**AL-Nahrain University**

**College of Medicine**

**Department of Surgery**

# Patterns of Refractive errors among School age Children

A Research submitted to Al-Nahrain University /Collage of Medicine In Partial Fulfilment for the Degree of M.B.CH.B

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# Abstract

## background :

An eye that has no refractive error when viewing distant objects is said to have *emmetropia* or be *emmetropic* meaning the eye is in a state in which it can focus parallel rays of light (light from distant objects) on the retina, without using any accommodation. A distant object in this case is defined as an object located beyond 6 meters, or 20 feet, from the eye, since the light from those objects arrives as essentially parallel rays when considering the limitations of human perception

## Aim of study

To study the patterns of refractive errors among school age children

**Patient & Method**

This cross sectional study done in Al-Imammain Al-kadhymain Medical City during the period from August 2018 to February 2019.

- **Inclusion criteria** :

Children from 6 to 15 years with refractive errors

- **Exclusion criteria :**

  Children whom age more than 12 years or less 6 yr

**Results :**

120 children were participating in our study , 63 of them was female while 57 was male , myopia by far was the most common refractive error in 63 most of them were male 42 male followed by hyperopia in 36 childern

**Conclusion & Recommendation**

Myopia is the most common type of refractory error among school age children.The best corrected visual acuity among them is 6/9.Children with refractory error usually have no strabismus except for astigmatism about half of them have exotropia. Periodic screening in schools should be carried out; school teachers, children and **their** parents should be educated about signs and symptoms of refractive errors and for the risk factors involved in their development.

# Introduction

When a ray of light passes from one transparent medium to another, it is velocity decreased in a more dense medium and increase in a less dense medium[1].
If the transparent medium is bounded by surfaces that are not perpendicular to the ray of light so in addition to change in velocity, the emerging ray has different direction which is called ( refraction )[1]

- A ray of light entering the eye is refracted by the cornea then by lens[1].
- The anterior surface of cornea is the main refractive surface of eye[1].

**The refractive error is determined by two factors:**

1- The refractive power of cornea and lens
2- The length of eye
So long eye has less refractive error and short eye has more refractive error[2]

**Emmetropic eye**

The condition in which there is no refractive error so that rays of light parallel to visual axis upon entering the eye are brought to focus on fovea centeralis when no accommodation is exerted[3]

**Ametropia:**

The condition in which the refractive power of cornea and lens and length of the globe are not correlated so rays of light not focus on fovea centeralis[4]

**Hyperopia;**

Condition in which ray of light entering the eye parallel to visual axis come to focus behind retina
Either:

- The refractive power of cornea and lens is inadequatefor the length of globe
- The globe is too short for amount of refractive power[5]

**Classified:**
*1- Total:*
The amount of hyperopia present with all accommodation suspended, its produced by paralysis of ciliary muscle by cycoplegic drug
*2- Manifest*
The maximum hyperopia that can be corrected with convex lens when accommodation is active
*3-Latent:*
The difference between Total and manifest hyperopia[6]

**Sign & symptoms [7]**

- specific sign for hyperopia
- comfortable vision after prolong time spent in reading
- Headache and Blured near vision
- It predisposed to angle closure glaucoma .

**Myopia**

condition in which ray of light entering the eye parallel to visual axis come to focus in front of retina[8]

Either[1,9]:

- The refractive power of cornea and lens is too great for the length of globe
- The globe is too long for amount of refractive power

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*1- Physiologic:*

Due to inadequate correlation of refractive power of cornea and lens with length of globe[9.]

*2- Pathologic:*

Due to axial length of eye is excessive bc. Overgrowth of post 2/3 of globe[9].

