Global Journal of Medicine & Public Health

Ocular morbidities and refractive errors in primary school children in rural Aligarh, Uttar Pradesh

Mohd Yasir Zubair[1], Anees Ahmad[2], Uzma Eram[3], Tabasum Nawab[4], Karthika P[5], Ragul JS[6]

ABSTRACT

Background

Children with vision impairment are likely to suffer the consequences throughout their lives. With impaired vision, they grapple to learn to walk, to study, to go to school, and to be able to work. Many Children do not complain of defective vision, and may not even be aware of it. Moreover, children in rural areas often do not have access to eye testing facility. In this study we have studied prevalence of refractive error and other ocular problems in primary school children aimed at identifying those children and facilitating their management.

Methods

This cross-sectional school-based study was carried out from July, 2019 to September, 2019 in primary schools out of Jawan village, Aligarh, UP. Ocular examination of all children was done by Ophthalmologist at School and at eye clinic (when required).

Results

A total of 243 students from class III to V were examined of which 108 (44.4%) were males and 135 (55.6%) were females. Uncorrected distance visual acuity was normal (Snellen's visual acuity of 6/6) in 198 (81.5%, 95% CI; 76.1 – 85.9) students and refractive error was found in 45 (18.5%, 95% CI; 14.1 – 23.9) students. In other Ocular morbidities, allergic conjunctivitis was found in 5 students, sign of vitamin A deficiency (bitot's spot), Amblyopia and Ptosis was found in one student each. Thus, ocular morbidity was present in a total of 53 students yielding a prevalence of 21.8% (95% CI; 17.0% - 27.4) in our study population.

Conclusion

Refractive error is by far the commonest ocular morbidity in school going children. The most encouraging fact about this visual disability is that it can readily be corrected with spectacle correction. There is an apparent need for strengthening the school health programs along with effective monitoring of school-based vision screening, quality optometric services, and provision of providing affordable spectacles

GJMEDPH 2023; Vol. 12, issue 4 | OPEN ACCESS

5***Corresponding author:** . Karthika P, Senior Resident, department of Community Medicine, Jawahar Lal Nehru Medical College, AMU, Aligarh, Email: drkarthikap92@gmail.com. 1. Mohd Yasir Zubair, Senior Resident, department of Community Medicine, Jawahar Lal Nehru Medical College, AMU, Aligarh, 2.Anees Ahmad, Professor, department of Community Medicine, Jawahar Lal Nehru Medical College, AMU, Aligarh 3. Uzma Eram, Associate Professor, department of Community Medicine, Jawahar Lal Nehru Medical College, AMU, Aligarh 4. Tabasum Nawab, Assistant Professor, department of Community Medicine, Jawahar Lal Nehru Medical College, AMU, Aligarh 6. Ragul JS, Senior Resident, department of Community Medicine, Jawahar Lal Nehru Medical College, AMU, Aligarh

Conflict of Interest—none | **Funding—**none

INTRODUCTION

Vision, the most precious of our senses, plays a defining role in every aspect and stage of our lives. We tend to take vision for granted, but with impaired vision, we grapple to learn to walk, to study, to go to school, and to be able to work. However, Ocular morbid conditions are very common. Most people will experience one or the other eye condition during their lifetime.

'Vision Impairment' is a broader term for any eye condition that affects the visual system and one or more of its vision functions while 'Blindness' is a severe deprivation in vision function. World Health Organisation's world report on vision in the year 2019 estimates that globally, 2.2 billion people have a vision impairment and in at least 1 billion or almost half of these people, vision impairment could either have been prevented or is yet to be addressed. The common causes of visual impairment are Unaddressed refractive error (123.7 million), Cataract (65.2 million), Glaucoma (6.9 million), Corneal opacities (4.2 million), Diabetic Retinopathy (3 million), Trachoma (2 million), and Unaddressed Presbyopia (826 million).[1]

Children with vision impairment are likely to suffer the consequences of vision impairment throughout their lives. Thus, childhood vision impairment and blindness has been one of the goals of the World Health Organization's (WHO) VISION-2020-The Right to Sight strategy.[2] It is estimated that globally there are 19 million visually impaired children of whom 1.14 million children are blind.[3] In India and other developing countries Uncorrected Refractive errors are the major cause of vision impairment in school-going and school-aged children.[4-10] Existing studies in India have reported varying prevalence of refractive error from various places.[11] Timely detection and correction of visual problems is essential for children to have educational and behavioural benefits, and contributes to Quality of Life.[12]

