D to 6D, the patient generally gives up accommodation and absolute hypermetropia is precipitated and patient complains of diminished near vision and diminished distant vision.

5. **Pseudo myopia.** A child may over accommodate to achieve good distant vision. In this effort the child may overshoot the emmetropia and become myopic, which again causes diminished distant vision that may be wrongly

corrected subjectively by minus glasses worsening the condition. Thus all children should get their glasses only after refraction under cycloplegia.

6. **Squint sensation.** Some children may complain of squinting without diplopia, in absence of obvious squint, however, there may be esophoria.

7. **Squint.** A child may present with esotropia in high hypermetropia.

8. Recurrent blepharitis, stye and chalazion.

9. Some children may hold the book too close to the face and may be mistaken as myopic. The phenomenon of keeping books near the eyes give larger retinal image that compensates for poor vision.

10. The children may have other ocular deformity like microphthalmos, microcornea or nanophthalmos.

#### **SIGNS :**

1. Low hypermetropia looks as normal as emmetropic eye. An eye with moderate to high hypermetropia is typically a small eye not only in anterior posterior diameter but in all directions.<sup>3</sup>The cornea is smaller than emmetropia and the anterior chamber is shallower. The pupil is also small.

3. **Pseudo divergent squint.** This is due to large positive angle alpha. ( $\kappa$ )

4. **Esotropia.** This is due to high hypermetropia *i.e.* between +4D to +7D. And mostly is an accommodative esotropia.

5. **Fundus.** Overall size of the fundus is smaller than the emmetropic eye with small disc, which resembles optic neuritis without visual symptoms. This is called **pseudoneuritis**. Generally fundus background has a peculiar sheen that is

called **shot silk appearance**.The blood vessels reflect more light than emmetropia.The macula is generally situated away from the disc.<sup>33</sup>

**Management of hypermetropia.:**Management of hypermetropia like myopia is optical or surgical. **Surgical treatment is not indicated in children**. Optical treatment consists of prescription of **spectacles** or **contact lens**, which depend on available accommodation.

1. **Children below six years.** Some accommodation for distance is physiological at this age and the child may not be aware of presence of hypermetropia. These children are asymptomatic and need no treatment.Treatment given, if there is evidence of asthenopia or muscle imbalance.

2. **In school going children** who requires prolonged near work, require correction even of smaller degree.

3. Children with accommodative squint and diminished vision should be corrected. If the error of refraction is more than +3D, the child should be given glasses for constant use.In children under six years, the power of glasses should be +1.5D to +2.0D less than the objective finding.In children above six years, full correction with good vision should be prescribed.

As the child grows, some of axial hypermetropia gets reduced and the refraction may swing towards emmetropia. In rarer instances the accommodation may worsen with corresponding increase of hypermetropia in children in second

decade. So, **all hypermetropic children should undergo yearly ophthalmic check and undergo corresponding adjustment.**<sup>34</sup>

**Contact lenses in hypermetropia.:** It is better to prescribe contact lenses in hypermetropic children after hypermetropia has stabilised. Other indications are anisometropia and unioocular hypermetropia.

**Surgical management of hypermetropia :** Hexagonal keratotomy, Photo refractive keratectomy, Lasik, Laser thermal keratoplasty, Phakic intraocular lens

### **Astigmatism :**

This is a state of refraction where a point focus of light is not formed on the retina with or without accommodation. Instead of one **focal point** there are **two focal lines**. The distance between the two focal lines is known as **focal interval** that represents the **astigmatic power** of the eye. In between the two focal lines is the **circle of least diffusion** which represents the spherical power

All eyes have some minor degree of astigmatism without any symptoms. The cornea of a new born is almost spherical, with age slight astigmatism is natural due to pressure of the lids on the cornea. The vertical meridian is **steeper**, hence slightly more myopic than **flatter** horizontal meridian, which remains emmetropic. This is known as **direct astigmatism** or **astigmatism with the rule**. In contrast to this, where horizontal curvature **steeper**, the condition is called **indirect astigmatism** or **astigmatism against the rule.**<sup>35</sup>

### **Types of astigmatism :**



2. The two axes are at right angles to each other but not horizontal and vertical, the condition is called **oblique astigmatism**. The axes are off the horizontal or vertical by  $20^\circ$  or more. The axis in one eye is mirror image of the other eye i.e  $80^\circ$  and  $110^\circ$  or  $20^\circ$  and  $160^\circ$ .
3. The difference between the two meridians is less than  $90^\circ$ , the condition is called **bioblique astigmatism**.

**Irregular astigmatism** is that astigmatism where astigmatism in the principal meridian vary. This is caused due to corneal irregularity like corneal scar, keratectasia, keratoconus, pterygium, limbal dermoid, post keratoplasty. According to position of image in relation to retina. The astigmatism can be simple, compound or mixed.

**Simple astigmatism** is that astigmatism in which one meridian is emmetropic, the other is either myopic or hypermetropic. The former is called simple myopic astigmatism, while the latter is called simple hypermetropic astigmatism. Each is corrected by suitable single cylinder of appropriate sign, axis and power.

**Compound astigmatism** is that astigmatism where both the meridians are either myopic or hypermetropic and known as compound myopic or compound hypermetropic astigmatism respectively. They are corrected by sphere and cylinder of same sign *i.e.* compound myopic astigmatism is corrected by myopic sphere with myopic cylinder<sup>36</sup>.

**Mixed astigmatism** is that astigmatism where two meridians have different signs *i.e.* one is myopic, the other is hypermetropic or vice-versa. In mixed astigmatism the power of the cylinder is always more than the sphere. They are most difficult to correct.

**Symptoms of astigmatism :**

1. Small degree of astigmatism may be symptomless.
2. Diminished distant vision
3. Difficulty in focusing near objects—As accommodation fails to correct astigmatism, the near vision is never comfortable for an astigmatic.
4. Head turning and tilting—The child may turn or tilt the head to compensate for the axis of astigmatism.
5. Narrowing of interpalpebral fissure—The child tries to produce a pinhole effect to improve the vision
6. Muscle imbalance is more common in astigmatism than in other errors of refraction.
7. **Asthenopia and asthenopia related** symptoms are more common in astigmatism of low grade. They are : Watering, redness of eye, recurrent blepharitis, sty, chalazion, frontal headache.

**Signs of astigmatism :**

1. Externally the eyes may not look abnormal.
2. **Placido disc** may show irregularity in the circles, in irregular astigmatism and crowding and elliptical shape in high regular astigmatism.

3. **Computerised keratometry** shows irregularity in the corneal surface.
4. Refraction always shows difference in refraction in two principal meridians.
5. **Keratometry** shows difference in power in different meridian and their axis.
6. On fundus examination the optic disc looks oval. Vertically oval disc is more common than horizontal.
7. An astigmatic child when examined on E chart may not be able to tell the direction of the arms of E. He may be able to tell the direction in vertical direction but fumble in horizontal direction and vice versa.
8. On astigmatic fan the child may see some lines clearly and not those at right angles to it.

### **Management**

1. No treatment—If there is no visual loss or there are no symptoms of eye strain, asthenopia or muscle imbalance, no treatment is required. The child is examined once every year and retinoscopy is done under cycloplegia.
2. Prescription of glasses :
  1. Simple astigmatism is corrected by single cylinder of appropriate power and sign at proper axis.
  2. Compound astigmatism is corrected by prescribing sphere and cylinder of same sign.
  3. Mixed astigmatism is corrected by sphere and cylinder of opposite sign.



**As a rule every attempt should be made to correct cylindrical defect fully.**<sup>37</sup>

While correcting astigmatism utmost attention should be given to correct axis of the cylinder. A wrongly placed cylinder is more troublesome .

In mixed astigmatism the combination that is most comfortable should be prescribed *i.e.* minus sphere with plus cylinder at right angles or plus cylinder with minus cylinder at horizontal axis.

The power and axis of the cylinder can be checked by :

1. Auto refraction—These are good for non-verbal children who can not be tested subjectively. However refraction under cycloplegia should be done
2. Keratometry—This is more important in contact lens fitting than spectacle. This measure the curvature of a anterior corneal surface only 3 mm wide.
3. Fogging
4. Astigmatic fan
5. **Jackson's cross cylinder.** This is the best and most accurate method to verify power of cylinder and axis of cylinder.

**Contact lens.** Contact lenses are prescribed only when the child can manage the contact lens himself. Contact lenses are more suitable for high astigmatism, bi-oblique astigmatism and irregular astigmatism. For high cylindrical error, **toric contact lenses** are best suited. A toric lens<sup>37</sup> should have full corneal coverage

and good centering. The lens should have good movement with each blink, the up and down gaze.

### **Amblyopia**

It is a symptomatic disturbance of vision in children due to deprivation of vision or abnormal binocular interaction.<sup>38</sup> The cause of which can not be explained by presence of disorders of ocular media or visual pathway..

Prevalence of amblyopia ranges between 0.5 to 3.5 percent in school going children.<sup>37</sup> It is seen equally in boys and girls. No race is immune. There is no fixed hereditary factor, however, the predisposing causes like error of refraction or concomitant squint may have genetic background.

Amblyopia develops due to failure of visual pathway development, which may start at birth or soon after. Development of amblyopia after full maturation of visual pathway is rare. Onset after six to seven years is almost unknown.

#### **Characteristics of amblyopic eyes :**

1. Amblyopia starts in the critical period of development of visual pathway.
2. It is seen in children under six to seven years of age.
3. If amblyopia is not treated before eight years of age it becomes permanent.
4. Amblyopia is mostly uniocular disorder however in a very small percentage of cases ,it can be bilateral.
5. It is not possible for the parents to know that the child is amblyopic unless the child undergoes examination of the vision. This happens more often in children who have amblyopia in spite of straight eyes.

6. In contrast to this a child may be brought with squint and found to have amblyopia. This is also known as amblyopia with squint.

7. Diminished distant vision - The amblyopic eye always has poorer vision than the normal fellow eye. A difference of two lines on Snellen's chart after best correction is diagnostic.

8. Vision in amblyopic eye may be as low as perception of light in congenital squint.

9. **Crowding phenomenon.** An amblyopic eye has better vision when single optotypes are shown but when letters of same size in a line are shown, the child is unable to read them. Greater the difference between the single letter vision and linear vision, poorer is the prognosis.

10. **Vision with neutral density filter.** In non amblyopic eye if neutral density filter is put in front of the eye, the vision is reduced by one to two lines but not in amblyopic eye when neutral density filter of increasing strength is put in front of the eye the vision either remains same or even improves<sup>39</sup>

11. Colour vision and dark adaptation are normal in amblyopia.

12. Contrast sensitivity, grating acuity, Vernier acuity and spatial localisation are lowered.

### **Classification of amblyopia :**

1. **Strabismic amblyopia.** Amblyopia due to abnormal interaction between two eyes due to squint.

2. **Anisometropic amblyopia.** Amblyopia due to uncorrected unequal refraction into eye.
3. **Stimulus deprivation amblyopia** is caused due to blurring of retinal image due to opacity in the media, i.e. congenital or traumatic cataract, corneal opacity, ptosis. It was formerly called **amblyopia exanopsia**. The term is no more in vogue
4. **Ametropic amblyopia** is caused due to high uncorrected error of refraction.
5. **Meridional amblyopia** due to high astigmatism in a particular meridian.
6. **Amblyopia of arrest** due to arrest of development of vision.
7. **Amblyopia of extinction** due to secondary loss of vision.<sup>38</sup>

#### **Amblyopia with squint :**

##### **Characteristics :**

1. The child constantly uses one eye for fixation. The deviating eye becomes amblyopic, patients with alternate fixation do not develop amblyopia.
2. Esotropes develop more amblyopia than exotropes. Congenital esotropes do not develop amblyopia due to cross fixation.
3. Hypertropes generally do not develop amblyopia as they manage to maintain fusion by abnormal head posture.
4. Micro strabismus causes more amblyopia when compared to large degree squint<sup>34</sup>.
5. Strabismus causes more amblyopia than anisometropia.

6. Strabismic amblyopia is caused due to suppression of image in the squinting eye.

7. Degree of amblyopia is influenced by duration of squint rather than age of onset of squint.

8. Earlier the squint develops, deeper is the amblyopia and more difficult to treat. Thus in case of congenital squint where inhibition is present at birth, the vision in the amblyopic eye will not improve beyond perception of light.

**Diagnosis.** Diagnosis of amblyopia in squint is easy. All squinting eyes should be examined for possibility of amblyopia. Strabismic children have **15 times**<sup>35</sup> more chances of developing amblyopia than non strabismic children. Squint is responsible for one third case of amblyopia.

The diagnosis depends on :

1. Recording of vision.
2. Crowding phenomenon.
3. Unchanged or improved vision with **neutral density filter**

**Treatment :**

1. Management of amblyopia is rewarding

(i) If diagnosed early,

(ii) If treatment is initiated early,

(iii) If treatment is continued for sufficient time and maintained for sufficient time after vision has improved and come to equal level in both eyes.

*All above factors depends upon compliance of the patient and co-operation of parents*

**Management begins with—Refraction under cycloplegia** followed by prescription of best possible power in both eyes which gives the child a comfortable vision.

Any opacity in the media should be removed, so should be any physical obstruction like ptosis, tumours of lid. This is followed by occlusion of sound eye to begin with. Occlusion is a time honoured method of treatment for amblyopia in children.

**Occlusion therapy should take into consideration following parameters :**

Occlusion should be started as soon as amblyopia has been confirmed. Occlusion after six years of age do not have much impact on amblyopia though it has been observed to give fairly good result up to age of fifteen.<sup>40</sup>

The **occlusion** should be **complete** and **constant** to begin with.

**There are various types of occluders.** The best is a skin patch attached to the forehead and cheek by an adhesive tape. This occludes the eye fully. The child has no chance to peep over the patch which is always possible with spectacle occluders *i.e.* Doyne's occlude or ground glass occluders.

Duration of Occlusion:

Months of age	Patching scheme
0-1	no patching
1-2	1-2 hours/day
2-4	2-3 hours/day
4-6	50% of waking hours
6-12	80% of waking hours
12	Full day
24	2:1 [patch 2 of 3 days]
36	3:1 [patch 3 of 4 days]
48 [4 years]	4: 1 [patch 4 of 5 days]
60 [5 years]	5:1 [patch 5 of 6 days]
72 [6 years] onwards	6: 1 [patch 6 of 7 days]

As far as possible occlusion should be full time i.e. during all waking hours.

Part time occlusion means that the eye is occluded only for a few hours

Occlusion therapy may be accompanied by enhanced near vision work like tracing picture, joining dots, hand video games.

**Follow up.** The child should be followed up at the frequency of **1 week per year of age**, i.e. a child aged one should be examined every week while a child of three years is examined after three weeks of occlusion

**What to look for on follow up visits :**

1. On every visit child's vision in both eyes must be recorded separately with correction when needed on the same Snellen's chart in the same setting always.

The fixation pattern of the amblyopic eye should be noted on every visit

**Occlusion is continued till :**

1. Vision in amblyopic eye is as good as in normal eye.
2. Fixation becomes alternating.
3. There is no improvement of vision following occlusion for three months.
4. Once vision has been equalised or the child has developed alternating. Part time occlusion is continued up to age of eight years after which chances of improvement are less. Visual improvement is generally better in straight eye amblyopia than amblyopia with squint.

*Occlusion of sound eye is contra indicated in amblyopia with eccentric fixation.*

**CAM vision stimulator.** The normal eye is occluded for 7 minutes. The child uses the amblyopic eye to draw patterns on the transparent cover placed over the stimulator that has slow rotation, high contrast grating with sharp edges. The child may be exposed to the stimulator 10 to 20 times at a stretch. This method is not superior to conventional occlusion.

**Complication of occlusion.** Occlusion is a safe, simple and sound method for treatment of amblyopia provided it is done properly in selected children for sufficiently long time. The co-operation of the child and parent are some of the prerequisites.

They are :

1. Occlusion amblyopia in better eye.
2. Development of new strabismus.
3. Worsening of pre-existing strabismus



4. Intractable diplopia
5. DVD
6. Allergic reaction to occluder
7. Infection may develop in occluded eye

**Pharmacological defocusing (Penalisation).** <sup>37</sup>This may be considered as a modified type of occlusion without actually covering the eye. The amblyopic eye is given full correction . . . One drop of one percent atropine is instilled in the better eye once a day. The vision is blurred in better eye and forcing the amblyopic eye to see. The better eye is denied spectacle correction<sup>41</sup>

**Surgery.** Squint surgery is performed after amblyopia has been treated. However ptosis, haemangioma of lid, cataract are operated before starting occlusion.

