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Assessment and association of refractive error between types of gender

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Abstract:

Introduction:Refractive error is mostfrequent and common cause of visual impairment across India and the world.Essentially in early days blindness and the second leading origin of treatable of blind person years followed by cataract, undetected, Unobserved and uncorrected refractive errors are especially a huge issue among school children.

*Aim of the study**:** To determine, if there is any association and correlation between types and gender.*

*Material and Methods**:**This cross-sectional examination was concluded in the school children of Thiruvallur district of Tamil Nadu from May 2019 to January 2020. Sample size was calculated to be 1745. Children, those who were selected from different schools, were there on the day of observations. The examination include visual acuity for distance (snellen's chart), for near (jaeger's chart), auto refractometer, slit lamp (used external examination), ophthalmoscopy (used internal examination), lensometer (checked power lenses), trial lenses, trial frames.*

Results:In this present study in school children were examined 1745 schools children, (60.8%) 1061 children was males, and (39.2%) 684 children was females. The prevalence of refractive error in our study was 17.25%, prevalence of uncorrected refractive error was higher in males accounting for (9.97%) followed by females accounting for (7.28%). Myopia and astigmatism were more frequent in males than in females and hypermetropia was more frequent in females compared in males, there is not statically significant relationship between sex and refractive status (P=0.23).

*Conclusion**:** In this present study, we concluded the prevalence of uncorrected refractive error according to the gender showed that the prevalence was more frequent among males compared in females.*

Keywords**:** *Refractive error, hypermetropia, school children, myopia, astigmatism, prevalence.*

INTRODUCTION

Visual impedance is a noteworthy general medical issue. Refractive errors are one of the most well-known reasons for visual disability around the globe and a second driving reason for treatable blindness [1], basically in Childhood blindness is the second biggest reason for individual blindness years pursued by cataract[2].Childhood and early age

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blindness is a worldwide concern. It has an incredible noteworthiness since a visually impaired kid experiencesmore visually impaired a very long time than a visually impaired grown-up. Additionally is the commonestcondition, looking for consideration at the ophthalmology outdoor departments[3, 4].In India refractive error is second most significant reason for patients to counsel ophthalmologists [5]. The world health organization, an expected 153 million individuals worldwide had visual hindrance (VI) from UREs, in 2004 and 8 million of them were visually impaired [6], evaluates that 333 million individuals are visually impaired 154 million are experiencing uncorrected refractive error with in excess of 13 million of them children . Rates fluctuate between areas of the world with about 25% of Europeans and 80% of Asians influenced [7]. Rates among children are between 1, 2-42%[8]. Overall, this condition has been viewed as one of the priority worldwide activity to end avoidable blindness: 33% of the world's visually impaired (around 15 million) are in SEAR (southeast area) and half of the world visually impaired children live this locale. Blindness is one of the most critical social issues in India with uncorrected refractive error as the subsequent significant reason representing 7% of blindness and low vision.

The extent of this uncorrectable weight of visual weakness has been ignored in light of the fact that epidemiological examinations have would in general spotlight on "best amended" sight instead of exhibiting visual sharpness Smith et al. [9]. In their report on the worldwide visual impairment coming occurring because of uncorrected refractive error, Dandona and Dandona [10], assessed that all around there were 5 million people (4-6 million) who were visually impaired (separation vision more regrettable than 3/60 in the better eye) because of uncorrected refractive error. A refractive error is required to analyze in the previous stage. Uncorrected refractive error is one of the most widely recognized reasons for visual hindrance[11,12,13,14], likewise is the main source of eye issue on the planet and the second reason for blindness[15], incorporating the definition utilized in the worldwide statically characterization of sickness and related medical issue[16]. Undetected and uncorrected refractive errors are especially a huge issue in school children[17].As children are not full grown enough to bring up the inadequacy at a beginning period the guardians have no clue on the developing vision problem that is creating vision issue, an uncorrected refractive error can dramatically affect the learning procedure and instructive limit[18].The majority of the children with such ailments are evident and thus, screening helps in early recognition and remedy with spectacles[19]. Dandona and Dandona [20] demonstrated that blindness because of uncorrected or deficiently adjusted refractive errors starts at a early age, all things considered obstacles in their education and career development. Refractive error is effectively estimated dispassionately and abstractly refraction, target refraction the analyst decides the sort and level of refractive error without dynamic interest of patient, basic just as helpful for deciding the sort and level of refractive error basically in young patient and with poor vision utilizing with retina extension or autorefractor (with or without cycloplegics),photo refraction and keratometry, and may or may not be followed with subjective refraction. In subjective refraction, the subjective refraction esteems are refined by requesting that the patient react to changes in vision because of lenses being changed before the person in question, until the person reports the lens or lenses that give the best vision, clarification and continuation by the creator.