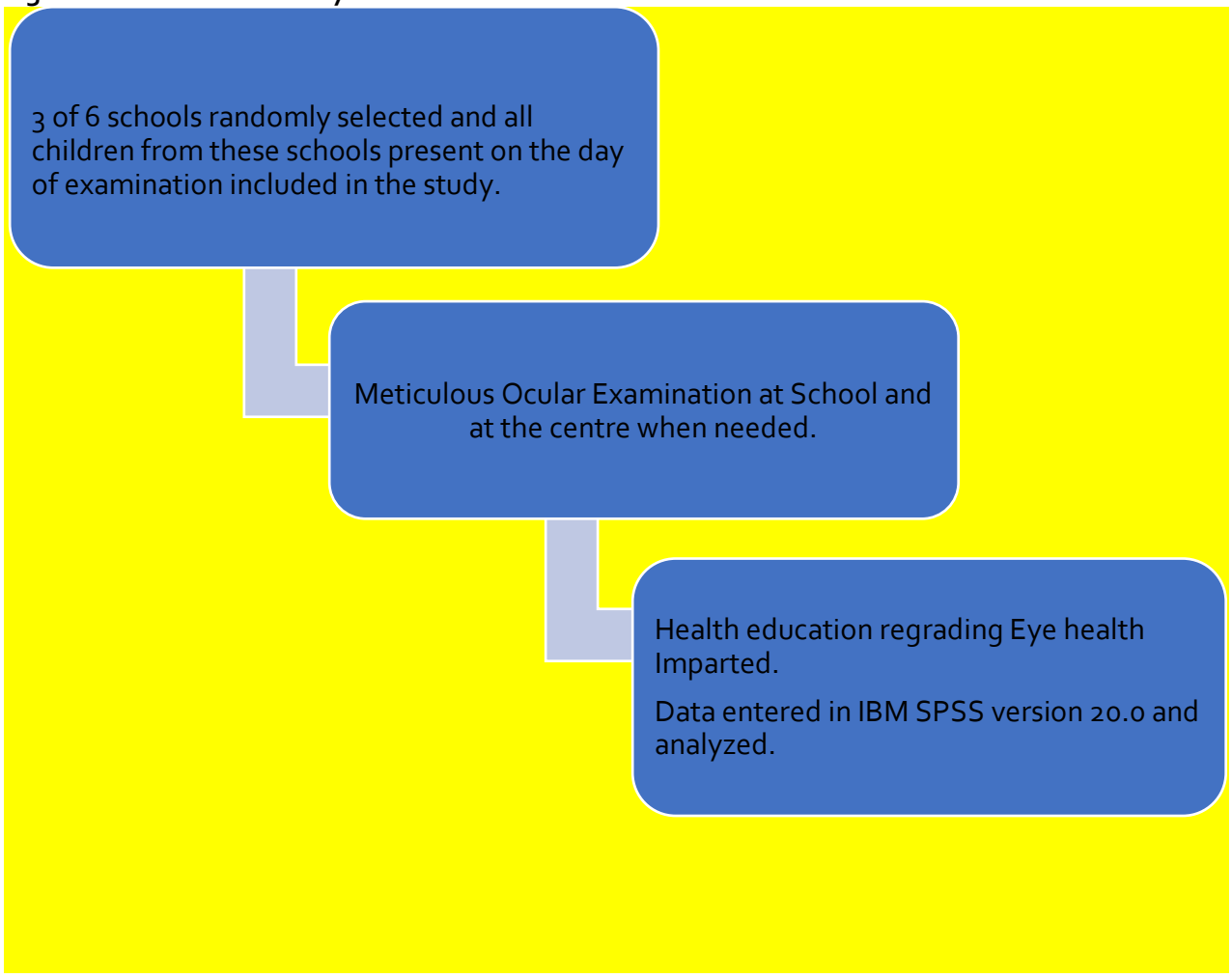
Many Children do not complain of defective vision, and may not even be aware of their problem. Moreover, children in rural areas often do not have access to eye testing facilities. Screening for visual impairment in school children particularly in rural areas is thus an effective strategy for identification of the children suffering from refractive errors and other ocular conditions. In this study, we have studied prevalence of refractive error and other ocular problems in primary school children from western Uttar Pradesh aimed at identifying those children and facilitating their management.