**Medical treatment.** Levodopa has been tried in small groups of amblyopic children with improvement of vision in both amblyopic and non amblyopic eye without any side effect.

## **8.SQUINT**

### **Functional status ;**

Phoria – a latent deviation in which fusional control is always present.

Tropia – a manifest deviation in which fusional control is not present.

## **Variation in deviation with gaze position :**

- Concomitant ; Deviation does not vary with the direction of gaze or fixating eye.
- Incomitant : Deviation varies with the directions of gaze or fixation.
- Most incomitant strabismus are paralytic or restrictive.<sup>33</sup>

## **Fixation**

Alternating –Spontaneous alternation of fixation from one eye to the other

.Monocular –Definite preference for fixation with one eye.

## **Age of Onset**

Congenital – A deviation detected in early infancy, presumably related to a defect present at birth.Acquired – A deviation with later onset after a period of apparently normal visual development.

## **Type of Deviation**

Horizontal –Esodeviation or exodeviation

Vertical – Hyperdeviation or hypodeviation

Torsional – Incyclodeviation or excyclodeviation

Mixed – Horizontal.,vertical and or torsional

## **Etiology of Squint**

Any perversion or subversion of normal binocular reflex brought out by various obstacles operative during developmental period and after can lead to squint.<sup>42</sup>

It is divided into

### **1.SENSORY OBSTACLES**

Dioptric factors leading to uncorrected refractive errors, media opacities,,External factors like Ptosis,,Retino-neural disturbance in Birth trauma, Retinal haemorrhage

### **2.MOTOR OBSTACLES**

These may affect the orbit,extraocular muscles, nerve pathway or nerve nucleus.

a.Developmental Anomalies in the Orbit like oxycephaly, facial asymmetry,

Muscle – Abnormal insertion, fibrosis of muscle

b.Birth Trauma

c.Disease -Muscle- Myasthenia gravis, Grave's disease,Nerves – Mastoiditis,

Meningitis,Nucleus –Encephalitis,.Vascular disorders ;Aneurysm or thrombosis affecting the nerves/ nerve nucleus.

d..Neoplasms Within orbit, or Affecting the muscles by direct contact

E..Trauma- Of the orbit,muscles, nerve or nerve

### **EXAMINATION OF A CASE OF SQUINT :**

**HISTORY :**A detailed history is obtained. Following points enquired

- When was the deviation noted
- Direction of deviation , one or both eyes involved
- Sudden or gradual onset
- Consatant or Intermittent

- Any change in amount of squint
- Any injury or illness before onset
- Any reduction in vision or double vision
- Any family history of similar problems
- Previous history of use of spectacles, exercises, or surgery

## **EXAMINATION**

A general examination done to rule out any systemic illness.

On ocular examination Look for any abnormal Head posture, Presence or absence of a manifest squint.

### ***HIRSCHBERG'S TEST***

Light thrown into the eyes at an arms distance with a focused light beam.

Patient is asked to fix at the light. 1 mm of deviation of corneal reflex = 7° deviation. If reflex is at the pupillary margin → deviation is 15°. Reflex ½ way between pupillary margin & limbus → deviation is 30°. If reflex seen at limbus → deviation is 45°

### **COVER TEST**

Cover test is used for detecting heterotropias. It is done for distance by asking the patient to fixate a target straight ahead and for near, by fixating an accommodative target. If deviation suspected in right eye, left eye is covered by the examiner and right is observed for any fixative movement.

## **UNCOVER TEST**

It is used to detect heterophorias<sup>42</sup>. It is done for distance by asking the patient to fixate a target straight ahead and for near, by fixating an accommodative target. The examiner should cover right eye for 2 to 3 seconds. Then the cover is removed and eye under cover is observed. If there is no movement, it is orthophoria.

## **ALTERNATE COVER TEST**

It disrupts the fusion and hence should be done after cover-uncover test. The right eye is covered for few seconds and then cover shifted to other eye, repeatedly back and forth for several times. In the presence of an alternate squint, the eye under cover deviates and uncovered eye takes up fixation alternatively.

## **PRISM COVER TEST**

It is used to measure the angle of deviation. Prisms of increasing strength are placed in front of one eye in a such a way that the base of prism is opposite to the direction of deviation of eye. Alternate cover test is performed. The prism strength is increased until no movement is seen. This is the end point. A further increase in strength of prism will cause a movement in opposite direction<sup>42,43</sup>.

## ***KRIMSKY TEST***

Prism in front of fixing eye which fixates a target. Increase strength of prism till corneal reflex is centered in eye.

## **NON-SURGICAL MANAGEMENT OF SQUINT**

*1. Glasses* - for accommodative esotropia

Accommodative esotropia with hypermetropia:

- Regular plus glasses to relax accommodation & increase convergence
- Bifocals → if more hyperopia for near

2. *Prisms*—used Only when BSV present, in acquired parietic squint, vertical palsies. Fused with spectacle lenses

3. *Orthoptic exercises* –

- Increasing fusional amplitude by stimulating physiological diplopia
- Increases accommodation amplitude & improves convergence & fusion<sup>43,44</sup>

4. *Pharmacological* -

- Atropine - for penalization of normal eye in accommodative esotropia
- Miotics - phospholine iodine, pilocarpine
- Botulinum toxin A - chemical denervation.

## **SURGERY**

### **1. WEAKENING PROCEDURES ON RECTI MUSCLES includes**

Conventional, Hang back, Adjustable, Vertical transposition of horizontal recti, Slanting recession, Retro equatorial myopexy, Marginal myotomy, Myectomy, Free tenotomy or disinsertion

### **2. STRENGTHENING PROCEDURES ON RECTI includes**

Resection, Advancement, tucking, Cinching

## 9. CONGENITAL CATARACT

### CAUSES

- Unknown - 45%
- Hereditary, genetic
- Intra-uterine infection - rubella, CMV infection, chickenpox, toxoplasmosis
- Metabolic - galactosemia, diabetes mellitus, hypoparathyroidism
- Secondary to coloboma, PHPV
- Associated with microphthalmos, aniridia
- Mesodermal/ectodermal dysgenesis → persistent papillary membrane, posterior lenticonus

### TYPES

- Zonular - nuclear/lamellar/sutural/capsular
- Polar - anterior/posterior
- Blue dot cataract
- Coronary cataract
- Membranous cataract
- Total/mature cataract

## **INVESTIGATIONS**

TORCH titers, Chromosomal analysis [Down's & Patau's syndrome], Urine analysis [galactosemia], Serum calcium & phosphorus, Fasting & post-prandial blood sugar

## ***SURGERY***

### ***Indications;***

Visually significant cataract, Unilateral partial/complete cataract [operate within 6 weeks of birth if visually significant], Cataract with strabismus, Cataract with nystagmus, Bilateral cataract with one eye operated → the other should be operated within 1-2 weeks to prevent amblyopia, Bilateral mature cataracts [operate both eyes within 10 weeks of birth, with a gap of 1-2 weeks]<sup>42</sup>

### **Technique:**

- Lensectomy & anterior vitrectomy - via limbal/ pars plana approach
- Phacoaspiration with primary posterior capsulotomy with/without anterior vitrectomy, & capsular bag implantation/optic capture of IOL.



## 10 .PTOSIS

– Abnormal drooping of upper eye lid .

### CLASSIFICATION:

NEUROGENIC	MYOGENIC	MECHANICAL	APONEUROTIC
1. IIn palsy	1. Myaesthesia	1. Tumors	1. Involutional
2. Homer's syndrome	gravis	2. Lid edema	2. Following lid surgery,
3. IIn misdirection	2. Myotonic dystrophy	3. Dermatochalasis	trauma,
4. Marcus Gunn jaw winking	3. Ocular myopathy	4. Scars	blepharochalasis
	4. Simple congenital ptosis	5. Anterior orbital lesions	
	5. Blepharophimosis syndrome		

### Treatment

- Nonsurgical options: Observation. Taping upper lids open and eyelid crutches attached to glasses in neurogenic and myogenic ptosis.  
Management of chalazion with warm compresses and/or topical or intralesional steroid/antibiotic.

- Surgical options: Excision of eyelid and/or orbital lesions (e.g., chalazion, neoplasm), transcutaneous levator advancement, transconjunctival levator advancement, frontalis muscle suspension, Fasanella–Servat procedure, Müller muscle resection. Surgical approach depends on preoperative evaluation and the underlying etiology of ptosis.

## **11.AIM OF THE STUDY**

To assess the prevalence and associated factors related to ocular morbidity among Primary rural school going children (age 6-12 yrs).

### **Primary objective :**

To assess the Prevalence of ocular morbidity among the primary rural school children in Rural kallur block in Tirunelveli district.

### **Secondary objective :**

To identify the Associated factors related to ocular Morbidity among the school going children.

## **12.MATERIALS AND METHODS :**

**Study design:** Cross sectional study, Sample size : 500

**Study period:** The study was carried out from December 2018 to December 2019 in almost 6 primary school in kallur Block in Tirunelveli district .The study population comprised of students from first to fifth standard { 6-12yrs }

### **Inclusion criteria:**

- Children age group-6-12yrs, Both males and females.
- Visual acuity  $<6/9$  and improving with Pinhole was considered to be Refractive error. Strabismus was diagnosed by recording corneal light reflex combined with extraocular movements and cover-Uncover tests.
- A Probable diagnosis of amblyopia was made, if vision was  $<6/9$ , not improving with pinhole and no organic lesions was detected after complete ocular examination.

### **Exclusion criteria :**

Children below 6yrs and above 12yrs, Children's absent on the day of examination.children with previous ocular surgery or any ocular disease .

### **Methodology :**

This study was conducted as a school based cross sectional study to estimate the prevalence of refractive error and its associated factors among school children in Rural Kallur Block in Tirunelveli district, Tamilnadu

Institutional ethical clearance and appropriate permissions from the school authorities was obtained through the Medical officer of Kallur PHC and consent

from the parents were obtained. A complete history was taken from the students and parents. Complete eye examination of both eyes was carried out in all students and free of cost referral and treatment was provided at Tirunelveli medical college and Hospital.

**Eye examination of each student included:**

- Torch light examination of the eye & adnexa, Visual acuity for distance vision tested separately for each eye with a Snellen chart at distance of 6 m. In children already prescribed spectacles, visual acuity was tested with glasses. Visual acuity for near vision tested separately for each eye with a Jaeger's near vision chart at distance of 25 cm.
- Visual acuity was tested by a single experienced optometrist to avoid inter-observer variation, Ocular deviation (phoria and tropia)- determined using the cover test.
- Fundus examination using direct ophthalmoscopy, Students having visual acuity 6/9 or less were further evaluated at tertiary health care centre (Tirunelveli Medical college and Hospital). These students underwent cycloplegic refraction with 1% cyclopentolate eye drops. Streak Retinoscopy was performed and post mydriatic test were carried out in all students. Children were given final prescription based on post mydriatic test and subjective acceptance.
- Amblyopic children were given full refractive correction. Patching was advised and follow up every 3 months.

### 13.REVIEW OF LITERATURE

- In a cross sectional study done by Shrestha <sup>46</sup>et al to compare ocular morbidity between children attending government and private driven schools of Kathmandu valley, the prevalence of ocular morbidity was 19.56% with refractive error constituting 11.9% among study population.
- In a study of ocular morbidity prevalence among school children in Shimla,Gupta<sup>47</sup> et al had found Prevalence of ocular morbidity as 31.6%, refractive errors 22% , squint 2.5% , color blindness 2.3%, vitamin A deficiency 1.8 % , conjunctivitis 0.8%.
- Singh, et al.<sup>48</sup>: Prevalence of ocular morbidity in school going children in West Uttar Pradesh: Urban versus Rural scenario. A total of 4838 students (2271 males and 2567 females) were screened. The prevalence of ocular morbidity was 29.35% (28.65% urban, 30.05% rural). Refractive error (17.36%) was the major cause of ocular morbidity followed by convergence insufficiency (2.79%), blepharitis (2.11%), Vitamin A deficiency (2.09%), allergic conjunctivitis (1.92%), bacterial conjunctivitis (0.95%), amblyopia (0.41%), stye (0.31%) and squint (0.27%). There was an increase in ocular morbidity with age, especially in refractive error and convergence insufficiency

- In a school survey to assess the pattern of ocular morbidity among school children of central India was done by Singh et al<sup>49</sup> in various schools during the period of Nov 2004 to Dec 2007. Complete ocular examination was done for school children in the age group of 5 to 16 years. Visual acuity of <math><6/9</math> and improving with pinhole was considered to be refractive error. In this study, prevalence of ocular morbidity was 14.5%. The most common ocular morbidity was refractive error (47.91%) and 8 to 12 years was the most common age group affected with ocular morbidity.
- Sharma<sup>50</sup> A, Maitreya A, Semwal J, Bahadur H. Ocular morbidity among school children in Uttarakhand: Himalayan state of India A cross sectional multistage randomized study was done on school children between 5 -16 years of age in Dehradun-capital of Uttarakhand, India. Out of 5918 children, the prevalence of ocular morbidity was 4.92% (291 children). The most common causes of ocular morbidity were refractive error in 164 (2.77%) children, convergence weakness in 32 (0.54%), strabismus in 24 (0.40%) and conjunctivitis in 23 (0.38%) children. Ocular morbidity was more in children of age group 5 – 10 years in comparison to age group 11-16 years
- Sarkar, et al<sup>51</sup>.: A school-based cross-sectional study on Ocular morbidity screening among 540 school children in Meghalaya Shillong, from class VI to X. The most common ocular morbidity was refractive error (57.4%) followed by vitamin A deficiency (38.1%), color blindness (3.1%), nevus (3%), manifest squint (2.2%), ptosis (2.2%), conjunctivitis (0.9%), stye

(0.4%) The prevalence of ocular morbidities was found to have highly significant association with the educational status of both the father ( $P = 0.0001$ ) and mother ( $P = 0.001$ ). In addition, the occupational status of the father ( $P = 0.0472$ ) and the mother ( $P = 0.0251$ ) were significantly associated with the prevalence too.

- Nepal, Koirala, Adhikary, et al<sup>52</sup> -Ocular morbidity in schoolchildren in Kathmandu A total of 1100 children from three schools are included in this report. 11% of our schoolchildren have ocular morbidity, 97% (117 out of 121) of which is preventable or treatable. Refractive error is the commonest type of ocular morbidity (8.1%). Myopia is the commonest type of refractive error (4.3%) as opposed to hypermetropia (1.3%). 12.4% of children with refractive error have already developed amblyopia. Strabismus is the second commonest type of ocular disability (1.6%). Alternate divergent squint is the commonest type of strabismus (1.4%). Traumatic eye injuries (0.54%), xerophthalmia (0.36%), and congenital abnormalities (0.36%) are much less common.
- ***B.T.PrasannaKamath et al,***<sup>53</sup> on Prevalence of ocular morbidity among school going children (6-15years) did a cross-sectional study of school children of two schools in rural area of Karnataka state. A total of 1300 children were examined. The prevalence of ocularmorbidity was 44.77%. Vitamin A deficiency was the commonest morbidity (33.8%) and uncorrected refractive error was the second commonest morbid condition (5.6%).



## 14.RESULTS AND ANALYSIS

### RESULTS

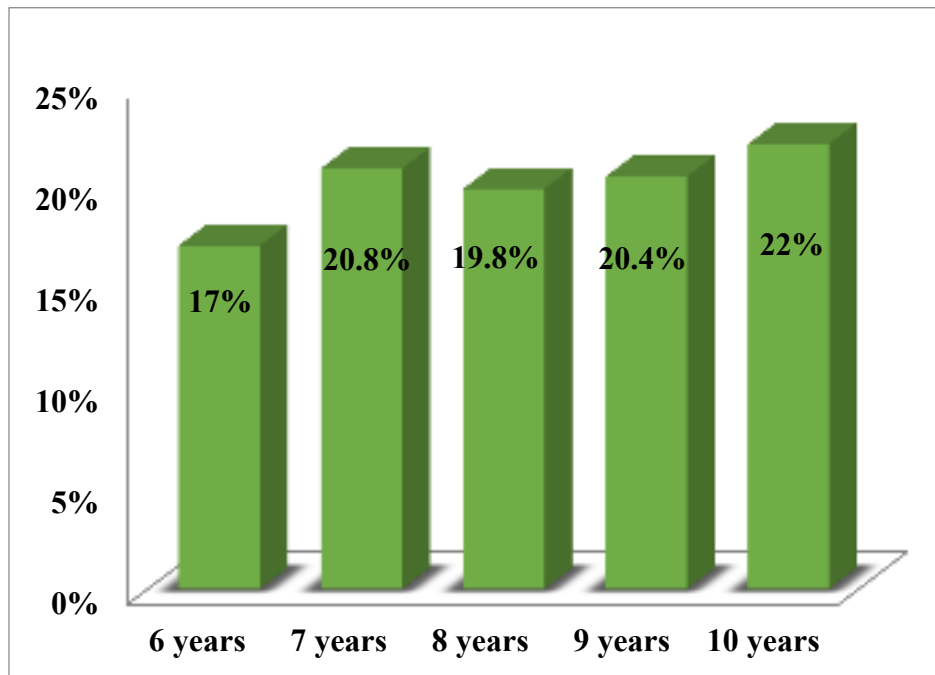
#### I.SOCIODEMOGRAPHIC PROFILE OF STUDY PARTICIPANTS

**Table 1: Age group distribution among study participants:**

Age group	Frequency	Percentage
6 years	85	17%
7 years	104	20.8%
8 years	99	19.8%
9 years	102	20.4%
10-12 years	110	22%
Total	500	100%

The age group distribution was equal in all the groups. The participants were highest in 10-12 years age group which was 22%. The remaining distribution was 20.8% in 7 years of age, 20.4% in 9 years of age, 19.8% in 8 years of age and 17% in 6 years of age.