*3- Lenticular:*[9]
Increase refractive power of crystalline lens increase the refractive power of anterior Segment
Ex: DM, nuclear sclerosis, hydralazine

**Sign & symptoms**[10]

- Blurred distant vision
- Headache rare
- It predisposed to vitro retinal degeneration & retinal holes

**Astigmatism:**

condition in which the refracting power of the lens is not the same in all meridians
1- *Regular*: when meridians of refraction are at right angle to each other
2- Irregular: when meridians are not at right angle to each other
3- *Ocular* when one meridians is on retina
4- *Simple myopic* : when other meridians is ant. To retina
5- *Simple hyperopic* :when other meridians is intercepted by retina before focus
6- *Compound:* both meridians are in front of retina
7- *Mixed :* one focused line in front of retina and other line is intercepted by retina[11]

**Sign & symptoms[12]**

- Uncomfortable vision
- Blurred vision

**Amblyopia, or lazy eye,**

refers to a unilateral or bilateral decrease of vision, in one or both eyes, caused by abnormal vision development in childhood or infancy. It is a common vision problem in children and is the leading cause of decreased vision among children. Most vision loss is preventable or reversible with the right kind of intervention[14,15,16].

Signs and symptoms [17,2]

The history should address the following:

- Previous history of patching or eye drops
- Past compliance with these therapies
- Previous ocular surgery or disease
- Family history of strabismus or other ocular problems

Diagnosis [13,4]

Imaging studies that may be helpful when the ocular examination is normal and suspicion of an organic cause exists include the following:

- CT
- MRI
- Fluorescein angiography (to assess the retina)

Other tests that may be helpful in diagnosis include the following:

- Electrophysiologic studies (investigational; differences noted are controversial)
- Spectral-domain optical coherence tomography (SD-OCT) [3]

See Workup for more detail.

Management

First, rule out an organic cause and treat any obstacle to vision, such as cataract or ptosis, if clinically significant. Next, treat anisometropia and refractive errors. Then, initiate occlusion therapy (to force the use of the amblyopic eye) or penalization therapy [17,5.]

*Occlusion therapy* [2,7]

The following are general guidelines for occlusion therapy:

- Patching may be full-time or part-time
- Always consider lack of compliance in a child when visual acuity is not improving. Question patients regarding peeking

- In addition to adhesive Band-Aid–type patches, consider the use of opaque contact lenses, occluders mounted on spectacles, and adhesive tape or Bangerter foils on glasses [20]
- Establishing whether the vision of the better eye has been degraded sufficiently with the chosen therapy [21,22]

# Aim of the study

To study the patterns of refractive errors among school age children

## Patient & METHOD

This cross sectional study done in Al-Imammain Al-kadhymain Medical City during the period from August 2018 to February 2019.

- **Inclusion criteria** :

Children from 6 to 15 years with refractive errors

- **Exclusion criteria :**
  Children whom age more than 12 years or less 6 yr
  Children who had no refractory error.

We take the sample in random way and children underwent a comprehensive eye examination consisted of visual acuity , auto refraction ,cover test ,ocular motility test ,pupillary evaluation ,anterior segmental examination ,cycloplegic auto refraction and dilated fundus examination with direct ophthalmoscopy.

### Statistical analysis

the data were analyzed by Microsoft excel software and represented in the form of frequency and percentage for certain variables in tables and graphics design using Microsoft words software & Microsoft excel software .

# Result

120 children were participating in our study , 63 of them was female while 57 was male , myopia by far was the most common refractive error in 63 most of them were male 42 male followed by hyperopia in 36 childern

**Table 1 distribution of the sample according to gander**

| gender | Refractive error | | | total |
|---|---|---|---|---|
| | myopia | hyperopia | astigmatism | |
| male | 42 | 12 | 3 | 57 |
| female | 21 | 24 | 18 | 63 |
| total | 63 | 36 | 21 | 120 |

Myopia was most common refractive error in our study 52.5% followed by hyperopia 30% and astigmatism 17.5% .