METHODS

This cross-sectional school-based study was carried out from July, 2019 to September, 2019. The study was a part of a larger comparative study which was carried out in rural and urban schools of Aligarh. In this study, findings from the rural schools are presented. Three primary schools out of 6 schools were selected randomly from Jawan village, the field practice area of Rural Health Training Centre, Jawaharlal Nehru Medical College, AMU, Aligarh. All the selected schools were sent written information detailing the purpose of the eye examination, and permission was sought. After obtaining permission from the School Principal, consent was also obtained from parents with facilitation from the schools.

All the children attending the school on the day of examination were included in the study and those absent were left out. Thus, a total of 243 students from Class III to V were examined. After the examination, health education of healthy practices regarding eye health was imparted to all students.

Figure 1: Flowchart of Study Procedure



Ocular Examination

Ocular examination of all children was done by Ophthalmologist. Children with reduced visual acuity were taken to the eye clinic in a departmental vehicle at RHTC for further evaluation. All the findings were documented in a predesigned semi-structured questionnaire.

Examination at School

Uncorrected visual acuity was assessed with Snellen's vision chart at 6m distance for each eye as per the standard of visual acuity assessment. Diffuse torch light examination was performed. Ocular movements were assessed and cover tests were performed.

Examination at Centre

In the eye clinic at RHTC, Cycloplegic refraction and Fundus evaluation was done where required. Children needing glasses were handed over their written prescriptions and their parents were informed through the schools. Those needing further evaluation and treatment were referred to Eye OPD of the medical college.

Diagnostic Criteria

The diagnostic criteria used for refractive error was 0.5 diopters or more for myopia, 1.00 diopter or more for hypermetropia and ≥ 0.50 diopter for astigmatism.

Statistical Analysis

Class enumeration and examination data proformas of each student was reviewed for completeness prior to computerized data entry. All data were entered in MS Excel (2010) and analyzed using IBM SPSS version 20.0 software. Data has been described in frequency distributions, and percentages and associations among categorical variables was studied with Chi Square test.

Ethics

Approval for the study was obtained from the Institutional Ethics Committee, Jawaharlal Nehru Medical College, AMU, Aligarh.

Results

A total of 243 students from class III to V were examined of which 108 (44.4%) were males and 135 (55.6%) were females. Demographic details and ocular morbidities of study participants are summarised in Table 1.

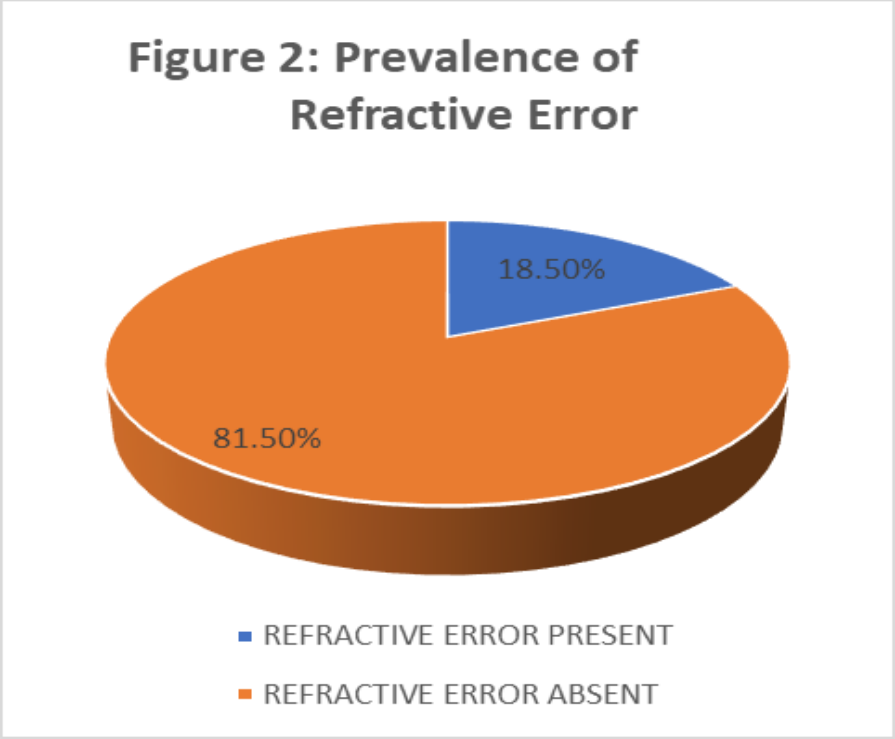
Table 1: Demographic Details and Ocular Morbidities of the Participants