**Chart 1: Age group distribution among study participants:**

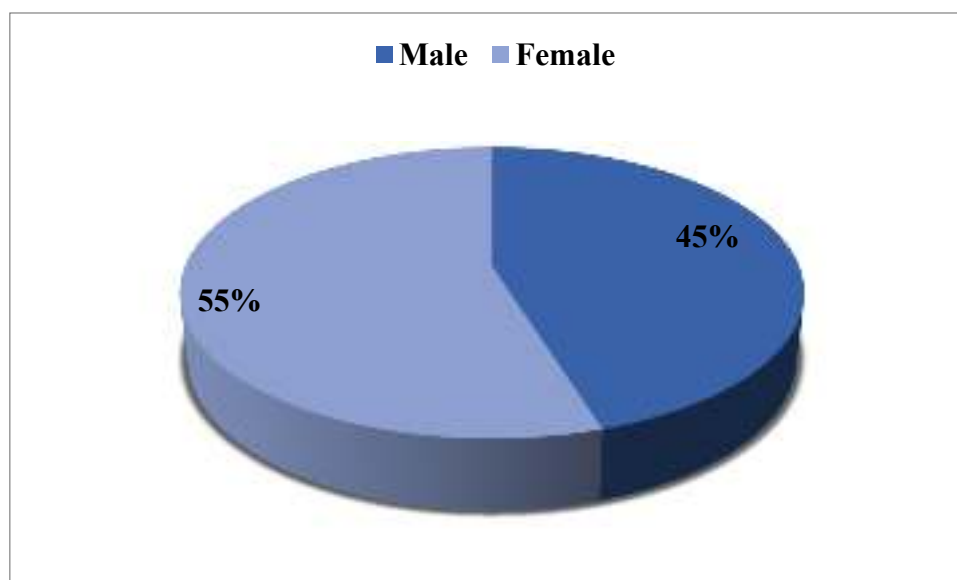


**Table 2: Sex distribution among study participants:**

<b>Sex</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Male</b>	226	45.2%
<b>Female</b>	274	54.8%
<b>Total</b>	500	100%

The sex distribution was almost equal in both male and female groups. The participants were highest in female which was 54.8% and 45.2% in males.

**Chart 2: Sex distribution among study participants:**

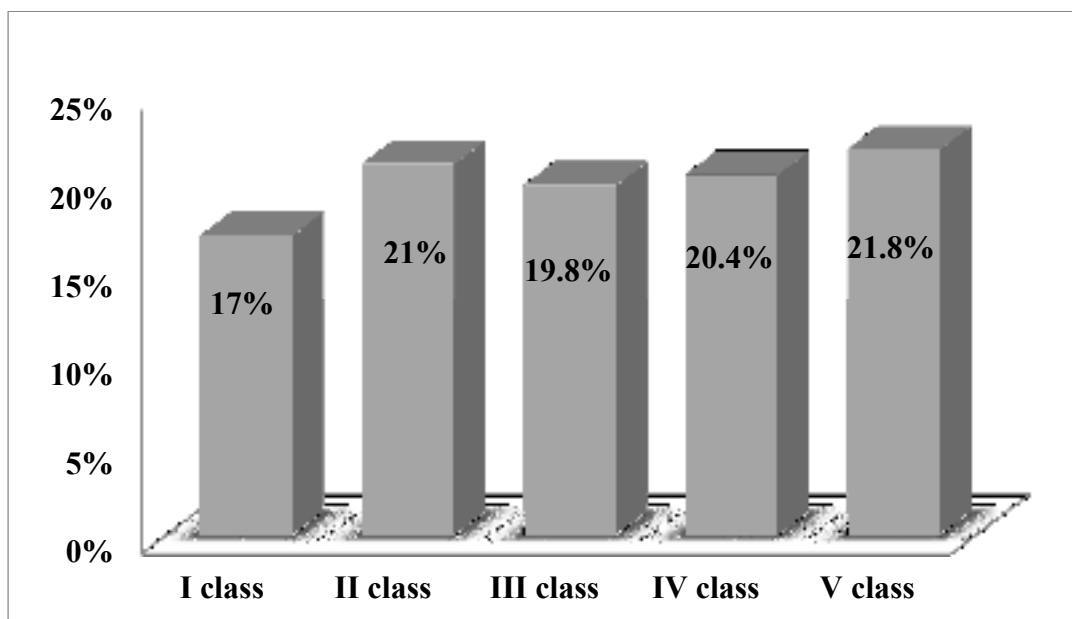


**Table 3: Class distribution among study participants:**

Type of Class	Frequency	Percentage
<b>I class</b>	85	17%
<b>II class</b>	105	21%
<b>III class</b>	99	19.8%
<b>IV class</b>	102	20.4%
<b>V class</b>	109	21.8%
<b>Total</b>	500	100%

The class distribution was almost equal in all the groups. The participants were highest in V class which was 21.8%. The remaining distribution was 21% in II, 20.4% in IV, 19.8% in III and 17% in I.

**Chart 3: Class distribution among study participants:**

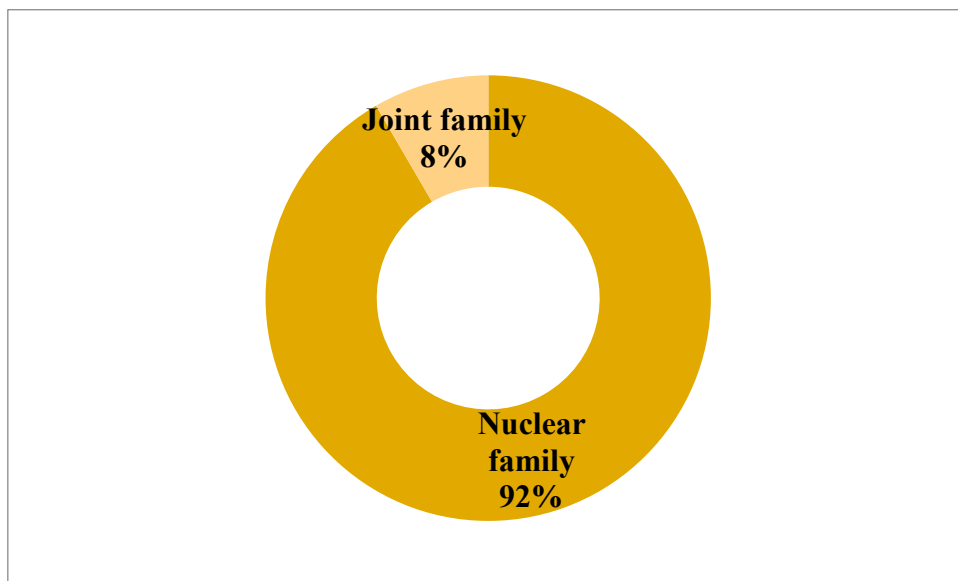


**Table 4: Type of family distribution among study participants:**

Type of family	Frequency	Percentage
<b>Nuclear family</b>	458	91.6%
<b>Joint family</b>	42	8.4%
<b>Total</b>	500	100%

The type of family most common was nuclear family which came to 91.6% and joint family was found in only 8.4% of study participants.

**Chart 4: Type of family distribution among study participants:**

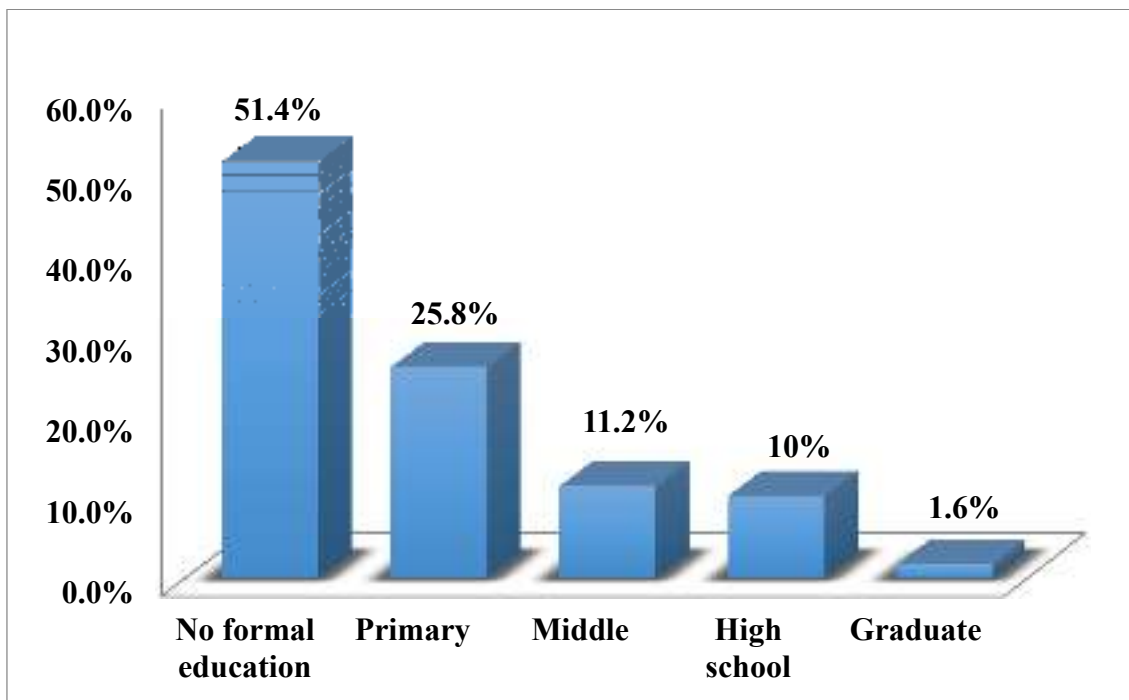


**Table 5: Education status of parents:**

<b>Education status</b>	<b>Frequency</b>	<b>Percentage</b>
<b>No formal education</b>	257	51.4%
<b>Primary</b>	129	25.8%
<b>Middle</b>	56	11.2%
<b>High school</b>	50	10%
<b>Graduate</b>	8	1.6%
<b>Total</b>	500	100%

Almost half the study participants parents were uneducated (51.4%), 25.8% were having primary school education, 11.2% had middle school education, 10% had high school education and only 1.6% were graduates.

**Chart 5: Education status of parents:**

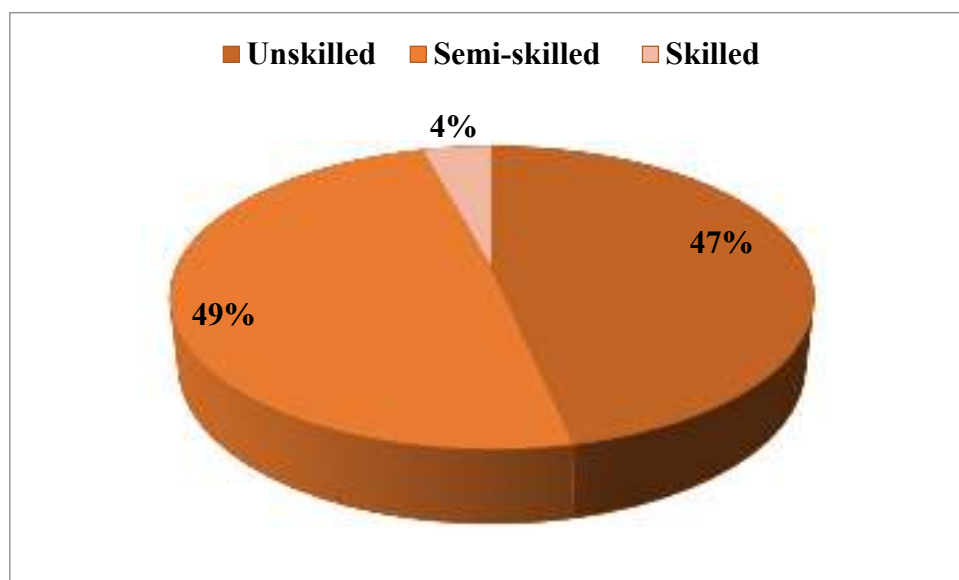


**Table 6: Occupation of father distribution among study participants:**

<b>Occupation of father</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Unskilled</b>	233	46.6%
<b>Semi-skilled</b>	246	49.2%
<b>Skilled</b>	21	4.2%
<b>Total</b>	500	100%

Almost equal proportion of study participants father were in unskilled or semi-skilled occupation. Unskilled occupation was done by 46.6% of fathers and semi-skilled was done by 49.2% of fathers. Only 4.2% of the fathers were in skilled occupation.

**Chart 6: Occupation of father distribution among study participants:**

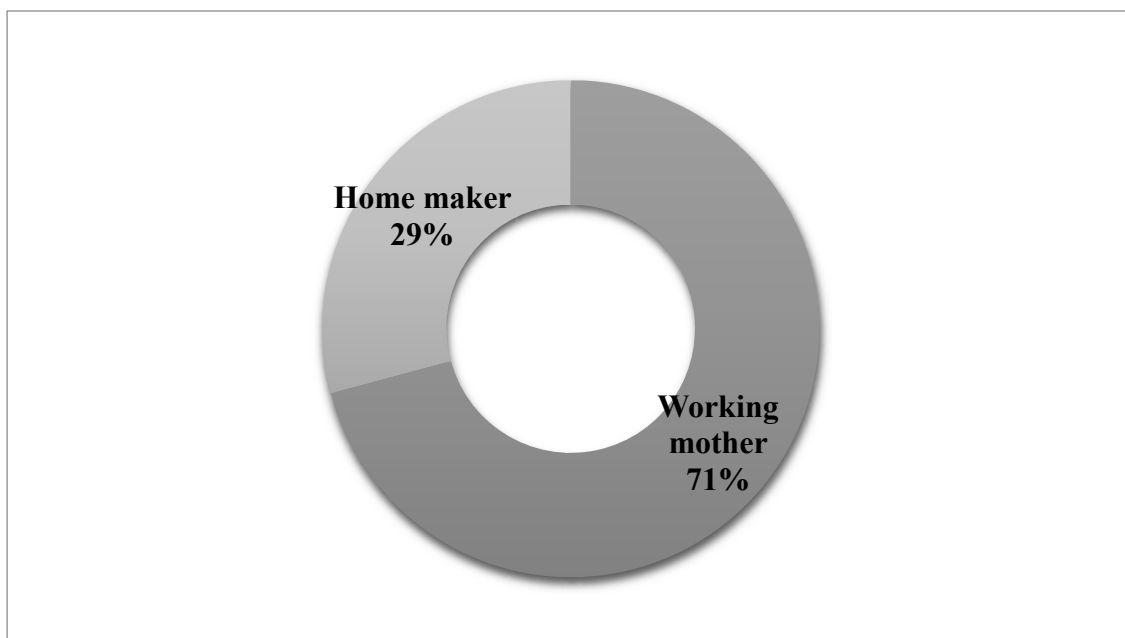


**Table 7: Occupation of mother distribution among study participants:**

<b>Occupation of mother</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Working mother</b>	354	70.8%
<b>Home maker</b>	146	29.2%
<b>Total</b>	500	100%

Majority of the study participants mothers were working mother which was 70.8% and only 29.2% were home makers.