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Material and methods

Ethical approval and authorization was conceded by institutional ethical council of NIMS University Rajasthan, Jaipur Medical College before endeavoring this perception.

Study design**:** This cross-sectional examination was concluded in the school children of Thiruvallur district of Tamil Nadu from May 2019 to January 2020 were examined to determine the association between type of refractive error with gender.

Study population**:** All the sample groups were in the age group of 11-14 years of age and were studying in class 6 to 9th standard.

Inclusion criteria:All the children population of both genders attending government Schools children in Thiruvallur District, Tamil Nadu will be included, and were willing to partake in the study were targeted for this study. Parents consent was taken in advance of the childrens, who were part of this cross sectional study.

Exclusion criteria:Children with defective vision due to other reasons.

It was proposed that only those children who were not willing to participate or whose parents were not ready for consent, were excluded from the study, and having other problem like: Corneal and lenticular opacities, Presence of any ocular infection / inflammation, history of ocular injury, history of previous surgery. Children aged 11-14 years absent during the survey.

Sample size calculation:

The sample size has been calculated as per the formula given below:

Determination of the required minimal sample size of the total number of children that were interviewed was based on the following formula:

$SS = Z^2 * (p)*(1-p) / C^2$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)

p = percentage picking a choice, expressed as decimal

(.5 used for sample size needed)

c = confidence interval, expressed as decimal

(e.g., .04 = ±4)

$SS = Z^2 * (p)*(1-p) / C^2 = (1.96)2*17.25*82.75/25= 219.24 = 219$ rounded N= 219 children.

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In our research, the sample size is 1745, which is much higher the required sample of 1526.Thus, the sample may be considered as sufficient and acceptable for this research.The total of 1745 schools children aged 11-14 years were examined. The study period was May 2019 to January 2020. The study was carried out through oral questionnaire, age, sex, class, etc, following by ocular examination. Ocular examination was tested used the following instruments:

1. Snellen's chart for distance vision
2. Jaeger's chart for near vision
3. Occluded
4. Autorefractometry
5. Streak radioscopy.
6. Ophthalmoscope
7. Trial lenses and trial frame.
8. Lens meter

Vision test was executed from the distant; snellen's chart was placed at the distance of 6m from children. The room was provided the sufficient light on the chart. Each eye was tested separately, first we started the right and left eye is occluded, secondly the left eye and right eye is occluded. Close and nearby vision was tested with the help of jaeger's chart keeping at the distance of 25-30 cm from the children eyes. Children with visual acuity 6/9 to 6/18 6/24 to 6/60 or less than 6/60, we used auto refractor to know information about refractive error. The technique used for auto refractor, the child was comfortably seated and instructed to focus on a small target inside the auto refractor. Automated and computerized, auto refractor quickly brief about the refractive error of the patient in terms of sphere cylinder with axis and interpupillary distance. The test was done monocular, and the subject was the classified as emmetropic, hyperopic, myopic, astigmatic. However, the subjective verification of refraction is a mandatory procedure even after autorefractometry used with trial lenses and trial frame, this test also used monocular. Patient requires cooperating in arriving at the appropriate estimation of the refractive error. It was for determining the refractive error of the eye changes in clarity of his or her vision when different lens powers were placed in the trial frame placed in front of his or her face. It was involved to determine the two components of the refractive errors, namely the sphere and cylinders. After determination of these, binocular balance was done, to balance the vision on both eyes by adjusting the lenses on both eyes to values that made the eyes work comfortably together. If the best corrections of visual acuity (BCVA) are not improvement with the trial lenses, we will refer in the department of ophthalmology for checked ophthalmic examination.

