PREVALENCE OF OCULAR MORBIDITIES AMONG SCHOOL GOING CHILDREN OF 6 - 16 YEARS IN AN URBAN AREA OF KANCHEEPURAM DISTRICT, TAMILNADU

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ABSTRACT

This study was carried out among children of age group 6 – 16 years in Kancheepuram District to study the prevalence of ocular morbidities among them. The study was conducted in Anakaputhur which is located at a distance of 7 kilometres from the institution with an area covering approximately 16 sq. kilometres. The burden of blindness is already high in our country we have to have a blindness prevention approach, beginning right from the childhood and school eye- screening programme should be an integral part of it.

Introduction

A child is a person 19 years or younger unless national law defines a person to be an adult at an earlier age. However, in these guidelines when a person falls into the 10 to 19 age category they are referred to as an adolescent (An adolescent is a person aged 10 to 19 years inclusive).1 The global child mortality rates, though lower than the under 5 mortality rates are themselves as close to 1 million children aged 5–14 in 2017. The probability of dying among children aged 5 – 14 was 7.2 deaths per 1,000 children aged 5 in 2017 – substantially lower than the probability of dying among children under age 5 (39 deaths per 1,000 live births). 2 The school eye health program is one through which children can be screened for diseases, such as refractory error, strabismus, amblyopia and trachoma 3-6 In most of the countries school screening programs are done routinely to detect the prevalence rate and causes of ocular morbidity.5 Refractive errors are the leading cause of ocular morbidity in school - aged children of India.Children do not complain of defective vision and may not even be aware of their problem. They adjust to the poor eyesight by sitting near the blackboard, holding the books closer to their eyes, squeezing the eyes and even avoiding work requiring visual concentration. This warrants early detection and treatment to prevent permanent disability. 6 Although the prevalence of morbidity in children is relatively low compared to adult population, it negatively affects the development, education and employment opportunities of children,as well as the quality– adjusted life years of society as a whole. This can have far reaching implications on the quality of life of children and the affected families. 7-1 0 Childhood blindness is one of the priorities in " Vision 2020: the right to sight". The estimated prevalence of childhood blindness/low vision in India is 0.8 per thousand population. 1 1 In terms of the 'blind person years' childhood blindness forms the maximum burden of blindness on the community, next only to cataract, which is the commonest cause of avoidable blindness. 6 School children are a captive audience and can be reached more easily in comparison to general population.Considering the fact that 30% of India's blind population loses their sight before the age of 20 years, the importance of early detection and treatment of ocular diseases and visual impairment in young is obvious. 1 2

Data on prevalence of childhood ocular morbidity and visual impairment is vital to set priorities and to plan various prevention strategies. This is especially important in a developing nation like

ours so as to prioritize the l imited resources. 1 2 There are very few field based studies on the pattern of ocular morbidity among school children. We hope that our study will provide a platform to formulate further policies and programs in a target oriented manner for planning and implementation of such screening and management programs, so that the objectives of "Vision 2020 : the right to sight" are achieved 1 3 Globally, the prevalence of blindness among children is estimated to be approximately one tenth of that in adults, at around 0.7 per 1000 children. Childhood blindness is one of the priorities in "Vision 2020: the right to sight" . The estimated prevalence of childhood blindness/low vision in India is 0.8 per thousand population.

Preventable blindness is still one of the major public health problems in India. The scarcity of community- based studies on ocular morbidity, more especially from rural areas is one of the reasons for the inadequate focus on the subject. Ocular morbidity is considered as one of most under diagnosed and undertreated public health problems in many developing nations especially in Asia.13 Factors which strongly influence the occurrence and burden and pattern of ocular diseases in a particular community include age structure of the population, socioeconomic conditions, educational status, occupational profile and environmental conditions etc., Healthcare system related factors l ike ac cess, quality, financing etc., also strongly influence the impact of these morbidities. Various researchers all over the world, has studied the prevalence of ocular morbidities among the adult population, and some even among the school going population. 14 However there are not many studies done in urban India, especially in Tamil Nadu

MATERIALS AND METHODS

STUDY DESIGN:

This study is a community based cross- sectional study conducted in urban area of Kancheepuram district, Tamil Nadu.