**Chart 7: Occupation of mother distribution among study participants:**





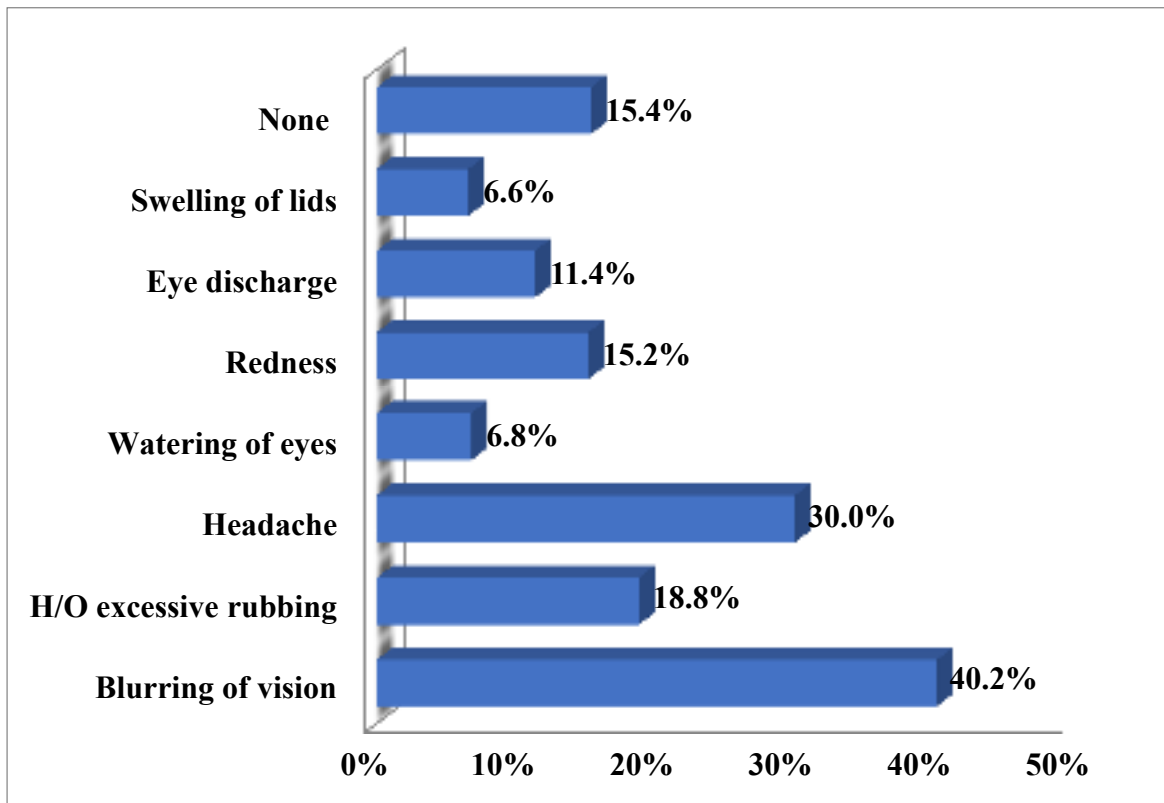
## II. CLINICAL PROFILE AND DIAGNOSIS OF STUDY PARTICIPANTS

**Table 8: Distribution of presenting illness among study participants:**

<b>Presenting illness</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Blurring of vision</b>	201	40.2%
<b>H/O excessive rubbing</b>	94	18.8%
<b>Headache</b>	149	30%
<b>Watering of eyes</b>	34	6.8%
<b>Redness</b>	76	15.2%
<b>Eye discharge</b>	57	11.4%
<b>Swelling of lids</b>	33	6.6%
<b>None</b>	77	15.4%

Blurring of vision was most common complaint reported by 40.2% of the study participants. Headache was reported by 30% of the participants. H/O excessive rubbing was found in 18.8% of the study participants, redness was reported by 15.2% of the participants. Other complaints like eye discharge, swelling of lids, watering of eyes was found in 11.4%, 6.6% and 6.8% of the participants. 15.4% did not report any specific complaints.

**Chart 8: Distribution of presenting illness among study participants:**

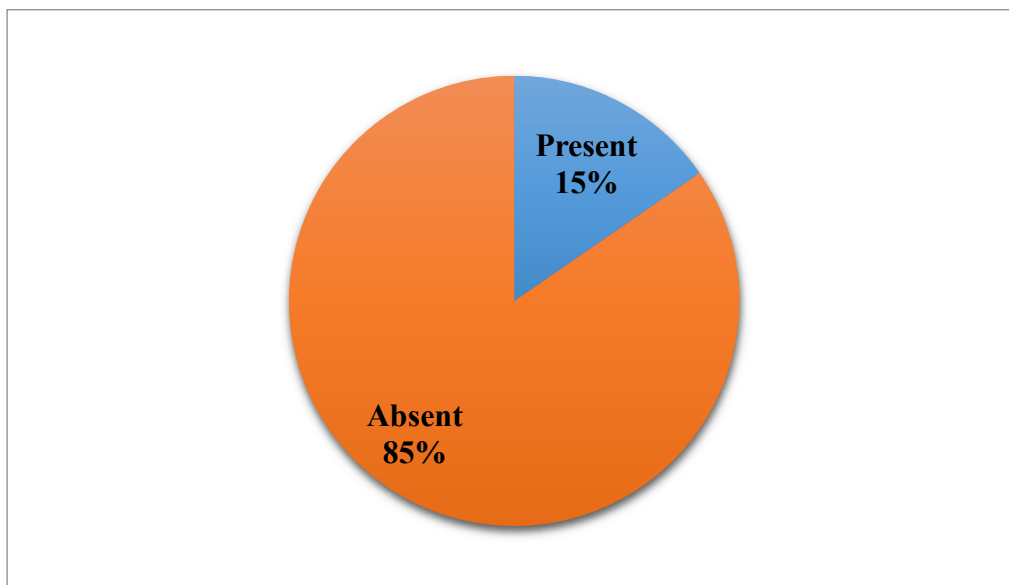


**Table 9: Prevalence of ocular morbidity among study participants:**

<b>Ocular morbidity</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Present</b>	77	15.4%
<b>Absent</b>	423	84.6%
<b>Total</b>	500	100%

The prevalence of total ocular morbidity among our study participants was 15.4%.

**Chart 9: Prevalence of ocular morbidity among study participants:**

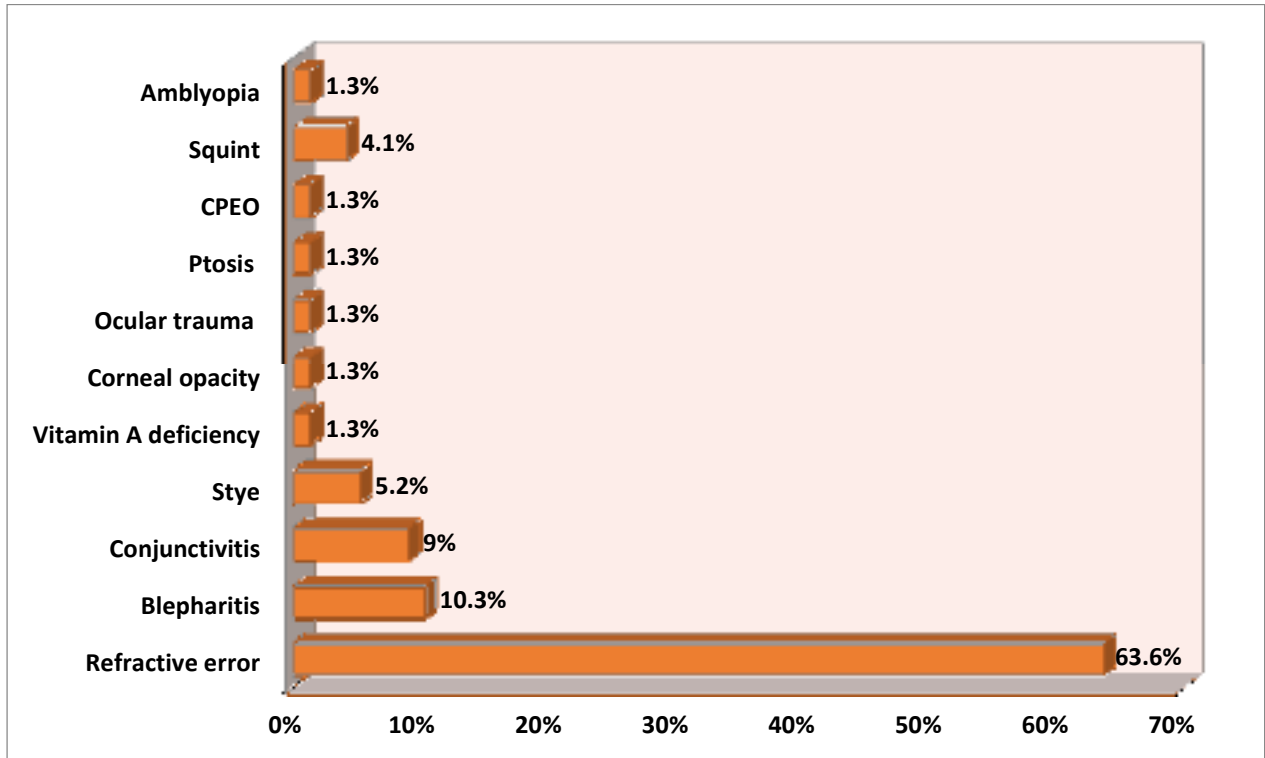


**Table 10: Distribution of types of ocular morbidity present among study participants:**

<b>Ocular morbidity</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Refractive error</b>	49	63.6%
<b>Blepharitis</b>	8	10.3%
<b>Conjunctivitis</b>	7	9%
<b>Stye</b>	4	5.2%
<b>Vitamin A deficiency</b>	1	1.3%
<b>Corneal opacity</b>	1	1.3%
<b>Ocular trauma</b>	1	1.3%
<b>Ptosis</b>	1	1.3%
<b>CPEO</b>	1	1.3%
<b>Squint</b>	3	4.1%
<b>Amblyopia</b>	1	1.3%
<b>Total</b>	77	100%

Among all reported ocular morbidities refractive error was the leading cause of ocular morbidity which formed 66% of the total morbidities. This was followed by Blepharitis which accounted for 10.3%, conjunctivitis for 9.3%, Stye for 5.2%, squint 4.1% of total ocular morbidities. Other lesser common conditions like vitamin A deficiency, corneal opacity, ocular trauma, ptosis, CPEO, amblyopis accounted for 1.3% each in total ocular morbidity.

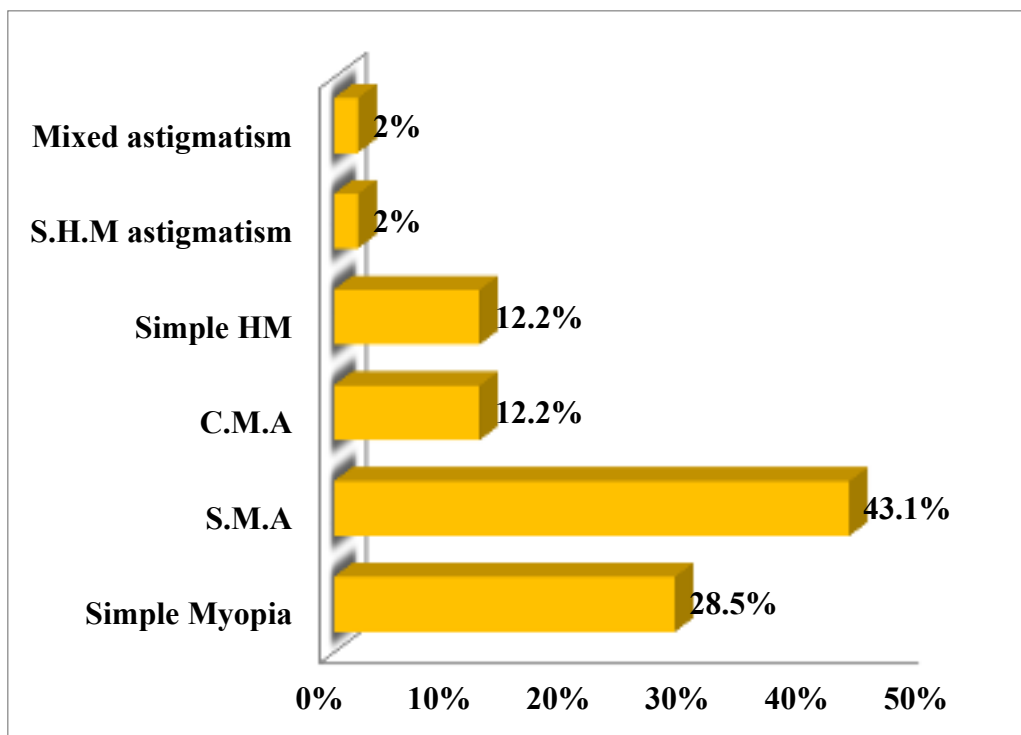
**Chart 10: Distribution of types of ocular morbidity present among study participants:**



**Table 11: Distribution of types of Refractive error present among study participants:**

<b>Types of Refractive error</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Simple Myopia</b>	14	28.5%
<b>S.M.A</b>	21	43.1%
<b>C.M.A</b>	6	12.2%
<b>Simple HM</b>	6	12.2%
<b>S.H.M astigmatism</b>	1	2%
<b>Mixed astigmatism</b>	1	2%
<b>Total</b>	49	100%

**Chart 11: Distribution of types of Refractive error present among study participants:**



**Table 12: Distribution and association of age with Ocular morbidity:**

Age group	Ocular morbidity		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
6 years	1 (1.3%)	84 (20%)	85 (17%)	33.37	<0.001
7 years	9 (11.7%)	95 (22.5%)	104 (21%)		
8 years	18 (22.4%)	81(19.1%)	99 (20%)		
9 years	17 (22%)	85 (20%)	102 (20%)		
10-12 years	32 (41.6%)	78 (18.4%)	110 (22%)		
<b>Total</b>	77 (100%)	423 (100%)	500 (100%)		

Age group was checked for association with ocular morbidity. The proportion of ocular morbidity was more in 10-12 years age group which was 41.6%. The next common age group with more ocular morbidity was 8 years which was 22.4%. Among the group with no refraction the age group 10 had 18.4% and 8 had 19.1%. This difference in distribution of age was statistically significant. Age was significantly associated with ocular morbidity with P value <0.001.

**Table 13: Distribution and association of gender with Ocular morbidity:**

<b>Gender</b>	<b>Ocular morbidity</b>		<b>Total</b>	<b>Chi square value</b>	<b>P value</b>
	<b>Present</b>	<b>Absent</b>	<b>N = 500</b>		
	<b>N = 49</b>	<b>N = 451</b>			
<b>Male</b>	33 (43%)	193 (45.6%)	226 (45%)	0.202	0.653
<b>Female</b>	44 (57%)	230 (54.4%)	274 (55%)		
<b>Total</b>	77 (100%)	423 (100%)	500 (100%)		

The proportion of males in ocular morbidity and non-ocular morbidity group were 43% and 45.6%. The proportion of females in ocular morbidity and non-ocular morbidity group were 57% and 54.4% respectively. This difference was not statistically significant. Gender was not significantly associated with ocular morbidity with P value 0.653.



### III. FACTORS ASSOCIATED WITH REFRACTIVE ERROR

**Table 14: Distribution and association of age with refractive error:**

Age group	Refractive error		Total	Chi square value	P value
	Present N = 49	Absent N = 451	N = 500		
6 years	1 (2%)	84 (18.6%)	85 (17%)	25	<b>&lt;0.001</b>
7 years	6 (12.3%)	98 (21.7%)	104 (21%)		
8 years	11 (22.4%)	88(19.6%)	99 (20%)		
9 years	8 (16.3%)	94 (20.8%)	102 (20%)		
10-12 years	23 (47%)	87 (19.3%)	110 (22%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

Age group was checked for association with refractive error. The proportion of refractive error was more in 10-12 years age group which was 47%. The next common age group with more refractive error was 8 years which was 22.4%. Among the group with no refraction the age group 10 had 19.3% and 8 had 19.6%. This difference in distribution of age was statistically significant. Age was significantly associated with refractive error with P value <0.001.

**Table 15: Distribution and association of gender with refractive error:**

<b>Gender</b>	<b>Refractive error</b>		<b>Total</b> N = 500	<b>Chi square</b> <b>value</b>	<b>P value</b>
	<b>Present</b> N = 49	<b>Absent</b> N = 451			
<b>Male</b>	18 (36.7%)	208 (46%)	226 (45%)	1.5	0.210
<b>Female</b>	31 (63.7%)	243 (54%)	274 (55%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

The proportion of males in refractive error and non-refractive error group were 36.7% and 46%. The proportion of females in refractive error and non-refractive error group were 63.7% and 54% respectively. This difference was not statistically significant. Gender was not significantly associated with refractive error.