Variables of interest and operational definitions

- Refractive errors: according to W.H.O "A refractive error is a very common eye disorder. It occurs when the eye cannot clearly focus the images from the outside world. The result of refractive errors is blurred vision, which is sometimes so severe that it causes visual impairment".

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- Myopia**:**Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health, defines myopia as "a defect of vision consisting of an error of refraction in which rays of light entering the eye parallel to the optic axis are brought to a focus in front of the retina, so that vision for near objects is better than for far. This results from the eyeball being too long from front to back, Called also nearsightedness."
- Hypermetropia**:**it is a situation where far off items might be seen more obviously than objects that are close. The light beams get engaged behind the retina.
- Astigmatism**:**according to merriam-webster dictionary astigmatism is"a defect of an optical system (such as a lens) causing rays from a point to fail to meet in a focal point resulting in a blurred and imperfect image."
- Presenting vision**:** Presenting vision: is the visual sharpness in the better eye with the right now accessible refractive correction, assuming any.
- Best corrected Vision**:** is the visual action in the better eye accomplished either by pinhole or by refraction.
- Visual impairment**:** is the visual acuity of under 6/6 in the better eye however on the off chance that it is < 6/18 in the better eye it must be improved to equivalent to or superior to 6/18 by refraction or pinhole along these lines spreading over the low vision and visual impairment classes as at present characterized in the ICD-10.
- Sever visual impairment: Snellen chart reading (6/60–3/60)
- Moderate visual impairment: Snellen chart reading (6/12–6/60)
- Amblyopia**:** Amblyopia is a vision improvement issue in which an eye neglects to accomplish ordinary visual sharpness, even with remedy eyeglasses or contact lenses. Amblyopia starts during earliest stages and early youth. Much of the time, just one eye is influenced.
- Low vision: powerlessness to perform ordinary visual activities, for example, perusing or perceiving faces, coming about because of a visual impairment.
- Presence of refractive error: - visual acuity of <6/12 in either eye or both, which can be corrected by spectacle.
- Absence of refractive error: - visual acuity of >6/12 in both eyes.
- Emmetropic: eye is defined if neither eye is myopic or hypermetropia.

Results:

In this study, we found the most of children participants was males followed by females. The participants of males comprised (60.8%) 1061 children much higher the participants of females comprised (39.2%) 684 children. The prevalence of refractive error in our study was 17.25%; the prevalence of uncorrected refractive error was higher in males accounting for (9.98%) 174 children followed by females accounting for (7.26%) 127 children. The prevalence of corrected refractive error by gender in the right eye, most of the participants 95.3% showed corrected visual acuity of 0.0LogMAR (6/6) or better. The percentage distribution of corrected visual acuity of 0.0Log MAR (6/6) in males was 95.8% and worse 0.2-1.0Log MAR (6/9 to 6/60) was 4.2%, and the percentage distribution of

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corrected visual acuity of 0.0Log MAR (6/6) in females was 94.8% and worse 0.2-1.0Log MAR (6/9 to 6/60) was 5.2%. The prevalence of corrected refractive error by gender in the left eye, most of the participants 94.2% showed corrected visual acuity of 0.0Log MAR (6/6) or better. The percentage distribution of corrected visual acuity of 0.0LogMAR (6/6) or better in males was 94.6% and worse 0.2-1.0Log MAR (6/9 to 6/60) was 5.4%, and the percentage distribution of corrected visual acuity of 0.0 Log MAR (6/6) or better in females was 93.8% and worse 0.2-1.0 Log MAR (6/9 to6/60), it was6.2%.