Variable	Frequency	Percentage
Gender		
Male	108	44.4%
Female	135	55.6%
Age group		
5-6 years	88	36.2%
7-8 years	51	21.0%
≥9 years	104	42.8%
Refractive Error		
Myopia	26	10.7%
Hypermetropia	6	2.5%
Myopic Astigmatism	11	4.5%
Hypermetropic Astigmatism	2	0.8%
Other morbidities		
Allergic conjunctivitis	5	2%
Bitot's Spot	1	0.4%
Ptosis	1	0.4%
Amblyopia	1	0.4%

Uncorrected distance visual acuity was normal (Snellen's visual acuity of 6/6) in 198 (81.5%, 95% CI; 76.1 – 85.9) students and refractive error was found in 45 (18.5%, 95% CI; 14.1 – 23.9) students (Figure 2). The classification of refractive error based on severity is presented in Table 2. After refractive correction, visual acuity was improved to normal (6/6) in 43 (95.5%) students. Vision did not improve to 6/6 in two (4.5%) students who were found to be Amblyopic.

Table 2:Classification of Refractive Error According to Severity

Visual Acuity	Frequency	Percentage
6/6	198	81.5%
6/9-6/12	21	8.6%
6/18-6/60	24	9.9%
<6/60	0	0

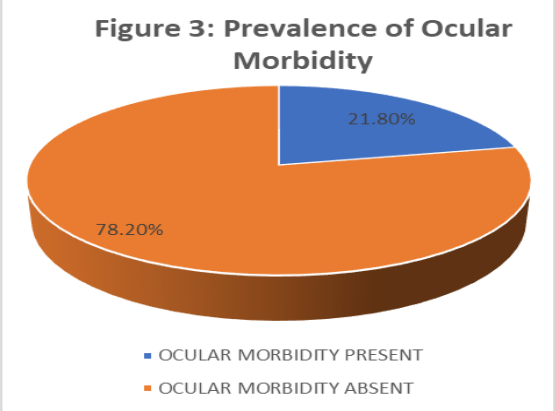


Among the 45 students with refractive error, Myopia was found in 26 (57.8%, 95% CI; 43.3 – 71.2), Myopic Astigmatism in 11 (24.4%, 95% CI; 14.6 -39.4), Hypermetropic Astigmatism in 2 (4.4%, 95% CI; 1.6 -10.5) and Hypermetropia in 6 (13.3%, 95% CI; 6.3-23.3) students. Refractive error was found in 20.4% (22/108) males and 17.0% (23/135) females (table 3). This difference was not significant statistically ($X^2 = 1.542$, df = 1, p = 0.214). Table 3 also shows that the prevalence of refractive error which was 11.36 % in age group of 5-6 years increased to 17.6 % in ages 7-8 years and to 25% in ≥ 9 years suggesting that refractive error was more prevalent in elder children ($X^2 = 5.906$, df = 2, p = 0.052).

Table 3:Association of Refractive Error with Gender and Age

Variable	Refractive Error		Total	Significance
	Yes	No		
Gender				
Male	22 (20.4%)	86 (79.6%)	108	p = 0.214
Female	23 (17.0%)	112 (83.0%)	135	
Age Group				
5-6 years	10 (11.4%)	78 (88.6%)	88	p = 0.052
7-8 years	09 (17.6%)	42 (82.4%)	51	
≥9 years	26 (25.0%)	78 (75.0%)	104	

In other Ocular morbidities, allergic conjunctivitis was found in 5 students, sign of vitamin A deficiency (Bitot's spot), Amblyopia and Ptosis were found in one student each. Thus, ocular morbidity was present in a total of 53 students yielding a prevalence of 21.8% (95% CI; 17.0% - 27.4) in our study population (Figure 3).