STUDY AREA:

This study was conducted in Anakaputhur which is the urban field practice area of the Urban Health and Training Centre (UHTC) attached to our Institution (SreeBalaji medical college and hospital. Anakaputhur is a municipality in the district of Kancheepuram, Tamilnadu. It is divided into 18 wards. The study was conducted in Anakaputhur which is located at a distance of 7 kilometres from the institution with an area covering approximately 16 sq. kilometres.

STUDY POPULATION:

According to the 2011 census, Anakaputhururban field practice area had a total population of 48,050 of which 24,158 were Males, 23,892 were Females and 9850 were Children between 6 - 16 years of age. Among the children 5045 were Males and 4805 were Females. Total number of houses in Anakaputhur is 12,146 The study was done among Children between 6 -16 years of age, residing in the study area permanently at the time of the study.

STUDY PERIOD:

The study was carried out from. December 1st 2017 –May 31st 2018 Physical measurement such as, Height, weight, BMIwer e taken from the study participants. Section VI: Ophthalmic Measurements Ophthalmic measurements like visual acuity, corrected visual acuity and colour vision were taken using Snellen chart and ishihara chart respectively.

ETHICAL APPROVAL:

The study proposal was presented and approv al from Institutional Ethics Committee was obtained prior to the pretesting.

STATISTICAL ANALYSIS:

The statistical analysis of the data was done using descriptive and analytical statistics. The descriptive statistics analysed were presented as frequency distribution and percentage. The analytical statistics used were Chi – square, Odds Ratio and Confidence Interval. Binary logistic regression was used to called the adjusted odds ratio. The association of Socio- demographic characters and determinants of ophthalmic morbidity was assessed. P value < 0. 05 was considered as statistically significant value. Da ta was entered in Microsoft excel and analysed using the software SPSS, version 22 software.

RESULTS

Table 1: Frequency distribution of sociodemographic variables

S. No	Sociodemographic variable		Frequency (N=672)	Percentage
1	Age	6-9 yrs	194	28.90
		10- 12 yrs	229	34.18
		13- 16 yrs	249	36.92
2	Sex	Male	304	44.98
		Female	368	55.02
3	Standard	1st -5th	280	41.4
		6th -8th	156	23.07
		8th -12th	236	35.5
4	Socio- economic status	Upper	154	22.9
		Upper middle	326	48.6
		Lower middle	129	19.2
		Upper lower	44	6.5
		Lower	19	2.8
5	Literacy of head of family	Illiterate	62	9.5
		Primary school	49	7.7
		Higher secondary	269	40.2
		Diploma	258	37.9
		Masters	34	4.7
6	Religion	Hindu	588	87.0
		Muslim	32	4.7
		Christian	47	7.7
		Others	5	0.6
7	Family type	Nuclear	452	67.5
		Joint	188	27.8
		3 generation	32	4.7
8	School type	Govt.	318	47.3
		Private	354	52.7

Socio-demographic characteristics of the study population is shown in table 1. Among the study participants , 36. 9% belonged to 13- 16 years of age,34. 1% belonged to 10 -12 years and 28.9% belonged to 6 -9 years of age. 280 students belonged to 1 -5th standard, whereas only 156

belonged to the 6 -7 category. About 54.1% of the study participants were females and 44.9% were males. According to the modified Kuppusamy' s scale , 48.6% belonged to upper middle class , 22. 9% belonged to upper class whereas only 2.8% belonged to lower class.Coming to literacy of the head of the family, 269 of them had passed higher secondary whearea 258 of them had a diploma degree in hand. There were no entries in middle school and graduate category whereas 49 & 62 of them were primary school and illiterate category respectively. More than half of them 87% were hindus , whereas 4.7% and 7.7% of them were muslims and Christians,only 0.6% of them belonging to religions other than this. Almost half of them(452) hai led from a nuclear family, whereas 188 of them were from a joint family and 32 of them from a 3 generation family. 354 students were from private schools and 354 students were from government schools.