Relationship between sex and refractive status, in our study we found myopia was more prevalent in males than females accounting for (65.7%) 115 children. Astigmatism has been observed more frequent in males compared to the female children accounting for (28%) 49 children, and hypermetropia was found more frequent in females than in male children accounting for (11.9%) 15 children. The total refractive error in our study was more frequent in male compared to females.

Figure: - Distribution of Gender of the children participants

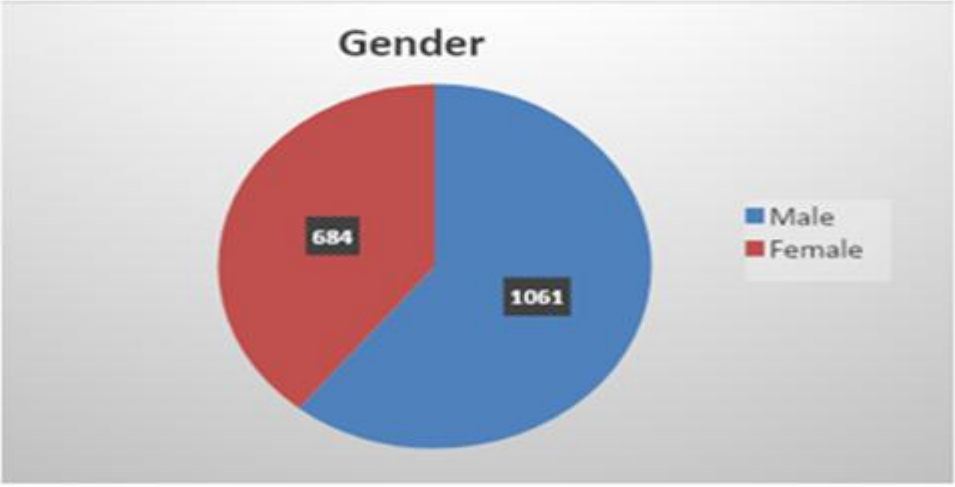

Table 1: Distribution of uncorrected visual acuity Log (MAR) values by the gender

Gender	Visual acuity Log (MAR) , N%							
	0.0	0.2	0.3	0.5	0.6	0.8	1.0	N%
Male	50.82	1.86	4.27	0.89	0.76	1.11	1.11	60.8
Female	31.94	2.37	1.62	0.76	1.06	0.6	0.83	39.2
Total	**82.76**	**4.23**	**5.89**	**1.65**	**1.82**	**1.71**	**1.94**	**100.0**

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Figure2: Distribution of corrected visual acuity Log (MAR) values by the gender in the right eye

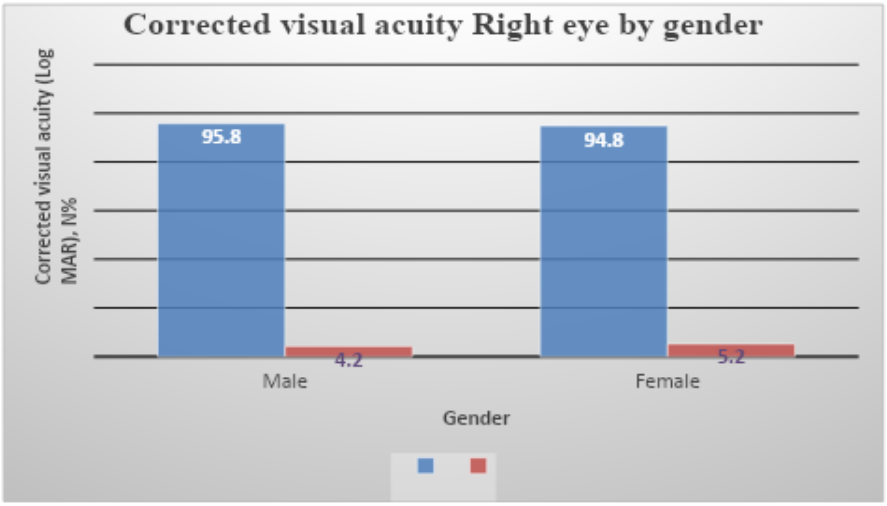

Figure 3: illustrating of corrected visual acuity (Log MAR) value in the left eye by gender in the left eye