DISCUSSION

The International Agency for the Prevention of Blindness and the WHO have consistently found refractive error as the second most common cause of vision impairment (after cataracts), and therefore addressing this is a WHO Vision 2020 priority.[13-14] Since, cataract generally occurs in older age, in our study amongst school children refractive error was found to be the commonest ocular morbidity. Our prevalence of 18.5% is similar to those reported in various other studies in India. In a study from western Uttar Pradesh, Singh V et al[15] (2017) reported a similar prevalence of 17.36%. Gupta et al.[16] in Shimla found refractive error as the most common disorder in school children, with a prevalence of 22%, Das et al.[17] in Kolkata and Desai et al.[18] in Jodhpur also found a similar prevalence of 25.11% and 20.8%, respectively.

These studies indicate that in children morbidity due to refractive errors continues to remain high which is a cause for concern because this impacts various domains. Uncorrected refractive errors result in reduced educational opportunities as well as employment options, impacting the individual and the community.[19] There's also a burden in terms of economic costs. The risk of myopia and myopic astigmatism in childhood is associated with a range of socioenvironmental factors, such as indoor lifestyle and more time on schooling and other near-work tasks and reduction in outdoor activities.[20-21] The fact that time spent indoors and on near work is a risk factor for myopia in children is of concern in Indian scenario where due to rapid urbanisation and increasing literacy rate, children are spending more and more time indoors and on near activities. These observations have implications for predicting future patterns of refractive error prevalence across India. Myopia is generally associated with urban locations, but near tasks related to increasing use of mobile phones, tablets and other devices are becoming increasingly common which influence refractive error in both rural and urban locations. A systematic review found that South Asians living in Australia, England or Singapore had five times higher probability to be myopic than those living in Nepal or India.[22] These findings again highlight the influence of sociocultural and environmental factors on myopia, such as use of digital devices and time spent on indoor activities Thus, in addition to focus on adequate correction of refractive error at the right time, there's an urgent need to identify and address the risk factors in order to prevent and control the rising prevalence.

With regards to type of errors among the students with refractive error, Myopia was found in 28 (62.22%), Myopic Astigmatism in 11 (24.44%), Hypermetropic Astigmatism in 4 (8.88%) and Hypermetropia in 2 (4.44%) students. Comparable findings were reported in a population of school children aged 6–17 years in Kerala where myopic astigmatism was found in 68.3%, simple myopia in 13.8%, hypermetropic astigmatism in 13.1% and simple hypermetropia in 1.20%.[23]

The prevalence of refractive error in our study was similar between males and females (20.4% vs 17.0%). Many other studies from across India have reported similar results with no significant difference in refractive error between male and female students.[24-26] An increasing refractive error prevalence was noted in our study with increase in age of students. Other studies among school students in India and abroad have also reported this association.[27-28] Other ocular morbidities, such allergic conjunctivitis, sign of vitamin A deficiency (Bitot's spot), Amblyopia and Ptosis were also observed.

CONCLUSION

Refractive error is by far the commonest ocular morbidity in school-going children. The most encouraging fact about this visual disability is that it can readily be corrected with spectacle correction. There is an apparent need for strengthening the school health programs along with effective monitoring of school-based vision screening, quality optometric services, and provision of providing affordable spectacles. Other ocular morbid conditions should also be not neglected and health awareness regarding signs, symptoms, and when to seek care is needed in this regard.