TABLE 2: AGE AND STANDARD CHARACTERISTICS OF THE POPULATION.

Variable	Minimum value	Maximum value	Mean		Standard deviation
			value	Std error	
Age	6	16	11.25	0.105	2.734
Standard	1	12	6.20	0.108	2.792

The mean age of the study population was found to be 11 years wherein the subjects varied from 6 to 16years of age. The mean standard of the study subjects was found to be 6 t h standard wherein the stdy subjects were distributed between 1 s t and 12th standard. succumbed to watching television from nearby. And 46.1% were seated in the first benches and had a possibility of having difficulty reading the black boards from a distance.

**Figure 1 : Prevalence of eye complaints among the study population.**
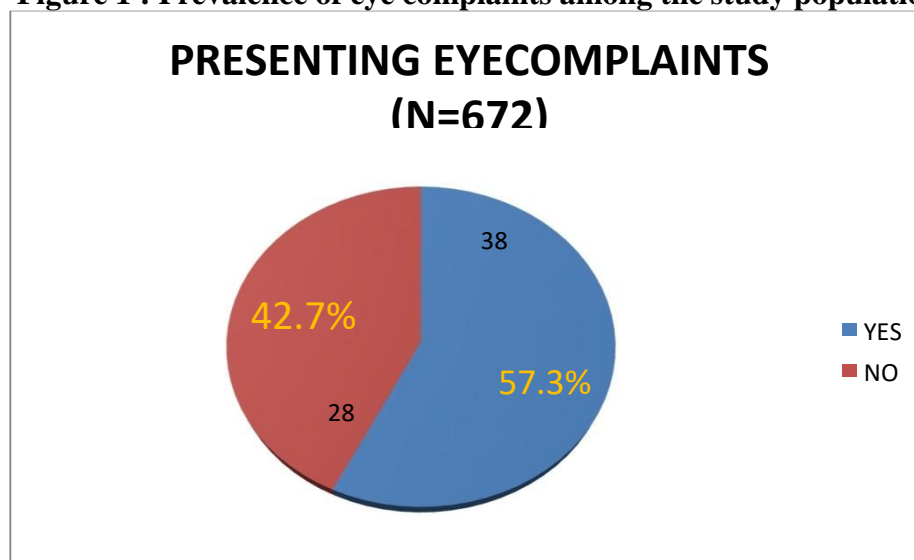
According to figure 1, eye complaints were quite prevalent among our study population(57. 3%), whereas 42.7% of the study subjects were asymptomatic.

Figure 2: Percentage distribution of various eye complaints among the study group presenting with visual complaints.(n= 385)