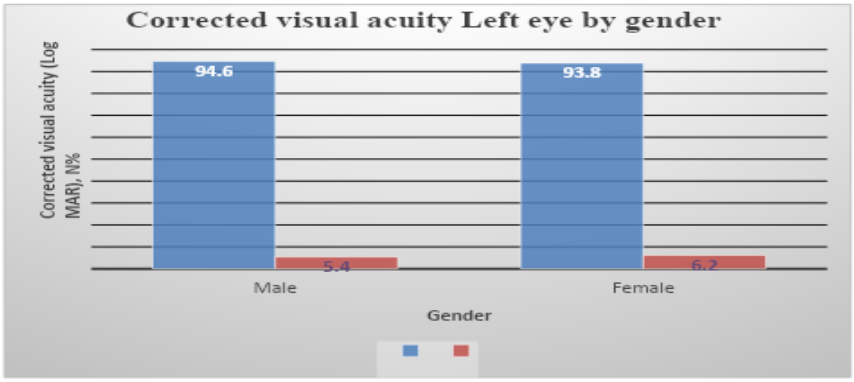

Table 2: Relationship between sex and refractive status

Characteristics	Females, (n %)	Males, (n %)	OR (95%CI)	P value
Myopia	77 (61.1)	115 (65.7)	2.9485	.228956
Hypermetropia	15 (11.9)	11 (6.3)		
Astigmatism	34 (27)	49 (28)		

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Discussion:

In this particular cross sectional investigation, myopia and astigmatism were more pervasive in males than in females and hypermetropia was discovered a higher predominance in females than males counterpart, which is comparative finding to the others examines[21, 22, 23], and other examination discoveries concur with the report of Mabaso et al [24], where hyperopia was more and exorbitantly regular in females representing 5% than males representing 3.6%. Additionally discovering were found by Zelalem and Abdirahman, [25]; Kumar et al [26] where it was seen as more typical in females than guys.. Our study, it was foundthat hyperopia was more and extremely and excessively common in females for than males. This could be clarified most likely by the way that females have littler eyes than male counterpart as reported by Kondo et al. (1985). This might be on the grounds that female's eyes by and large have a shorter axial length and shallower front load profundity than those of guys, and subsequently a higher likelihood of being hyperopic[27]. However, astigmatism was more common in males accounting for 16.3% than females accounting for 11.3%. This finding of occurrence in males agrees with the report done by Mabaso et al (2006), where astigmatism was more common and much frequent in males than females, but there were not so many gender differences with astigmatism.From this investigation, it was seen that myopia influenced more in males (38.2%) than in females (25.6%), oppositely in study done Mavracanas et al [28] the event of myopia was seen as (36.8%) and was every now and again normal in females (46.0%) than in males (29.7%)[29].In other examination done by Khalaj et al [30] myopia was seen as progressively predominant in females (60%) than in males (40%). The aftereffect of the two examinations above not relate with the consequence of our investigation. On looking at the prevalence of refractive errors were found more commonly in males than in females, gender wise males had 58% prevalence in comparison to females 42%.,which is similar in some studies done in Rahman et al [31],Niroula and Sahal[32], and Sun et al.[33], reported higher prevalence among males compared to females. In the others studies, there was no dissimilarity in the occurrence of refractive errors, but in some studies[34, 35, 36] girl showed high rate prevalence of refractive errors. In others studies refractive errors were found frequently and excessively common in females than in males, probably related to the rate of growth [37], females accomplish adolescence prior on a normal and arrive at their last body weight 1-2 years sooner than in the guy's[38], which is similar to that reported study done in Seema Sharma et al discovered that commonness of refractive error was 23.7% in young females and just 12.2% in male[39] counterpart. Comparative outcomes were seen by Tay MT et al in their examination, which was tried on young males' individuals in Singapore, despite the fact that it is opposing in nature to our investigation.