**Table16: Distribution and association of type of class with refractive error:**

Type of class	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>I CLASS</b>	1 (2%)	84 (18.6%)	85 (17%)	25.5	<b>&lt;0.001</b>
<b>II CLASS</b>	6 (12.3%)	99 (22%)	105 (21%)		
<b>III CLASS</b>	11 (22.4%)	88(19.5%)	99 (20%)		
<b>IV CLASS</b>	8 (16.3%)	94 (20.8%)	102 (20%)		
<b>V CLASS</b>	23 (47%)	86 (19.1%)	109 (22%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

The proportion of Class V in refractive error group was more (47%) than non-refractive error group (19.1%). The proportion of class III in refractive error group was 22.4% and non-refractive error group was 19.5. The proportion of class IV in refractive error group was 16.3% and non-refractive error group was 20.8. Class III and V had more refractive error. This difference was statistically significant. Class was significantly associated with refractive error with P value<0.001.

**Table 17: Distribution and association of Type of family with refractive error:**

Type of family	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>Nuclear</b>	43 (86.8%)	415 (92%)	458 (91.6%)	1.044	0.307
<b>Joint</b>	6 (12.2%)	36 (8%)	42 (8.4%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

The proportion of nuclear family in refractive error and non-refractive error group were 86.8% and 92%. The proportion of joint family in refractive error and non-refractive error group were 12.2% and 8% respectively. This difference was not statistically significant. Type of family was not significantly associated with refractive error with p value = 0.307.

**Table 18: Distribution and association of Education status of parents with refractive error:**

Education status of parents	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>No formal education</b>	27 (55%)	230 (51%)	257 (51.4%)	1.28	0.979
<b>Primary</b>	12 (24.5%)	117 (26%)	129 (26%)		
<b>Middle</b>	6(12.2%)	50 (11.1%)	56 (11.2%)		
<b>High school</b>	4 (8.2%)	46 (10.2%)	50 (10%)		
<b>Graduate</b>	0 (0.0%)	8 (1.8%)	8 (1.6%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

Among the people with refractive error majority of their parents had no formal education (55%), 24.5% had primary education, 12.2% had middle school education, 8.2% had high school education and none had graduate education. Among the people without refractive error 51% had no formal education, 26% had primary education, 11.1% had middle school education, 10.2% had high school education and 1.8% had graduate education. This difference was not statistically significant. Parents education was not significantly associated with refractive error with p value = 0.979.

**Table 19: Distribution and association of Occupation of father with refractive error:**

Occupation of father	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>Unskilled</b>	12 (24.5%)	221 (49%)	233 (46.6%)	11.15	0.003
<b>Semi-skilled</b>	35 (71.4%)	211 (46.8%)	246 (49.2%)		
<b>Skilled</b>	2 (4.1%)	19 (4.2%)	21 (4.2%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

Among the people with refractive error majority of their fathers were in semiskilled occupation (71.4%), 24.5% had unskilled occupation, 4.1% had skilled occupation. Among the people without refractive error 49% had unskilled occupation, 46.8% had semi-skilled, 4.2% had skilled occupation. This difference was statistically significant. Fathers occupation was significantly associated with refractive error with p value = 0.003.

**Table 20: Distribution and association of Occupation of mother with refractive error:**

Occupation of mother	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>Working</b>	29 (59.2%)	325 (72%)	354 (71%)	3.546	0.060
<b>Home maker</b>	20 (40.8%)	126 (28%)	146 (29%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

Among the people with refractive error majority of their mothers were working (59.2%), 40.8% were home makers. Among the people without refractive error 72%of their mothers were working 28% were home makers..This difference wasnot statistically significant. Mothers occupation was significantly associated with refractive error with p value = 0.060..

**Table 21: Distribution and association of parental history of refractive error with refractive error:**

Parental history of refractive error	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>Father</b>	18 (36.7%)	22 (5%)	40(8%)	110.7	<b>&lt;0.001</b>
<b>Mother</b>	12 (24.5%)	20 (4.4%)	32 (6.4%)		
<b>Both</b>	4 (8.2%)	7 (1.6%)	11 (2.2%)		
<b>None</b>	15 (30.6%)	402 (89%)	417 (83.4%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

In the study participants with refractive error 36.7% of their father, 24.5% of their mother and 8.2% of both their parents had history of refractive error. Among participants without refractive error only 5% of their father, 4.4% of mothers, 1.6% of both the parents had history of parents with refractive error. The history of refractive error in parents was more common among people with refractive error, This difference was statistically significant with P value <0.001.



**Table 22: Distribution and association of Sibling refractive error with refractive error:**

<b>Sibling refractive error</b>	<b>Refractive error</b>		<b>Total N = 500</b>	<b>Chi square value</b>	<b>P value</b>
	<b>Present N = 49</b>	<b>Absent N = 451</b>			
<b>Present</b>	4 (8.2%)	3 (0.7%)	7 (1.4%)	18.00	<b>&lt;0.001</b>
<b>Absent</b>	45 (91.8%)	448 (99.3%)	493 (98.6%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

H/o refractive error in sibling was present in 8.2% of the participants with refractive error and 0.7% of participants without refractive error. This difference was statistically significant with  $P < 0.001$ . H/o refractive error in sibling was associated with presence of refractive error.

**Table 23: Distribution and association of Time spent on home work with refractive error:**

Time spent on home work	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>30 minutes</b>	14 (28.6%)	168 (37.3%)	182(36.4%)	2.137	0.711
<b>1 hour</b>	5 (10.2%)	45 (10%)	50 (10%)		
<b>2 hours</b>	2 (4.1%)	26 (5.8%)	28 (5.6%)		
<b>&gt;2 hours</b>	2 (4.1%)	13 (2.9%)	15 (3%)		
<b>None</b>	26 (53%)	199 (44%)	225 (45%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

There was no significant association between time spent on home work and refractive error. The time spent in home work was similar in both the participants with and without refractive error. The difference in time spent on home work was not statistically significant with  $P = 0.711$

**Table 24: Distribution and association of Time spent Time spent playing video/mobile games with refractive error:**

Time spent playing video/mobile games	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>30 minutes</b>	6 (12.2%)	51 (11.3%)	57 (11.4%)	91.157	<b>&lt;0.001</b>
<b>1 hour</b>	17 (34.7%)	110 (24.4%)	127 (25.4%)		
<b>2 hours</b>	14 (28.6%)	29 (6.4%)	43 (8.6%)		
<b>&gt;2 hours</b>	8 (16.3%)	4 (0.9%)	12 (2.4%)		
<b>None</b>	4 (8.2%)	257 (57%)	261 (52.2%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

There was significant association between time spent on video/mobile games and refractive error. The >2hours time spent in video/mobile games was 16.3% in people with refractive error while it was 0.9% in people without refractive error. The 2hour time spent on video games was 28.6% in people with refractive error around 6.4% in people. The difference in time spent on video/mobile games was statistically significant with  $P < 0.001$ .

**Table 25: Distribution and association of Time spent watching TV with refractive error:**

Time spent watching TV	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>30 minutes</b>	4 (8.2%)	68 (15.1%)	72 (14.4%)	43.32	<b>&lt;0.001</b>
<b>1 hour</b>	9 (18.4%)	196 (43.5%)	205 (41%)		
<b>2 hours</b>	26 (53.1%)	83 (18.4%)	109 (21.8%)		
<b>&gt;2 hours</b>	10 (20.4%)	48 (10.6%)	58 (11.6%)		
<b>None</b>	0 (0.0%)	56 (12.4%)	56 (11.2%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

There was significant association between time spent on watching TV and refractive error. The >2hours time spent in watching TV was 20.4% in people with refractive error while it was 10.6% in people without refractive error. The 2hour time spent on watching TV was 53.1% in people with refractive error and 18.4% in people without refractive error. The difference in time spent on watching TV was statistically significant with  $P < 0.001$ .

**Table 26: Distribution and association of Time spent in outdoor activities with refractive error:**

Time spent in outdoor activities	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
30 minutes	14 (28.6%)	168 (37.3%)	182 (36.4%)	2.137	0.711
1 hour	5 (10.2%)	45 (10%)	50 (10%)		
2 hours	2 (4.1%)	26 (5.8%)	28 (5.6%)		
>2 hours	2 (4.1%)	13 (2.9%)	15 (3%)		
None	25 (53%)	199 (44%)	225(45%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

There was no significant association between time spent on outdoor activities and refractive error. The time spent in outdoor activities was similar in both the participants with and without refractive error. The difference in time spent on outdoor activities was not statistically significant with P = 0.711

**Table 27: Distribution and association of TV watching distance with refractive error:**

TV watching distance	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<10 feet	13 (26.5%)	94 (20.8%)	107 (21.4%)	0.850	0.357
>10 feet	36 (73.5%)	357 (79.2%)	393 (78.6%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

There was no significant association between TV watching distance and refractive error. The proportion of people watching TV at <10 feet was 26.5% in people with refractive error and 20.8% in people without refractive error. The difference in TV watching TV was not statistically significant with P = 0.357

**Table 28: Distribution and association of attending extra class with refractive error:**

Attending extra class	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>Yes</b>	38 (77.6%)	398 (88.2%)	436 (87.2%)	4.531	<b>0.033</b>
<b>No</b>	11 (22.4%)	53 (11.8%)	64 (12.8%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

There was significant association between attending extra classes and refractive error. The proportion of people attending extra class was 77.6% in people with refractive error and 88.2% in people without refractive error. This difference in proportion of attending extra classes was statistically significant with  $P = 0.033$

**Table 29: Distribution and association of reading posture with refractive error:**

Attending extra class	Refractive error		Total N = 500	Chi square value	P value
	Present N = 49	Absent N = 451			
<b>Straight</b>	29 (59%)	293 (65%)	322 (64.4%)	0.645	0.422
<b>Others</b>	20 (41%)	158 (35%)	178 (35.6%)		
<b>Total</b>	49 (100%)	451 (100%)	500 (100%)		

There was no significant association between reading posture and refractive error. The proportion of people reading straight was 59% in people with refractive error and 65% in people without refractive error. This difference in proportion of people reading straight was not statistically significant with P = 0.422



## DISCUSSION

The current study is a school based cross sectional study conducted to estimate the prevalence of Ocular morbidity and the distribution of various associated factors among school children. The number of study participants involved were 500 students. The age of the study participants ranged from 6 to 12 years. In my study, 45.2% (226) were males and 54.8% (274) were females which is opposed to study by *B.T.PrasannaKamath et al*<sup>57</sup> in which (60.77%) were males and (39.23%) are females. No significant sex preponderance was noted.

In my study, the prevalence of ocular morbidity among children was found to be 15.4% which is similar to a study done by *Wedner SH et al*<sup>58</sup> in rural Tanzania, Africa with a prevalence of 15.6% of ocular morbidity reported in children aged 7-19 years. Least prevalence of 13% was reported by *Prajapati P et al*<sup>59</sup> among adolescents of Gandhinagar district. In contrast, higher Prevalence reported by *Chaturvedi et al*<sup>60</sup> (more than 40%) in rural Delhi [9] and *Kalikivayi et al*<sup>61</sup> (43.5%) at Hyderabad and prevalence reported by *Rajesh Kumar et al*<sup>62</sup> (24.6%) from Delhi, *Jayanth D and Malathi K* (27.65%) from rural Maharashtra and *Madhu Gupta and others* (31.6%) from Shimla<sup>65</sup> The prevalence of ocular morbidity varies at different places due to different factors prevailing at different places.

The commonest cause of ocular morbidity in the present study was refractive errors with a prevalence of 63.6% which is followed by Blepharitis which accounted for 10.3%, conjunctivitis for 9.3%, Stye for 5.2%, squint 4.1% of total ocular morbidities, which is similar to a study done by **Dandona R et al**<sup>63</sup> in which 61% had refractive error among children in rural population of India. Prajapati *et al* had observed it as the commonest with a prevalence of 40.1% in their study at Gandhinagar . And a Prevalence of refractive error of 32% has been reported by Kalikivayi in a study from South India . Madhu **Gupta et al**<sup>64</sup> at Shimla had identified refractive error as the commonest morbidity among children (22%) in their study. Refractive error is one of the most common causes of visual impairment around the world and the second leading cause of treatable blindness.

In my study, the proportion of refractive error was more in 10 years age group which was 47%. This difference in distribution of age was statistically significant with P value <0.001. Age was significantly associated with refractive error. This is similar to a study done by **Sun et al**<sup>54</sup> in china which observed that as the age increases, it was closely associated with increased risk of refractive error in multivariate models. Similar pattern has been noted by **S Mahapatro et al**<sup>64</sup> at Bhubanesar [ ] and also by **Goh PP**<sup>65</sup> *etal*<sup>67</sup> in Malaysia . Screening for refractive errors is an integral part of School health problem.

In my study, the proportion of males in refractive error and non-refractive error group were 36.7% and 46%. The proportion of females in refractive error

and non-refractive error group were 63.7% and 54% respectively. This difference was not statistically significant. Gender was not significantly associated with refractive error which is similar to a study on prevalence of refractive error in school children of Ahmedabad city done by **Sonam Sethi et al**<sup>66</sup> observed that females had 23.9% prevalence and males with 26.7% prevalence rate and this difference was not statistically Significant. This is apposed to a school based study done by **Nitin Batra et al**<sup>67</sup> which observed that girls had higher prevalence of refractive error than boys and this difference was statistically significant for myopia  $p < 0.01$ , hyperopia  $p < 0.01$  and astigmatism  $p < 0.003$ .

In my study, participants with refractive error 36.7% of their father, 24.5% of their mother and 8.2% of both their parents had history of refractive error. The history of refractive error in parents was more common among people with refractive error, which is similar to a study done by **Prema et al**<sup>68</sup> in southern state of Tamilnadu, there was significant association between different Refractive Errors and Parents with a glass history with Chi square value of 42.38 and p value  $< 0.001$ . If any of the parent or both wearing glasses, their children found to have defective vision. Also **Mutti et al**<sup>69</sup> study on school children reported that parents diagnosed with myopia tend to have children with myopia (chi square = 21.0;  $P = 0.001$ )

In my study, the children with >2hours time spent in video/mobile games and Television was 16.3% in people with refractive error while it was 0.9% in people without refractive error. There was significant association between time spent on video/mobile games and refractive error and was statistically significant with  $P < 0.001$ , which is similar to a cross sectional study done by **Prema et al**,<sup>68</sup> a significant association was found between refractive error and near work with Chi square value of 35.57 and  $p$  value  $< 0.001$ . Many of the children who spend more than two hours on systems and TV a lot are affected by refractive error than the children who use the same, for less than two hours..

In my study, the children time spent in outdoor activities was similar in both the participants with and without refractive error. There was no significant association between time spent on outdoor activities and refractive error which is apposed to a study done by **Mutti et al**<sup>69</sup> showed that those children playing less sports and staying indoors were myopic ( $p=0.0003$ ), compared with emmetropes. Myopes were spending more time reading for pleasure ( $P = 0.034$ ) and less time playing outdoors ( $P = 0.049$ ) than hyperopes .

## 16. CONCLUSION

The results of the study strongly suggest that

- There was no significant difference in the prevalence of myopia, hypermetropia and astigmatism between males and females in our study.
- In the present study, myopia showed an increasing trend with advancing age whereas hypermetropia and astigmatism showed a decreasing trend with advancing age which was statistically significant ( $p < 0.05$ )
- Among all ocular morbidities, Refractive error was the leading cause in our study contributing 66% which raises the need for prescription of glasses. Our study also correlates the associated factors in children with positive parental history of refractive error, watching television, playing mobile games for more than two hours with limited outdoor activities were more likely to develop visual impairment.
- (1.3%) student in our study suffered from amblyopia. Amblyopia treatment is most effective when done early in the child's life, usually before the age of seven. School screening is the best way to detect amblyopia in school children.
- This study proves that the risk factors associated with Refractive error that can be avoided and creating awareness among children, parents and particularly the teachers play an important role in preventing visual impairment.
- The necessity of proper and constant wear of spectacles should be emphasized. Health and hygienic habits to be included to maintain good vision. Children with history of refractive error in family should be screened at an early age.

In this manner, the incidence of preventable causes of blindness among school children will be minimised.