As per figure 2, the distribution of various eye complaints were such as , maximum students (16.8%) presenting with watering , followed by headache(13. 2%) , blurring (12.9%) , eye pain (10.6%) and redness (8.8%).The least prevalent complaints included swelling (4. 1%) and injury(1. 5%)
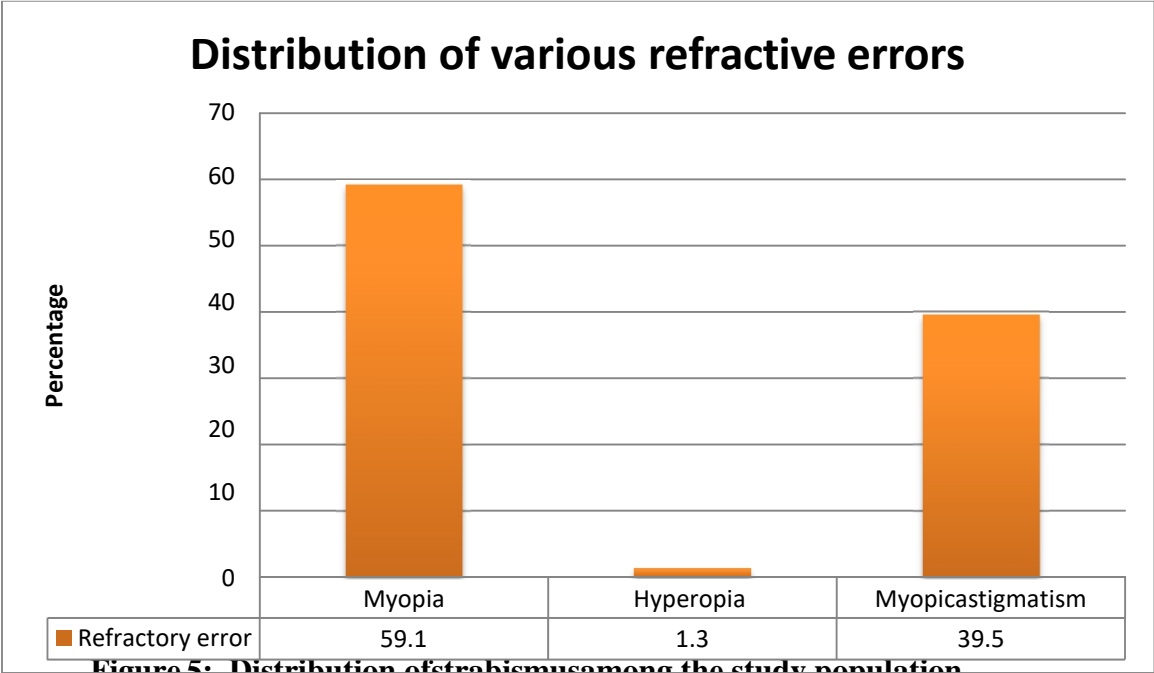
Figure 3: Prevalence of ophthalmic morbidity among the study population (N=672)