Conclusion:

In our examination, we concluded and observed that myopia and astigmatism were progressively frequent in male than female, hypermetropia was more continuous and frequent in female kids than in males kids, this could be explained probably by the manner in which that females have more diminutive eyes than males, additionally

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females' eye everything considered have a shorter pivotal length and shallower front chamber significance than those of male counterparts, and along these lines a higher probability of being hyperopic eye.

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Finding: No finding source

Conflicts of interest: None declared

Ethical approval: The study was approved by institutional ethics committee by Nims University, Rajasthan, Jaipur.

REFERENCE

1. Dandona R, Dandona L. Refractive error blindness. Bull World Health Organ. 2001;79:237-43
2. World Health Organization (1999) Report of WHO/IAPB scientific meeting, Hyderabad, India 13-17th April. Childhood blindness prevention.
3. Murthy GVS, John N, Gupta SK, Vashist P, Rao GV. Status of pediatric eye care in India. Indian J Ophthalmol. 2008; 56(6):481–8.
4. Dandona R, Dandona L. Refractive error blindness. Bull World Health Organ [Internet]. 2001; 79(3):237–43.
5. GP Kantha, Sonam Sethi. Prevalence of refractive errors in school children (12–17 years) of Ahmedabad city. Indian Journal of Community Medicine. 1987; 24:23-30.
6. Dandona L, Dandona R. Estimation of global visual impairment due to uncorrected refractive error. Bull World Health Organ. 2008 Aug; 86(8): B – C.
7. Atkinson J, Braddick OJ, Durden K, et al. Screening for refractive errors in 6-9 month old infants by photorefraction. Br J Ophthalmol 1984; 68:105-12.
8. Amos JF. Refractive amblyopia: a preventable vision condition. J Am Optom Assoc 1979; 50:1153-9.
9. Smith, T. S., Frick, K. D., Holden, B. A., Fricke, T. R., & Naidoo, K. S. (2009). Potential lost productivity resulting from global burden of uncorrected refractive error. Bulletin of the World Health Organisation, 87, 431-7
10. Dandona, R., & Dandona, L. (2008). Estimation of global visual impairment due to uncorrected refractive error. Bulletin of the World Health Organisation, 86(1), 63-70.
11. Ellwen Leon B. Case finding in refractive error. Community Eye Health. 2002; 15:43.
12. VISION 2020 CD-ROM, chapter 3. Developing an action plan: specific disease control strategies.
13. World Health Organization, author. Elimination of avoidable visual disability due to refractive error. 2001; 79:3.
14. Bull World Health Organ. 1. Vol. 86. Geneva: 2008. Jan,