REFERENCES

1. WHO. World Report on Vision. 2019
2. Gilbert C, Foster A. Childhood blindness in the context of VISION 2020--the right to sight. Bull World Health Organ 2001;79:227-32.
3. Gilbert C, Bowman R, Malik AN. The epidemiology of blindness in children: Changing priorities. Community Eye Health 2017;30:74-7
4. Murthy GV, Gupta SK, Ellwein LB, Munoz SR, Pokharel GP, Sanga L, et al. Refractive error in children in an urban population in New Delhi. Invest Ophthalmol Vis Sci 2002;43:623-31.
5. Dandona R, Dandona L, Srinivas M, Sahare P, Narsaiah S, Munoz SR, et al. Refractive error in children in a rural population in India. Invest Ophthalmol Vis Sci 2002;43:615-22.
6. 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;16:69-74.
7. Naidoo KS, Raghunandan A, Mashige KP, Govender P, Holden BA, Pokharel GP, et al. Refractive error and visual impairment in African children in South Africa. Invest Ophthalmol Vis Sci 2003;44:3764-70.
8. Kalikivayi V, Naduvilath TJ, Bansal AK, Dandona L. Visual impairment in school children in Southern India. Indian J Ophthalmol 1997;45:129-34.
9. Nepal BP, Koirala S, Adhikari S, Sharma AK. Ocular morbidity in school children in Kathmandu. Br J Ophthalmol 2003;87:531-4.
10. Alam H, Siddiqui MI, Jafri SI, Khan AS, Ahmed SI, Jafar M. Prevalence of refractive error in school children of Karachi. J Pak Med Assoc 2008;58:322-5
11. Sheeladevi S, Seelam B, Nukella PB, et al. Prevalence of refractive errors in children in India: a systematic review. Clin Exp Optom 2018;101:495–503.
12. Pizzarello L, Tilp M, Tiezzi L, Vaughan R, McCarthy J. A schoolbased program to provide eyeglasses: Child sight. J Am Assoc Pediatr Ophthalmol Strabismus 1998;2:372-4.
13. Naidoo KS, Leasher J, Bourne RR, et al. Global vision impairment and blindness due to uncorrected refractive error, 1990-2010. Optom Vis Sci 2016;93:227–34.
14. Resnikoff S, Pascolini D, Mariotti SP, et al. Global magnitude of visual impairment caused by uncorrected refractive errors in 2004. Bull World Health Organ 2008;86:63–70.
15. Singh V, K P S Malik, VK Malik, Kirti Jain. Prevalence of ocular morbidity in school going children in West Uttar Pradesh. Indian Journal of Ophthalmology 2017;65(6):500-508
16. Gupta M, Gupta BP, Chauhan A, Bhardwaj A. Ocular morbidity prevalence among school children in Shimla, Himachal, North India. Indian J Ophthalmol 2009;57:133-8.
17. Das A, Dutta H, Bhaduri G, De Sarkar A, Sarkar K, Bannerjee M. A study on refractive errors among school children in Kolkata. J Indian Med Assoc 2007;105:169-72.
18. Desai S, Desai R, Desai NC, Lohiya S, Bhargava G, Kumar K. School eye health appraisal. Indian J Ophthalmol 1989;37:173-5. 22
19. Rahi J, Gilbert C. Epidemiology and the world-wide impact of visual impairment in children. Pediatr Ophthalmol Strabismus, Expert Consult Print, 4 Pediatr Ophthalmol Strabismus 2012;1
20. Morgan IG, Ohno-Matsui K, Saw S-M. Myopia. Lancet 2012;379:1739–48.
21. Huang H-M, Chang DS-T, Wu P-C. The association between near work activities and myopia in children-A systematic review and meta-analysis. PLoS One 2015;10:e0140419.
22. Rudnicka AR, Kapetanakis VV, Wathern AK, et al. Global variations and time trends in the prevalence of childhood myopia, a systematic review and quantitative metaanalysis: implications for aetiology and early prevention. Br J Ophthalmol 2016;100:882–90.
23. Sathyan S, Unnikrishnan M, Kunjachan A, et al. Demographic profile of newly detected refractive errors among schoolgoing children in Thrissur district of Kerala. Kerala J Ophthalmol 2018;30:32–7
24. Singh H, Saini V, Yadav A, Soni B. Refractive errors in school going children – Data from a school screening survey programme. National J Community Med. 2013;4(1):137-40.
25. Prema N. A study on prevalence of refractive errors in school children. Indian J Sci Tech .2011;4(9):1160-1.
26. Sethi S, Kartha G. Prevalence of refractive errors in school children (12-17 years) of Ahmedabad City. Indian J Community Med. 2000;25(4):181-3.
27. Pavithra M, Maheshwaran R, Rani M. 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):619.
28. Saad A, El-Bayoumy B. Environmental risk factors for refractive error among Egyptian school children. Eastern Mediterranean Health J. 2007;13(4):819-27.