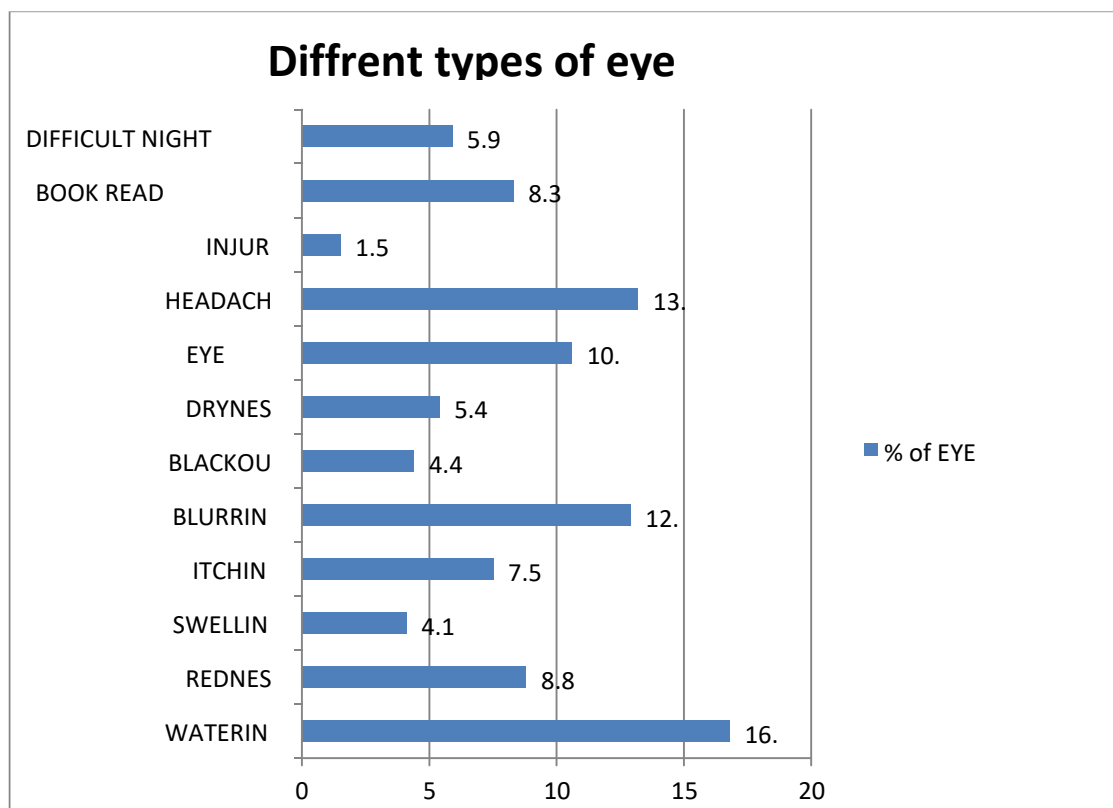
As In figure 3, in our study population 41.4% had one or the other ophthalmic morbidity, whereas 58. 6% did not suffer from any ophthalmic morbidity.
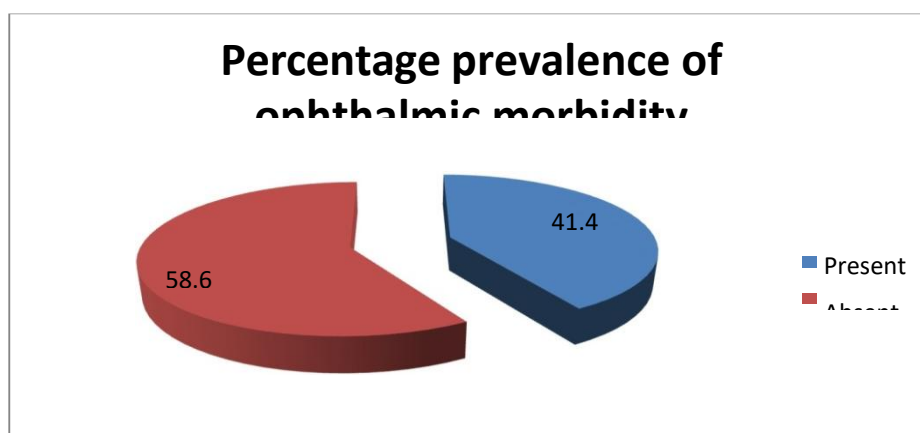
FIGURE 4: Prevalence of various refractive errors among the patients with refractive errors (n=225).