ISBN : 978-81-944855-2-0

15. Augsburger AR. Hyperopia. In: Amos JF, ed. Diagnosis and management in vision care. Boston: Butterworths, 1987:101-19.
16. Ingram RM, Barr A. Changes in refraction between the ages of 1 and 3 1/2. Br J Ophthalmol 1979; 63:339-42
17. Holden BA, Sulaiman S, Knox K. The challenge of providing spectacles in the developing world. Community Eye Health 2000; 13(33):9–10.
18. Yingyong P. Refractive errors survey in primary school children (6–12 years old) in 2 provinces: Bangkok and Nakhonpathom (one year result). J Med Assoc Thai. 2010; 93:1205–10.
19. Padhye AS, Khandekar R, Dharmadhikari S, Dole K, Gogate P, Deshpande M. Prevalence of uncorrected refractive error and other eye problems among urban and rural school children. Middle East Afr J Ophthalmol 2009; 16(2):69–74.
20. Dandona, R., & Dandona, L. (2001). Refractive error blindness. Bulletin of the World Health Organisation, 79(3), 237-243.
21. Ogbomo GOO, Assien R. Refractive error in school children in Agona Swedru, Ghana. S Afr Optom 2010; 69(2):86–92.
22. Lin LL, Chen CJ, Hung PT, KO LS. Nation-wide survey of myopia among school children in Taiwan, 1986. Acta Ophthalmol Suppl 1988; 66(S185):29–33.
23. Khan AA, Nasti AR, Dar MA, Lone SA. Prevalence of refractive errors in school children. JK-Practitioner 2005; 12(3):156–9.
24. Mabaso, R., Oduntan, A., & Mpolokeng, M. (2006). Refractive status of primary school children in Mopani District, Limpopo Province, South Africa. The South African Optometrist, 65, 125- 133.
25. Zelalem, M., & Abdirahman, Y. (2013). Prevalence of refractive errors among school children in rural central Ethiopia. Clinical & Experimental Ophthalmology, 96(1), 65-69.
26. Kumar, P., Pore, P., Dixit, K., & Singh, N. (2014). Prevalence and demographic distribution of refractory error in school of Pune, India. International Journal of Medical Research & Health Sciences, 2, 58-67.
27. Wong TY, Foster PJ, Ng TP, Tielsch JM, Johnson GJ, Seah SKL. Variation in ocular biometry in an adult Chinese population in Singapore: the Tanjong Pagar Survey. Invest Ophthalmol Vis Sci 2001 42 73-80.
28. Mavracanas, T.A., Mandalos, A., Peios, D., Golias, V., Megalou, K., Gregoriadou, A., et al. Prevalence of Myopia in a Sample of Greek Students. ActaOphthalmologicaScandinavica. 2000; 78, 656-659.
29. Khalaj M, Gasemi M and Zeidi I (2009): Prevalence of refractive errors in primary school children [7-15 years] of Qazvin City. European Journal of Scientific Research; 1450-216X, 28 (2): 174-185.
30. Rahman M, Devi B, Kuli JJ, Gogoi G. A study on the refractive status of school going children aged between 10 to
15 years in Dibrugarh Town, Assam, India. IOSR J Dent Med Sci 2015; 14(2):27–33

ISBN : 978-81-944855-2-0

31. Niroula DR, Saha SG. Study on the refractive errors of school going children of Pokhara city in Nepal. Kathmandu Univ Med J 2009; 7(25):67–72.
32. Sun Y, Cao H, Yan ZG. Prevalence of refractive errors in middle School students in Lanzhou city. Int J Ophthalmol 2008; 1(2): 180–82
33. Pavithra MB, Maheshwaran R, Rani Sujatha MA. A study on the prevalence of refractive errors among school children of 7–15 years age group in the field practice areas of a medical college in Bangalore. Int J Med Sci Public Health 2013; 2(3):641–5.
34. Sewunet SA, Aredo KK, Gedefew M. Uncorrected refractive error and associated factors among primary school children in Debre Markos District, Northwest Ethiopia. BMC Ophthalmol 2014; 14:95.
35. Ali A, Ahmad I, Ayub S. Prevalence of undetected refractive errors among school children. Biomedica 2007; 23:96–101.
36. Venkatramana K, Naduvilam T. Visual impairment in school children in southern India. Ind J Opthalmol. 1997:129-34.
37. Tay MT et al. Myopic and educational attainment in young Singapore Males, Ann Acad Med, Singapore. 1992; 21:785-91.
38. Kalkivayi V, Naduvilah TI, Bansal AK, Dandona L. Visual impairment in school children in Southern India. Indian J Ophthalmol. 1997; 45: 129-34.
39. Sharma S, Vashisht BM, Kalhan M, Goel M. Magnitude of Refractive Errors among school children in a rural block of Haryana. The Internet Journal of Epidemiology. 2009; 6(2). DOI: 10.5580/1e5f.