**RE BITOT'S SPOTS**



**RE CORNEAL OPACITY**



**CHRONIC PROGRESSIVE EXTERNAL OPHTHALMOPLEGIA**



**FUNDUS EXAMINATION DURING FOLLOW UP**



**RE CONGENITAL PTOSIS**



**ESOTROPIA LE**





**BE VERNAL KERATOCONJUCTIVITIS**

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## PROFORMA

Name :  
Age :  
Sex : 1. Male 2. Female  
Address : 1. RURAL  
2. URBAN  
Mobile Number :  
Occupation of the parent :

### History of present illness

1.H/o Defective Vision : 1a. Duration  
1b. Age of onset  
1c.Sudden (or) progressive  
1d. U/L (or) B/L  
1e. Ass with pain +/-

2.H/o Excessive rubbing of eyes Yes / No

3.H/o Headache Yes / No

4.H/o Watering of eyes Yes / No

5.H/o Eye pain Yes / No

6.H/o Eye discharge Yes / No

7.H/o Itching of eyes Yes / No

8.H/o Misaligned eyes/ deviation Yes / No

9.H/o Double Vision Yes / No

11.H/O Near work activities Yes / No

12. No of hours

a. reading / writing

b. Watching television

c. Playing with video games / working  
on the mobile phones & Computer

13.H/o trauma to eye

Yes / No

14.Drooping of eyelids

Yes / No

### **ANTENATAL HISTORY**

1.H/o maternal infections during pregnancy (TORCH)

Yes / No

2.H/o Maternal drug ingestion

Yes / No

**3. H/O Maternal smoking / Alcohol**

**4.H/O Maternal exposure to radiation**

### **BIRTH HISTORY**

1.Nature of delivery

1a. Normal

1b.LSCS

1c.Forceps

2.H/o Birth History

2a.Term

2b.Preterm- Gestational Age

2c. Birth weight- c1. Normal,c2 -low

2d. Associated Complications- Resp distress/  
Hypoglycemia/ ROP Screening/Hypothermia/Sep

## **FAMILY HISTORY**

- 1.H/o Consanguinity Yes / No  
2.Parental H/o Refractive error Yes /No  
3.sibling H/o Refractive error Yes /No

## **PAST HISTORY**

- H/o trauma Yes / No  
H/o Medication Yes / No  
H/o Ocular Surgery Yes / No

## **EXAMINATION**

### General Examination

- Conscious Yes / No  
Oriented Yes / No  
Anaemia Yes/ No  
Lymphadenopathy Yes/No  
Pulse  
Blood pressure  
Respiratory rate  
Ocular examination

	Right Eye	Left Eye
Best corrected visual acuity		
Intra ocular pressure		
Head posture		
Eye brow		

Eye lid		
Conjunctiva		
Cornea		
Anterior chamber		
Iris		
Pupil		
Lens		
Extra ocular movement		
Fundus examination		
Media		
Disc		
Colour		
Size		
Shape		
Margin		
Vessels		
Cup : Disc ratio		
Background		
Retinoscopy (Dynamic refraction/ subjective)		
Cover / Uncover test		
Hirshberg test		
Convergence		
Diplopia chart (Unocular / binocular)		
(crossed / uncrossed )		

## **INVESTIGATION**

Ocular

Laboratory investigation

Complete blood Count

ESR

CRP

Chest X RAY

ECG

Thyroid Function Test

Genetic screening

Galactose level

**TREATMENT GIVEN:**

Sno	age	Gender	Type of Class	Type family	Educational Status of Parents	Occupation of Father	Occupation of Mother	Parental H/o Ref. Error	Sibling H/o Ref. Error	Time Spent Home Work	Time Spent Playing Mobile / Video	Time Spent Watching TV	Time Spent Outdoor Activities	TV Watching Distance	Attending Extracurricular	Reading Posture	Spectacle use	HPI	U CVA Re	U CVA Le	B CVA re	B CVA LE	Convergence	Ant. Sep	Fundus	CT/ALT CT	ref error	Myopia	ocular morbidity	ocular morbidity p/a	Treatment	followup		
1	2	1	1	1	5	2	1	1	2	2	1	5	1	2	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	2	1	1	1		
2	1	1	1	1	5	2	1	1	2	2	1	1	5	1	1	1	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
3	1	1	1	1	5	2	1	1	2	2	1	2	5	1	2	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
4	2	1	1	1	1	1	1	1	2	1	5	4	1	2	1	1	2	1,3	0.2	0.2	0	0	1	1	1	0	1	SM	1	1	1	1		
5	1	1	1	1	5	2	2	1	2	2	1	1	5	1	2	1	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
6	1	1	1	1	5	2	2	1	2	2	1	5	5	1	2	2	2	1,8	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
7	2	1	2	1	1	1	1	1	2	1	4	1	1	1	1	1	2	1,3	0.5	0.3	0	0	0	1	1	1	0	1	SM	1	1	1	1	
8	2	2	1	1	5	2	1	1	2	2	1	1	5	2	2	1	2	3	0	0	0	0	0	1	1	1	0	2	nil	2	1	1	1	
9	2	2	1	1	5	2	1	1	2	2	1	5	5	1	1	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	2	1	1	1	
10	3	2	1	1	5	2	1	1	2	2	1	5	1	1	1	1	2	1	0	0	0	0	0	1	1	1	0	2	nil	2	1	1	1	
11	3	1	1	1	4	2	1	1	2	2	1	5	5	1	1	1	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	4	1	1	1	
12	3	2	1	1	4	2	1	1	2	2	1	5	1	1	1	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	2	1	1	1	
13	1	1	1	1	4	2	1	1	1	2	1	5	4	1	1	1	2	1	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
14	2	1	2	1	1	1	1	1	2	1	5	4	1	1	1	1	2	1,2	0.5	0.3	0	0	0	1	1	1	0	1	SM	1	1	1	1	
15	3	1	1	1	4	2	1	1	2	2	1	5	5	2	1	1	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	4	1	1	1	
16	1	1	1	1	4	2	1	1	2	2	1	5	1	2	1	2	2	1	0	0	0	0	0	1	1	1	2a	2	nil	0	2	1	1	
17	3	2	1	1	4	2	1	1	2	2	1	5	2	2	1	2	1	3	0	0	0	0	0	1	1	1	0	2	nil	10	1	1	1	
18	3	1	2	1	1	1	1	1	2	1	1	1	1	2	1	1	2	1	0.3	0.2	0	0	0	1	1	1	0	1	SM	1	1	1	1	
19	1	2	1	1	4	3	1	1	2	2	1	1	5	2	2	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
20	3	1	2	1	1	1	1	1	2	1	1	4	1	1	1	1	2	1,2	0.3	0.3	0	0.3	0	1	1	1	0	1	SHM	1	1	1	1	
21	1	2	1	1	4	3	1	1	2	2	1	1	5	2	2	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
22	3	2	1	1	4	3	1	1	1	2	1	5	5	2	2	2	2	1,2,4	0	0	0	0	0	1	1	1	0	2	nil	3	1	1	1	
23	1	2	1	1	4	3	1	1	2	2	1	1	2	2	2	2	2	1	0	3	0	0	0	1	1	1	0	2	nil	0	2	1	1	
24	1	2	1	1	4	3	1	1	2	2	1	5	2	2	2	2	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
25	1	2	1	1	4	3	1	1	2	2	1	1	5	2	2	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
26	1	2	1	1	4	3	1	1	2	2	1	1	2	2	2	2	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
27	3	1	1	1	4	3	2	1	2	2	1	5	2	2	2	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	2	1	1	1	
28	1	2	1	1	4	3	2	2	2	2	3	1	3	2	2	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
29	2	1	2	1	1	1	1	1	2	1	2	1	1	1	2	1	2	3	0.3	0.3	0	0	0	1	1	1	0	1	SM	1	1	1	1	
30	1	2	1	1	4	3	2	2	2	2	3	2	2	2	2	2	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
31	1	2	1	1	4	3	2	2	2	2	3	2	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
32	1	1	1	1	4	3	2	2	2	2	3	1	2	2	1	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
33	1	1	1	1	4	2	2	2	2	2	1	1	2	2	1	2	2	4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
34	1	1	1	1	4	2	2	2	2	2	1	1	5	2	1	2	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
35	1	1	1	1	4	2	2	2	2	2	1	1	5	2	1	2	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
36	1	1	1	1	4	2	2	2	2	2	1	2	2	2	1	2	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
37	1	1	1	1	4	2	2	2	2	2	1	2	2	2	1	2	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
38	1	2	1	1	4	2	2	2	2	2	1	1	2	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
39	1	1	1	1	4	2	2	2	2	2	1	3	1	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
40	1	1	1	1	4	2	2	2	2	2	1	3	1	2	1	2	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
41	1	1	1	1	4	2	2	2	2	2	1	3	5	2	1	2	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
42	1	1	1	1	4	2	2	2	2	2	1	2	1	2	1	2	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
43	1	1	1	1	4	2	2	2	2	2	1	3	1	1	1	2	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
44	4	1	1	1	4	2	2	2	2	2	1	3	1	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	3	1	1	1	
45	1	1	1	1	4	2	2	2	2	2	1	3	5	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
46	4	2	1	1	4	2	2	2	2	2	1	3	5	2	1	2	2	13	0	0	0	0	0	1	1	1	0	2	nil	10	1	1	1	
47	1	1	1	1	4	2	2	2	2	2	1	2	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
48	1	1	1	1	4	2	2	2	2	2	1	4	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
49	4	1	1	1	4	2	2	3	2	2	1	3	5	2	1	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	2	1	1	1	
50	1	1	1	1	4	2	2	3	2	1	5	4	5	2	1	2	2	1,8	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
51	1	1	1	1	4	2	2	3	2	1	5	2	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
52	1	1	1	1	4	2	2	3	2	1	2	2	5	2	1	2	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
53	1	1	1	1	1	2	2	3	2	2	4	2	4	5	2	1	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
54	1	1	1	1	2	2	2	3	2	1	1	4	5	2	1	2	2	1	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
55	1	1	1	1	2	2	2	3	2	1	2	4	5	2	1	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
56	1	1	1	1	2	2	2	4	2	2	2	4	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
57	2	1	2	1	1	1	1	1	2	1	2	4	1	1	1	1	2	1	0.3	0.3	0	0	0	1	1									



Sno	age	Gender	Type of Class	Type family	Educatio n Status of Parents	Occupat ion of Father	Occupat ion of Mother	Parental H/o Ref. Error	Sibling H/o Ref. Error	Time Spent Home Work	Time Spent Playing Mobile / Video	Time Spent Watchin g TV	Time Spent Outdoor Activitie s	TV Watchin g Distance	Attendin g Extracla m	Reuding Posture	Spectacl e use	HPI	U CVA Re	U CVA Le	B CVA re	B CVA LE	Converg ence	Ant. Sep	Fundus	CT/ALT CT	ref error	Myopia	ocular morbidity	ocular morbidity p/a	Treatme tn	followup	
71	2	1	1	1	2	2	1	4	2	5	2	4	5	2	1	1	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
72	2	1	1	1	2	2	1	4	2	1	2	4	5	2	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
73	2	1	1	1	2	2	1	4	2	1	2	4	5	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
74	2	2	1	1	2	2	1	4	2	1	5	4	5	2	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
75	2	1	1	1	2	2	1	4	2	1	5	4	5	2	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
76	2	1	1	1	2	2	1	4	2	1	1	4	5	2	1	2	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
77	2	2	1	1	4	2	1	4	2	4	2	4	1	2	1	2	2	1	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
78	2	1	1	1	1	2	1	4	2	5	1	3	5	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
79	2	1	1	1	2	2	1	4	2	1	3	3	5	2	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
80	2	1	1	1	1	2	1	4	2	4	1	4	5	2	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
81	3	1	1	1	1	2	1	4	2	4	5	3	5	2	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
82	3	1	1	1	1	2	1	4	2	4	5	4	5	2	1	1	2	1,2,4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
83	4	1	1	1	2	3	1	4	2	4	1	3	5	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
84	2	1	1	1	2	2	1	4	2	1	2	4	5	2	1	2	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
85	2	2	1	1	2	2	1	4	2	4	5	3	5	1	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
86	1	2	1	1	2	2	1	4	2	1	5	4	5	1	1	2	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
87	2	1	3	1	1	1	1	1	2	1	2	4	1	1	1	2	2	1,3	0.6	0.3	0	0	1	1	1	0	1	SHM	1	1	1	1	
88	3	2	1	1	2	2	1	4	2	4	2	4	3	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
89	2	1	1	1	2	2	1	4	2	4	2	4	5	1	1	1	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
90	3	1	1	1	3	2	1	4	2	1	3	2	5	1	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
91	2	1	1	1	3	2	1	4	2	1	2	2	5	1	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
92	2	1	1	1	3	2	1	4	2	1	2	4	5	1	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
93	3	1	2	1	3	2	1	4	2	1	1	4	5	1	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
94	2	1	4	1	3	2	1	4	2	1	5	4	5	1	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
95	2	1	2	1	3	2	1	4	2	1	2	4	5	1	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
96	4	2	2	1	3	2	1	4	2	4	3	2	5	1	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	3	1	1	1	
97	1	1	4	1	3	2	1	4	2	1	1	2	5	1	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
98	2	1	4	1	3	2	1	4	2	1	5	4	5	1	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
99	2	1	2	1	2	2	1	4	2	1	2	4	5	1	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
100	2	1	4	1	2	2	1	4	2	4	2	1	5	1	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
101	2	1	3	1	2	2	1	4	2	1	2	1	3	1	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
102	2	1	2	1	2	2	1	4	2	1	1	2	5	1	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
103	2	1	3	1	2	2	1	4	2	1	2	1	5	1	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
104	1	1	2	1	2	2	1	4	2	1	2	1	5	1	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
105	2	1	5	1	4	2	1	4	2	1	5	4	5	1	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
106	2	1	2	1	2	2	1	4	2	1	3	4	5	1	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
107	2	1	2	1	1	2	1	4	2	4	2	4	5	1	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
108	1	1	3	1	1	1	1	1	1	1	1	4	1	1	1	1	2	1,3	0.3	0.5	0	0	1	1	1	0	1	SM	1	1	1	1	
109	2	1	5	1	1	2	1	4	2	5	5	4	3	1	1	1	2	1,2,4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
110	3	1	3	1	1	1	1	1	1	1	1	3	1	1	1	1	2	1	0.2	0.6	0	0	1	1	1	0	1	SHM	1	1	1	1	
111	2	1	2	1	2	2	1	4	2	1	2	4	5	1	1	2	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
112	2	1	2	1	2	2	1	4	2	5	5	4	5	1	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
113	1	1	2	1	2	2	1	4	2	1	5	4	5	1	1	2	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
114	2	1	5	1	2	2	1	4	2	1	2	4	5	1	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
115	4	1	5	1	2	2	1	4	2	5	2	4	3	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	3	1	1	1	
116	2	1	3	1	2	2	1	4	1	5	2	4	5	1	1	1	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
117	2	1	3	1	2	2	1	4	2	1	3	1	5	1	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
118	2	1	2	1	3	2	1	4	2	1	2	1	5	1	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
119	3	1	2	1	3	2	1	4	2	1	2	4	5	1	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
120	3	1	3	1	1	1	1	1	2	1	1	3	1	2	1	1	2	4	0.8	0.6	0	0	1	1	1	0	1	SM	1	1	1	1	
121	3	1	3	1	3	2	1	4	2	1	2	4	3	1	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
122	3	1	2	1	3	1	1	4	2	1	2	4	5	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
123	3	1	2	1	3	1	1	4	2	5	3	1	5	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
124	1	1	3	1	3	1	1	4	2	1	2	2	5	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
125	3	1	3	1	3	1	1	4	2	1	5	4	5	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
126	3	1	2	1	3	1	1	4	2	1	2	4	3	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
127	4	2	3	1	3	1	1	4	2	5	2	3	3	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	3	1	1	1	
128	1	1	3	1	3	1	1	4	2	1	2	2	3	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
129	3	1	3	1	3	1	1																										