**figure 1 distribution of children according to type of refractory error**

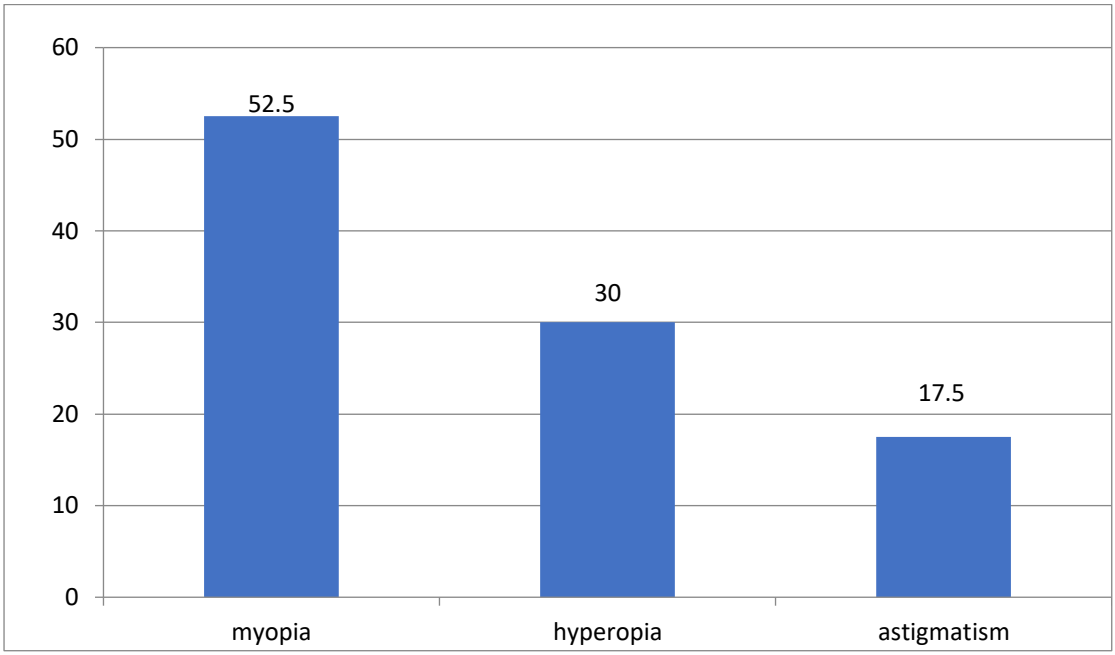


**Figure 2: Best Corrected Visual Acuity Among Children With Refractory Errors**

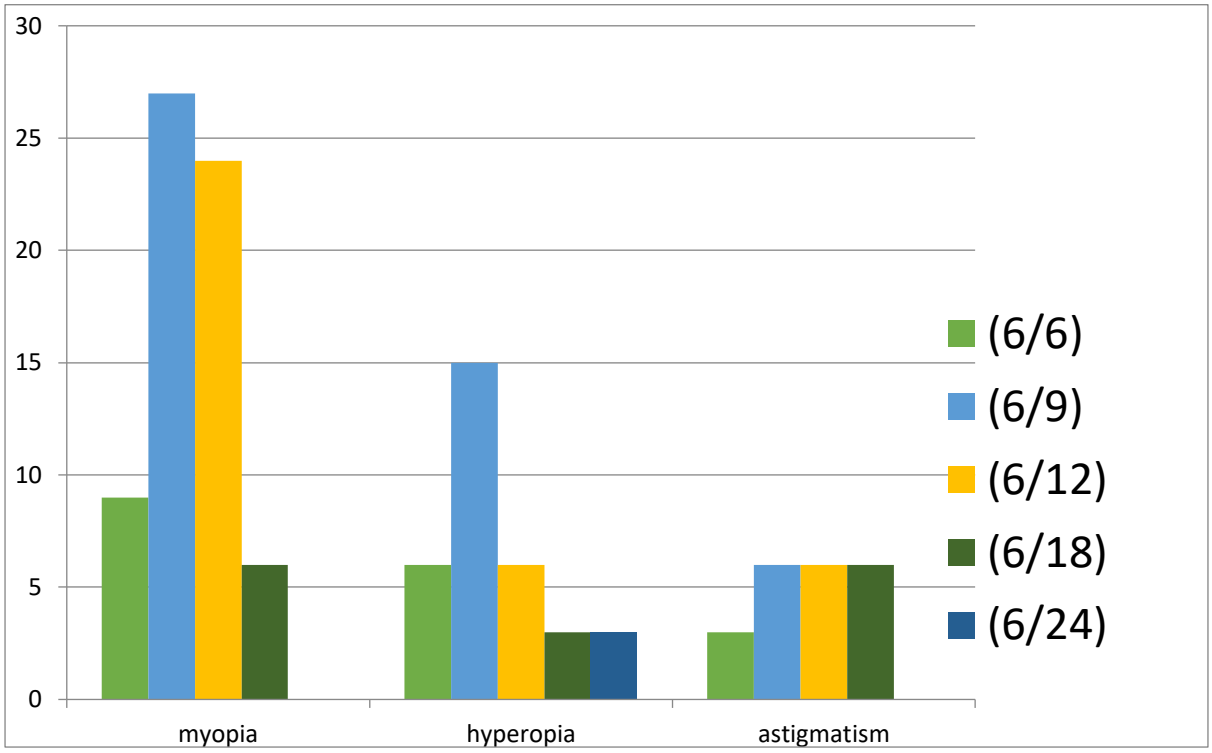
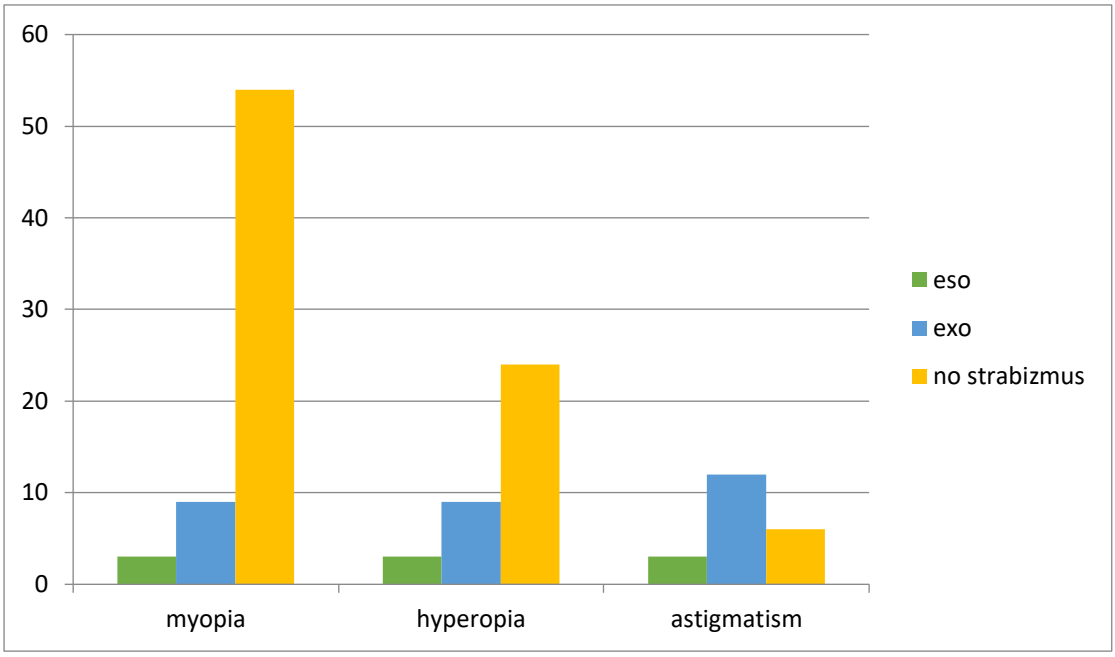


**figure 3: Exotropia & Esotropia Among Children With Refractory Error**



# Discussion

in this cross sectional study , myopic patients were the majority ,most of them were female and this similar to study of Kalkivayi V et [9]al this because myopia is significantly high among the school age children & association between gender and myopia

while hyperopic patients were the second most common refractive error most of them were female this because hyperopia is common in among the school age children and hyperopia decreasing with age in children may be the part of emmetropization process[13].

Astigmatism is least refractive error in our study , most of patients were female ,although there is no significant association between age and gender as in study don by Lian-Hong et al[18] .

In our study we found myopia is the most common refractive error followed by hypermetropia & astigmatism and this is similar to Murthy GVS, eT al[11]

Best corrected visual acuity in myopic patients was 6/9

# Conclusion

1. Myopia is the most common type of refractory error among school age children.
2. The best corrected visual acuity among them is 6/9.
3. Children with refractory error usually have no strabismus except for astigmatism about half of them have exotropia.

# Recommendation

Periodic screening in schools should be carried out; school teachers, children and their parents should be educated about signs and symptoms of refractive errors and for the risk factors involved in their development.

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