Sno	age	Gender	Type of Class	Type family	Educatio n Status of Parents	Occupat ion of Father	Occupat ion of Mother	Parental H/o Ref. Error	Sibling H/o Ref. Error	Time Spent Home Work	Time Spent Playing Mobile / Video	Time Spent Watchin g TV	Time Spent Outdoor Activitie s	TV Watchin g Distance	Attendin g Extracla m	Reading Posture	Spectacl e use	HPI	U CVA Re	U CVA Le	B CVA re	B CVA LE	Converg ence	Ant. Sep	Fundus	CT/ALT CT	ref error	Myopia	ocular morbidity	ocular morbidity p/a	Treatme tn	followup
141	2	2	2	1	1	1	1	4	2	1	5	5	5	1	1	2	2	1,8	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
142	4	2	2	1	1	1	1	4	2	1	5	3	5	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	6	1	1	1
143	3	1	3	1	1	1	1	1	2	1	2	2	1	2	1	2	3	0.3	0.3	0	0	0	1	1	1	0	1	SM	1	1	1	1
144	2	2	5	1	1	1	1	4	2	3	2	5	5	1	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
145	2	2	5	1	1	2	1	4	2	1	2	5	2	1	1	2	1	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
146	2	2	2	1	1	2	1	4	2	1	2	5	5	2	1	1	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
147	2	1	2	1	1	2	1	4	2	1	2	5	3	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
148	2	2	2	1	1	2	1	4	2	1	2	5	5	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
149	2	2	2	1	1	2	1	4	2	1	5	5	5	1	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
150	3	1	3	1	1	2	1	1	2	1	4	4	1	1	1	2	2	1,2	0.5	0.3	0	0	1	1	1	0	1	SM	1	1	1	1
151	2	2	2	1	1	2	1	4	2	1	2	5	3	2	1	2	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
152	2	2	4	1	3	2	1	4	2	1	5	3	5	1	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
153	2	2	4	1	3	2	1	4	2	3	5	3	5	1	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
154	2	1	4	1	3	2	1	4	2	1	2	2	5	2	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
155	2	2	2	1	3	2	1	4	2	1	2	3	3	2	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
156	4	1	2	1	3	1	1	4	2	1	2	3	4	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	3	1	1	1
157	2	2	2	1	3	1	1	4	2	1	2	3	4	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
158	2	2	2	1	3	1	1	4	2	1	2	3	5	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
159	3	1	3	1	1	2	1	1	1	1	3	2	1	2	1	1	2	7	0.6	0.2	0	0	1	1	1	0	1	SM	1	1	1	1
160	1	2	2	1	3	1	1	4	2	1	2	2	4	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
161	2	2	2	1	3	1	1	4	2	1	5	3	4	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
162	2	2	2	1	3	1	1	4	2	1	2	3	4	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
163	3	1	3	1	1	2	1	1	2	2	2	2	2	2	1	1	2	13	0.8	0.6	0	0	1	1	1	0	1	SM	1	1	1	1
164	2	2	2	1	3	1	1	4	2	1	2	3	3	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
165	3	1	3	1	1	2	1	1	2	2	1	2	2	2	1	1	2	7	0.3	0.3	0	0	1	1	1	0	1	SM	1	1	1	1
166	2	2	2	1	2	1	1	4	2	1	2	3	3	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
167	1	2	2	1	2	1	1	4	2	1	2	3	4	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
168	2	2	4	1	2	1	1	4	2	1	5	3	5	1	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
169	3	1	3	1	1	2	1	1	1	2	3	3	2	1	1	2	2	13	0.3	0.2	0	0	1	1	1	0	1	SHM	1	1	1	1
170	3	1	3	1	1	2	1	1	2	2	1	4	2	2	1	2	2	1,2	0.6	0.6	0	0	1	1	1	0	1	SHMA	1	1	1	1
171	2	2	4	1	1	1	1	4	2	3	5	3	5	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
172	2	2	4	1	1	1	1	4	2	3	5	5	4	2	1	1	2	1,2,4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
173	4	2	4	1	2	3	1	4	2	3	2	3	4	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
174	2	2	2	1	2	1	1	4	2	1	2	5	4	1	1	2	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
175	2	2	2	1	2	1	1	4	2	3	5	3	5	2	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
176	1	2	2	1	2	1	1	4	2	1	5	3	4	2	1	2	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
177	2	2	4	1	2	1	1	4	2	1	2	5	4	2	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
178	2	2	4	1	2	1	1	4	2	3	2	3	3	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
179	2	2	2	1	2	1	1	4	2	3	2	3	4	2	1	1	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
180	2	2	2	1	2	1	1	4	2	1	3	2	5	2	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
181	2	2	2	1	2	1	1	4	2	1	2	2	5	2	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
182	2	2	2	1	2	1	1	4	2	1	2	3	5	2	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
183	5	1	2	1	2	1	1	4	2	1	2	3	5	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	3	1	1	1
184	2	2	2	1	2	1	1	4	2	1	2	3	5	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
185	4	2	4	1	1	2	1	2	2	2	2	3	2	2	1	2	2	11	0.6	0.5	0	0	1	1	1	0	1	SM	1	1	1	1
186	2	2	2	1	2	1	1	4	2	3	3	2	5	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
187	1	2	2	1	2	1	1	4	2	1	2	2	5	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
188	2	2	2	1	2	1	1	4	2	1	5	3	5	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
189	2	1	2	1	2	1	1	4	2	1	2	3	5	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
190	2	1	2	1	2	1	2	4	2	3	2	3	5	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
191	1	1	2	1	2	1	1	4	2	1	2	2	5	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
192	2	1	2	1	2	1	2	4	2	1	5	3	5	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
193	4	2	4	1	1	2	1	2	2	3	2	3	3	2	1	2	2	1,2,3	0.8	0.6	0	0	1	1	1	0	1	CMA	1	1	1	1
194	2	1	2	1	2	1	2	4	2	1	2	3	5	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
195	2	1	2	1	2	1	2	4	2	1	2	3	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
196	2	1	2	1	2	1	2	4	2	1	2	3	5	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
197	2	1	2	1	2	1	1	4	2	3	3	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
198	1	1	2	1	2	1	1	4	2	1	2	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
199	2																															

Sno	age	Gender	Type of Class	Type family	Educational Status of Parents	Occupation of Father	Occupation of Mother	Parental H/o Ref. Error	Sibling H/o Ref. Error	Time Spent Home Work	Time Spent Playing Mobile / Video	Time Spent Watching TV	Time Spent Outdoor Activities	TV Watching Distance	Attending Extracurricular	Reading Posture	Spectacle use	HPI	U CVA Re	U CVA Le	B CVA re	B CVA LE	Convergence	Ant. Sep	Fundus	CT/ALTC	ref error	Myopia	ocular morbidity	ocular morbidity p/a	Treatment	followup	
211	4	1	5	1	2	3	1	4	2	5	3	1	2	1	1	2	1	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1	
212	2	1	2	1	2	1	1	4	2	1	5	5	1	1	1	2	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
213	2	1	2	1	2	1	1	4	2	5	5	3	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
214	4	2	4	1	2	2	1	2	2	4	4	3	4	2	1	2	2	3	0.5	0.3	0	0	0	1	1	1	0	1	CMA	1	1	1	1
215	3	1	5	1	2	1	1	4	2	5	5	5	1	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
216	3	1	5	1	2	1	1	4	2	5	5	1	3	1	1	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
217	3	1	2	1	2	1	1	4	2	5	5	1	1	2	1	1	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
218	3	1	2	1	2	1	1	4	2	5	3	2	1	2	1	1	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
219	3	1	2	1	2	1	1	4	2	5	5	2	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
220	3	1	2	1	2	1	1	4	2	5	5	1	1	2	1	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
221	3	1	2	1	2	1	1	4	2	5	5	1	1	2	1	1	2	4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
222	3	1	2	1	2	1	1	4	2	5	5	1	1	2	1	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
223	3	1	2	1	2	1	1	4	2	1	5	1	5	2	1	1	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
224	3	1	2	1	2	1	1	4	2	5	3	2	1	2	1	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
225	1	1	2	1	2	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
226	3	1	2	1	2	1	1	4	2	5	5	1	1	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
227	4	2	4	1	2	2	1	2	2	4	2	3	4	2	1	1	2	5	0.3	0.3	0	0	0	1	1	1	0	1	CMA	1	1	1	1
228	3	1	3	1	2	1	1	4	2	5	5	1	1	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
229	1	1	3	1	2	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
230	4	2	4	1	2	2	1	2	2	5	4	3	5	2	1	2	2	5	0.2	0.2	0	0	0	1	1	1	0	1	SMA	1	1	1	1
231	4	2	4	1	2	2	1	2	2	5	2	3	5	2	1	2	2	1,2,3	0.2	0.3	0	0	0	1	1	1	0	1	SMA	1	1	1	1
232	3	1	2	1	2	1	1	4	2	5	5	1	1	2	1	1	2	4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
233	3	1	3	1	2	1	1	4	2	5	5	1	1	2	1	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
234	3	1	2	1	2	1	1	4	2	1	5	1	5	2	1	1	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
235	3	1	2	1	2	1	1	4	2	5	3	2	1	2	1	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
236	1	1	3	1	2	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
237	5	2	3	1	2	1	1	4	2	5	5	1	1	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	4	1	1	1
238	3	1	2	1	2	1	1	4	2	5	5	1	1	2	1	1	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
239	3	1	3	1	2	1	1	4	2	5	5	1	1	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
240	3	1	3	1	2	1	1	4	2	5	5	1	1	2	1	1	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
241	3	1	2	1	2	1	1	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
242	3	1	3	1	2	1	1	4	2	5	5	1	1	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
243	4	2	4	1	2	2	1	2	2	5	2	3	5	2	1	1	2	5	0.5	0.3	0	0	0	1	1	1	0	1	SMA	1	1	1	1
244	3	1	5	1	3	1	1	4	2	1	5	1	5	1	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
245	3	1	2	1	2	1	1	4	2	5	3	1	5	1	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
246	3	1	2	1	1	1	1	4	2	5	5	5	5	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
247	3	1	5	1	1	1	1	4	2	5	5	1	5	1	1	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
248	3	1	5	1	1	1	1	4	2	5	5	5	1	2	1	1	2	1,2,4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
249	5	2	5	1	2	2	1	2	2	5	2	3	5	2	1	1	2	1	0.6	0.5	0	0	0	1	1	1	0	1	SMA	1	1	1	1
250	3	1	2	1	2	1	1	4	2	1	5	5	1	1	1	2	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
251	3	1	2	1	2	1	1	4	2	5	5	1	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
252	1	1	2	1	2	1	1	4	2	5	5	1	1	2	1	2	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
253	5	2	5	1	2	2	1	2	2	5	3	4	5	2	1	2	2	1,3	0.8	0.6	0	0	0	1	1	1	0	1	CMA	1	1	1	1
254	3	1	5	1	2	1	1	4	2	5	5	2	3	1	1	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
255	3	1	4	1	2	1	1	4	2	5	5	2	1	2	1	1	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
256	3	1	4	1	2	1	1	4	2	5	3	2	1	2	1	1	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
257	3	1	2	1	2	1	1	4	2	5	5	2	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
258	3	1	3	1	2	1	1	4	2	5	5	2	1	2	1	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
259	3	1	3	1	2	1	1	4	2	5	5	2	1	2	1	1	2	4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
260	3	1	4	1	2	1	1	4	2	5	5	3	1	2	1	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
261	4	1	3	1	2	1	1	4	2	1	5	3	5	2	1	1	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
262	4	1	3	1	2	1	1	4	2	5	3	3	1	2	1	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
263	1	1	4	1	2	1	1	4	2	5	5	3	1	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
264	4	1	4	1	2	1	1	4	2	5	5	3	1	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
265	4	1	3	1	1	1	1	4	2	5	5	3	1	2	1	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
266	5	1	3	1	1	1	1	4	2	5	5	3	1	2	1	1	2	4	0	0	0	0	0	1	1	1	0	2	nil	5	1	1	1
267	5	2	5	1	2	2	1	2	2	5	3	3	5	2	1	1	2	7	0.5														

Sno	age	Gender	Type of Class	Type family	Educational Status of Parents	Occupation of Father	Occupation of Mother	Parental H/o Ref. Error	Sibling H/o Ref. Error	Time Spent Home Work	Time Spent Playing Mobile / Video	Time Spent Watching TV	Time Spent Outdoor Activities	TV Watching Distance	Attending Extracurricular	Reading Posture	Spectacle use	HPI	U CVA Re	U CVA Le	B CVA re	B CVA LE	Convergence	Ant. Sep	Fundus	CT/ALT CT	ref error	Myopia	ocular morbidity	ocular morbidity p/a	Treatment	followup
281	3	1	5	1	1	1	1	4	2	5	5	3	5	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
282	5	1	5	1	1	1	1	4	2	5	5	5	1	2	1	1	2	1,2,4	0	0	0	0	1	1	1	0	2	nil	7	1	1	1
283	3	2	5	1	1	3	1	4	2	5	5	3	1	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
284	3	2	3	1	1	1	1	4	2	1	5	5	1	1	1	2	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
285	3	2	3	1	1	1	1	4	2	5	5	3	5	2	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
286	1	2	2	1	1	1	1	4	2	5	5	3	1	2	1	2	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
287	3	2	5	1	1	1	1	4	2	5	5	5	1	2	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
288	5	2	5	1	1	2	2	3	2	5	2	3	5	1	2	1	2	1,3	0.8	0.6	0	0	1	1	1	0	1	SMA	1	1	1	1
289	3	1	4	1	1	1	1	4	2	5	5	3	1	2	1	1	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
290	3	1	4	1	1	1	1	4	2	5	3	2	1	2	1	1	2	1,2	0.5	0.5	0	0	1	1	1	0	2	nil	0	2	1	1
291	5	2	5	1	1	2	2	3	2	5	2	2	5	2	1	2	2	1,3	0	0	0	0	1	1	1	0	1	SMA	1	1	1	1
292	3	1	3	1	1	1	1	4	2	5	5	2	1	2	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
293	3	1	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
294	3	1	4	1	1	1	1	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
295	3	1	3	1	1	1	1	4	2	1	5	2	5	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
296	3	1	3	1	1	1	1	4	2	5	3	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
297	1	1	4	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
298	3	1	4	1	1	1	1	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
299	3	1	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
300	3	1	4	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
301	1	1	4	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
302	3	1	4	1	1	1	1	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
303	3	1	3	1	1	1	1	4	2	5	5	2	1	2	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
304	5	2	5	1	1	2	2	3	2	5	3	3	5	2	1	1	2	4	0.3	0.3	0	0	1	1	1	0	1	SMA	1	1	1	1
305	3	1	4	1	1	1	1	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
306	3	1	3	1	1	1	1	4	2	1	5	2	5	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
307	3	1	3	1	1	1	1	4	2	5	3	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
308	1	1	4	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
309	3	1	4	1	1	1	1	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
310	3	1	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
311	5	2	5	1	1	2	2	4	2	5	3	3	5	2	2	1	2	13	0.5	0.3	0	0	1	1	1	0	1	SMA	1	1	1	1
312	3	1	4	1	1	1	1	4	2	5	5	2	1	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
313	3	1	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
314	5	2	5	1	1	2	2	4	2	5	3	3	5	2	1	1	2	13	0.3	0.3	0	0	1	1	1	0	1	SHM	1	1	1	1
315	1	1	3	1	1	2	1	4	2	5	5	2	1	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
316	3	1	5	1	3	2	1	4	2	1	5	2	5	1	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
317	4	1	3	1	1	2	1	4	2	5	3	2	5	1	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
318	5	1	3	1	1	2	1	4	2	5	5	5	5	2	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	8	1	1	1
319	3	1	5	1	1	2	1	4	2	5	5	2	5	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
320	3	1	5	1	1	2	1	4	2	5	5	5	1	2	1	1	2	1,2,4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
321	3	1	5	1	1	3	1	4	2	5	5	2	1	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
322	3	1	3	1	1	2	1	4	2	1	5	5	1	1	1	2	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
323	4	2	3	1	1	2	1	4	2	5	5	2	5	2	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
324	1	2	2	1	1	2	1	4	2	5	5	2	1	2	1	2	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
325	4	2	5	1	1	2	1	4	2	5	5	5	1	2	1	2	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
326	4	2	5	1	1	2	1	4	2	5	5	2	3	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
327	4	2	4	1	1	2	1	4	2	5	5	2	1	2	1	1	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
328	4	2	4	1	1	2	1	4	2	5	3	2	1	2	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
329	5	2	5	1	2	2	2	4	2	5	3	2	5	2	1	2	2	1,3	0.6	0.5	0	0	1	1	1	0	1	SMA	1	1	1	1
330	4	2	3	1	1	2	1	4	2	5	5	2	1	2	1	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
331	4	2	3	1	1	2	1	4	2	5	5	2	1	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
332	4	2	4	1	1	2	1	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
333	4	2	3	1	1	2	1	4	2	1	5	2	5	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
334	4	2	3	1	1	2	1	4	2	5	3	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
335	5	2	5	1	2	2	2	4	2	5	4	2	5	2	1	1	2	13	0.5	0.3	0	0	1	1	1	0	1	SMA	1	1	1	1
336	4	2	4	1	1	2	1	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
337	4	2	3	1	1	2	1	4	2	5	5	2	5	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
338	4	2	4	1	1	2	1	4	2	5	5	2	5	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
339	1	2	4	1	1																											

Sno	age	Gender	Type of Class	Type family	Educational Status of Parents	Occupation of Father	Occupation of Mother	Parental H/o Ref. Error	Sibling H/o Ref. Error	Time Spent Home Work	Time Spent Playing Mobile / Video	Time Spent Watching TV	Time Spent Outdoor Activities	TV Watching Distance	Attending Extracurricular	Reading Posture	Spectacle use	HPI	U CVA Re	U CVA Le	B CVA re	B CVA LE	Convergence	Ant. Sep	Fundus	CT/ALT CT	ref error	Myopia	ocular morbidity	ocular morbidity p/a	Treatment	followup
351	4	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
352	4	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
353	4	2	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
354	4	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
355	1	2	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
356	5	2	5	1	3	2	2	4	2	5	4	3	5	1	2	2	2	5	0.5	0.3	0	0	1	1	1	0	1	SMA	1	1	1	1
357	5	2	3	1	1	1	1	4	2	5	3	2	5	1	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
358	5	2	3	1	1	1	1	4	2	5	5	5	5	2	1	1	2	1.2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
359	5	2	5	1	1	1	1	4	2	5	5	2	5	1	1	1	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
360	5	2	5	1	1	1	1	4	2	5	5	5	1	2	1	1	2	1.2,4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
361	4	2	5	1	1	3	1	4	2	5	5	2	1	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
362	5	2	3	1	1	1	1	4	2	1	5	5	1	1	1	2	2	1.2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
363	5	2	3	1	1	1	1	4	2	5	5	2	5	2	1	2	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
364	5	2	5	1	3	2	2	4	2	5	4	3	5	2	1	2	2	3	0.5	0.6	0	0	1	1	1	0	1	SMA	1	1	1	1
365	5	2	5	1	1	1	1	4	2	5	5	5	1	2	1	2	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
366	5	2	5	1	1	1	1	4	2	5	5	2	3	1	1	1	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
367	5	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
368	5	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	1.2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
369	5	2	3	1	1	1	1	4	2	5	5	2	5	2	1	2	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
370	5	2	3	1	1	1	1	4	2	5	5	2	1	2	1	2	2	1.2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
371	5	2	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
372	5	2	5	1	1	1	2	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
373	5	2	3	1	1	1	2	4	2	1	5	2	5	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
374	5	2	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
375	1	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
376	5	2	5	1	3	2	2	4	2	5	5	3	5	2	1	2	2	5	0.3	0.3	0	0	1	1	1	0	1	SMA	1	1	1	1
377	5	2	3	1	1	1	2	4	2	5	5	2	1	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
378	5	2	5	1	1	1	2	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
379	1	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
380	5	2	5	1	1	1	2	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
381	5	2	5	1	3	2	2	4	2	5	3	4	5	1	2	2	2	1.2	0.3	0.2	0	0	1	1	1	0	1	SMA	1	1	1	1
382	5	2	3	1	1	1	1	4	2	5	5	2	5	2	1	2	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
383	1	2	2	1	1	1	2	4	2	5	5	2	1	2	1	2	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
384	5	2	5	1	1	1	2	4	2	5	5	5	1	2	1	2	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
385	5	2	5	1	1	1	1	4	2	5	5	2	3	1	1	1	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
386	5	2	5	1	1	1	2	4	2	5	5	2	1	2	1	1	2	3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
387	5	2	5	1	1	1	2	4	2	5	5	2	1	2	1	1	2	1.2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
388	5	2	3	1	1	1	2	4	2	5	5	2	1	2	1	2	2	1.3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
389	5	2	5	2	3	2	2	4	2	5	3	3	5	2	2	2	2	1.2,3	0.5	0.3	0	0	1	1	1	0	1	SMA	1	1	1	1
390	4	2	3	1	1	1	2	4	2	5	5	2	1	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
391	4	2	5	1	1	1	2	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
392	4	2	3	1	1	1	2	4	2	1	5	2	5	2	1	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
393	4	2	3	1	1	1	1	4	2	5	5	2	1	2	1	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
394	1	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
395	4	2	5	1	1	1	2	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
396	4	2	3	1	1	1	2	4	2	5	5	2	1	2	1	1	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
397	4	2	5	1	1	1	2	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
398	1	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
399	4	2	5	1	1	1	2	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
400	1	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
401	4	2	5	1	1	1	2	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
402	5	2	5	2	3	2	2	4	2	5	3	3	5	2	2	2	2	1.2,3	0.6	0.5	0	0	1	1	1	0	1	SMA	1	1	1	1
403	4	2	3	1	1	1	2	4	2	5	5	2	1	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
404	4	2	5	1	1	1	2	4	2	5	5	2	1	2	2	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
405	5	2	3	1	1	1	2	4	2	1	5	2	5	2	2	1	2	11	0	0	0	0	1	1	1	0	2	nil	10	1	1	1
406	4	2	3	1	1	1	1	4	2	5	5	2	1	2	2	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
407	1	2	5	1	1	1	1	4	2	5	5	2	1	2	1	1	2	13	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
408	4	2	5	1	1	1	2	4	2	5	5	2	1	2	1	2	2	5	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
409	4	2	3	1	1	1	2</																									

Sno	age	Gender	Type of Class	Type family	Educational Status of Parents	Occupation of Father	Occupation of Mother	Parental H/o Ref. Error	Sibling H/o Ref. Error	Time Spent Home Work	Time Spent Playing Mobile / Video	Time Spent Watching TV	Time Spent Outdoor Activities	TV Watching Distance	Attending Extracurricular	Reading Posture	Spectacle use	HPI	U CVA Re	U CVA Le	B CVA re	B CVA LE	Convergence	Ant. Sep	Fundus	CT/ALT CT	ref error	Myopia	ocular morbidity	ocular morbidity p/a	Treatment	followup	
421	1	2	2	1	1	1	2	4	2	5	2	1	2	1	2	2	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
422	4	2	5	1	1	1	2	4	2	5	5	5	1	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
423	4	2	5	1	1	2	1	4	2	5	5	2	3	1	2	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
424	4	2	5	1	1	2	2	4	2	5	5	2	1	2	2	1	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
425	4	2	5	1	1	2	2	4	2	5	5	2	5	2	2	1	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
426	5	2	5	2	4	2	2	4	2	5	2	2	5	2	1	2	2	1,3	0.5	0.6	0	0	0	1	1	1	0	1	SMA	1	1	1	1
427	4	2	3	1	1	2	2	4	2	5	5	2	5	2	2	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
428	4	2	3	1	1	2	2	4	2	5	5	2	5	2	1	1	2	4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
429	4	2	5	1	1	2	2	4	2	5	5	2	1	2	2	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
430	4	2	3	1	1	2	2	4	2	1	5	2	5	2	2	1	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
431	5	2	3	1	1	2	1	4	2	5	5	2	5	2	2	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
432	5	2	5	1	1	2	1	4	2	5	5	2	5	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
433	5	2	5	2	4	3	2	4	2	5	5	3	5	2	1	2	2	5	0.5	0.3	0	0	0	1	1	1	0	1	SMA	1	1	1	1
434	5	2	5	1	1	2	2	4	2	5	5	2	5	2	1	1	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
435	5	2	5	1	1	2	2	4	2	5	5	2	5	2	2	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
436	5	2	5	1	1	2	1	4	2	5	5	2	5	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
437	5	2	5	1	1	2	2	4	2	5	5	2	5	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
438	5	2	5	1	1	2	1	4	2	5	5	2	5	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
439	4	2	5	1	1	2	2	4	2	5	5	1	5	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
440	4	2	5	1	1	2	2	4	2	5	2	1	5	2	2	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
441	4	2	4	1	1	2	2	4	2	5	2	1	1	2	1	1	2	4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
442	4	2	4	1	1	2	2	4	2	5	2	1	1	2	2	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
443	4	2	4	1	1	2	2	4	2	1	2	1	5	2	2	1	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
444	4	2	4	1	1	2	1	4	2	5	5	2	2	2	2	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
445	4	2	4	1	1	2	1	4	2	1	2	2	2	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
446	4	2	4	1	1	2	2	4	2	1	5	1	2	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
447	4	2	4	1	1	2	2	4	2	1	2	1	5	2	1	1	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
448	5	2	5	2	4	3	2	4	2	5	2	3	5	2	2	1	2	13	0.5	0.5	0	0	0	1	1	1	0	1	SMA	1	1	1	1
449	4	2	4	1	1	2	2	4	2	1	2	1	1	2	1	1	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
450	4	2	4	1	1	2	2	4	2	1	2	2	5	2	1	1	2	4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
451	4	2	4	1	1	2	2	4	2	1	2	1	5	2	1	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
452	4	2	4	1	1	2	2	4	2	1	2	1	5	2	1	1	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
453	4	2	5	1	3	2	2	4	2	1	4	1	5	1	2	2	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
454	4	2	4	1	1	2	1	4	2	1	5	1	5	1	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
455	4	2	4	1	1	2	1	4	2	1	2	5	5	2	1	1	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
456	4	2	4	1	1	2	2	4	2	1	2	5	5	1	2	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
457	4	2	4	1	1	2	1	4	2	1	4	1	5	2	2	2	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
458	4	2	2	1	1	2	2	4	2	1	5	1	2	2	1	2	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
459	4	2	5	1	1	2	2	4	2	1	2	5	1	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
460	4	2	5	1	1	2	1	4	2	1	2	1	3	1	2	1	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
461	5	2	4	1	1	2	2	4	2	1	2	1	1	2	2	1	2	3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
462	5	2	4	2	1	2	2	4	2	1	5	2	2	2	2	1	2	1,2	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
463	5	2	4	2	1	2	2	4	2	1	2	2	5	2	1	2	2	1,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
464	5	2	4	2	1	2	2	4	2	1	2	1	2	2	2	2	2	1,2,3	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
465	5	2	4	2	1	2	2	4	2	1	2	1	2	2	1	1	2	4	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
466	5	2	4	2	1	2	2	4	2	1	2	1	1	2	2	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
467	5	2	4	2	1	2	2	4	2	1	2	1	5	2	2	1	2	11	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
468	5	2	4	1	1	2	1	4	2	1	5	2	2	2	2	1	2	7	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
469	5	2	4	2	1	2	1	4	2	1	2	2	2	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
470	5	2	4	2	1	2	2	4	2	1	5	1	2	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
471	5	2	4	2	1	2	2	4	2	1	2	1	2	2	1	1	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
472	5	2	4	2	1	2	2	4	2	1	2	1	2	2	2	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
473	5	2	4	2	1	2	1	4	2	1	2	2	2	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
474	5	2	4	2	1	2	2	4	2	1	5	1	2	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
475	5	2	4	2	1	2	1	4	2	1	2	2	2	2	1	1	2	13	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
476	5	2	4	2	1	2	2	4	2	1	5	2	2	2	1	2	2	5	0	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
477	5	2	4	2	1	2	2	4	2	1	2	2	2	2	2	2	2	1,2,3	0	0	0	0											

Sno	age	Gender	Type of Class	Type family	Educational Status of Parents	Occupation of Father	Occupation of Mother	Parental H/o Ref. Error	Sibling H/o Ref. Error	Time Spent Home Work	Time Spent Playing Mobile / Video	Time Spent Watching TV	Time Spent Outdoor Activities	TV Watching Distance	Attending Extraclm	Reading Posture	Spectacle use	HPI	U CVA Re	U CVA Le	B CVA re	B CVA LE	Convergence	Ant. Sep	Fundus	CT/ALTC	ref error	Myopia	ocular morbidity	ocular morbidity p/a	Treatment	followup
491	5	2	4	2	1	2	1	4	2	3	5	2	5	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
492	5	2	4	1	1	2	1	4	2	1	5	5	5	2	1	1	2	1,2	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
493	5	2	5	1	1	2	1	4	2	1	5	2	5	1	1	1	2	1,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
494	5	2	5	2	1	2	1	4	2	1	5	5	1	2	1	1	2	1,2,4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
495	5	2	5	2	1	3	1	4	2	1	1	2	2	2	1	1	2	1	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
496	5	2	4	2	1	2	2	4	2	3	5	2	2	2	2	2	2	1,2,3	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
497	5	2	4	2	2	2	2	4	2	3	1	2	2	2	1	1	2	4	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
498	5	2	4	2	2	2	2	4	2	3	5	2	1	2	2	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
499	5	2	4	2	2	2	2	4	2	1	5	1	5	2	2	1	2	11	0	0	0	0	1	1	1	0	2	nil	0	2	1	1
500	5	2	4	1	2	2	1	4	2	1	5	2	2	2	2	1	2	7	0	0	0	0	1	1	1	0	2	nil	0	2	1	1

## KEY TO MASTER CHART

1.Age - 1-6yrs

2-7yrs

3-8yrs

4-9yrs

5-10yrs

2.GENDER 1. Boys

2.Girls

3.Type of Class (Standard) 1-1std

2- ii std

3-iii std

4-iv std

5.v std

4.Type of Family – 1.Nuclear family

2. Joint family

5.Education Status of Parents 1. No Formal Education

2. Primary School(1-5)

3. Middle School (6-8)

4. Sec/ Higher Sec

5. Graduate

6.Occupation of Father-1. Unskilled

2. semi-skilled

3.skilled



7.Occupation of Mother 1. Working mother

2. house wife

8.Parental H/O - Ref Error-1.Father

2.Mother

3. Both

4. None

9.Sibling H/o - Ref Error -1.Yes

2.No

10.Time Spent during Homework 1.30 mins

2. 1 hr

3. 2hr

4. .>2hr

11.Time Spent - Watching TV -1.30 mins

2. 1 hr

3. 2hr

4. .>2hr

12.Time Spent in Playing Mobile / Video Games1.30 mins

2. 1 hr

3. 2hr

4. >2hr



18.UCVA- RE LE

19.BCVA -RE LE

20.Ant. Segment Examination 1. Normal

2. Abnormal

21.Fundus Examination 1. Normal

2. Abnormal

22.CT/ALT 1. Normal

2. Esotropia

3.Exotropia

4.Alternate

23.Convegence 1 Normal

2.Insufficiency

3.Excess

24.Diagnosis 1. Ref Error

I. Myopia

Ia. - Simple Myopia

Ib - Simple Myopic astigmatism

Ic - Comp. Myopic astigmatism

II.a - Simple HM

II.b - Simple HM astigmatism

II.c - Comp. HM astigmatism

III. - Mixed astigmatism

## 2.Strabismus

1. Esophoria - 1a. 15

- 1b. 30

- 1c. 45

2. Exophoria (1a, 1b ,1c)

3. Esotropia (1a, 1b ,1c)

4.Exotropia

5. Vertical

3.Ambylopa

3a. Anisometropic

3b. Strabismus

3c. Visual deprivation

4.Conjunctivitis

5.Blepharitis

6.Stye

7.Corneal opacity

8.Vit A Deficiency

9.Ptosis

10.CPEO

11.ocular trauma

Treatment 1. Optical Treatment 1a. Spectacles

2.Surgical Treatment

### 3.Occlusion Therapy

3a. Part Time

3b. Full Time

Medical Treatment

Follow up :

1. 6 Month
2. 1 Year

**CONSENT FORM**

Child's Name \_\_\_\_\_

Male \_\_\_\_\_ Female \_\_\_\_\_

Child's Date of Birth \_\_\_\_\_

Child's Age (in months or years) \_\_\_\_\_

Parent's or Guardian's Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zip \_\_\_\_\_

Home Phone ( \_\_\_\_\_ ) Work Phone ( \_\_\_\_\_ )

Cell Phone ( \_\_\_\_\_ ) E-mail address \_\_\_\_\_

I, the undersigned, hereby give permission for my child,  
\_\_\_\_\_ to participate in the screening event.

Signature of Parent or Guardian

Date

நோயாளிகளுக்கு அறிவிப்பு மற்றும் ஒப்புதல் படிவம்  
(மருத்துவ ஆய்வில் பங்கேற்பதற்கு)

ஆய்வு செய்யப்படும் தலைப்பு:

.....

பங்கு பெறுவரின் பெயர்: .....

பங்கு பெறுவரின் வயது: .....

பெற்றோரின் பெயர்: .....

முகவரி: .....

தொலைபேசி எண்: .....

நான் இந்த ஆய்வுக்கு எனது குழந்தை ..... யை பரிசோதிக்க

சம்மதம் தெரிவிக்கிறேன்.

பெற்றோரின் கையொப்பம் /..... இடம்

.....

ஆய்வாளரின் கையொப்பம் /..... இடம்

..... ஆய்வாளரின் பெயர்

..... மையம்

.....