Distribution of various refractive errors

	Myopia	Hyperopia	Myopicastigmatism
■ Refractory error	59.1	1.3	39.5

(Percentage, y-axis from 0 to 70)

Figure 5: Distribution ofstrabismusamong the study population.

As In figure 4, among the three refractive errors,myopia was the most prevalent,with 59.1% of those presenting with a refractive error being plain myopic, whereas 39. 5% of them had myopic astigmatism only a meagre 1. 3% ,ie 3 participants had hyperetropiaor near vision defect.

COVER UNCOVER TEST

POSITIVE
9%
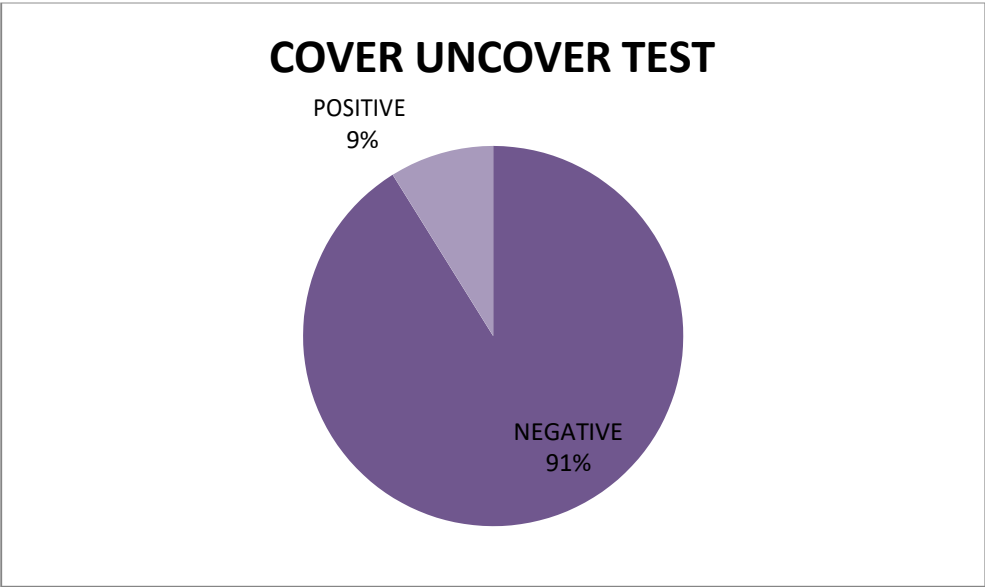
NEGATIVE
91%

As is evident from Figure 12, 9% of the study subjects had strabismus, whereas 91% showed negative results on cover uncover test , and were normal.

Table 3: Univariate analysis of sociodemographic variables with ophthalmic morbidity

| Socio demographic characteristics | Variable | Total frequency | Ophthalmic morbidity | | | |
			Frequency	Chi square value	P value	Odds ratio (95% CI)
Sex	Male	311	57	5.431	0.020*	1.66 (1. 08 - 2.56)
	female	361	43			
Age	< 10 yrs	206	38	38.57	0.000*	1.473 (0. 947 - 2.293
	≥ 10 yrs	466	62			
Socio-economic status	Upper	479	55	35.238	0.000*	0.420 (0. 272 - 0.651)
	Lower	191	45			
Religion	Hindu	571	81	2.041	0.564	0.704 (0. 405 - 1.224)
	Others	101	19			
School type	Govt.	318	38	4.095	0.043*	0.639 (0. 413 - 0.988)
	Private	354	62			

*Note: Significant p value of less than 0. 05

As in table 8,the variables that are significantly associated with ophthalmic morbidity by univariate analysis are sex (p value <0. 020 - OR value-1. 66) , age (p value<0.000 - OR value-) , socio - economic status (pvalue< 0. 000 -OR value-) and school type(p value<0.043 - OR value-).Other factors are not significantly associated with ophthalmic morbidity.

TABLE 4 : Multivariate analysis findings.

| Variable | Ophthalmic Morbidity | | | |
	p Value	Adjusted Or	95% CI	Nagelkerke R Square Value
Age	0.734	1.022	0.902 – 1.158	
Sex	0.067	.652	0.413 – 1.030	
				0.164
School Type	0.031	1.796	1.054 – 3.058	
Socio	0.003		1.452 –	

Economic Status		3.052	6.414	
Vitamin A Supplement	0.009	1.842	1.104 – 3.073	Cox And Snell R Square Value
Regular Fruit Veg Intake	0.019	.517	0.314 – 0.851	0.093
BMI	0.605	0.801	0.345 – 1.856	

The variables which were significantly associated in Univariate analysis were only included in multivariate analysis which is shown in TABLE 4. The multi variate analysis was done using Enter method. Model was found to be statistically significant (Cox and Snell R2 - 0.093, Nagelkerke R2 - 0.164, P value<0.001). The variables that are significant in multivariate analysis are sex , school type, socio economic status , Vitamin A intake and regular fruit vegetable intake. Other variables were found to be insignificant in multivariate analysis . Those who did not take vitaminA supplementation had 2 times more odds of developing an ophthalmic morbidity than those who took the supplementation. Those from government schools had 2 times more odds of developing an ophthalmic morbidity than those from private schools.Those from lower socioeconomic category had 3 times more odds of developing an ophthalmic morbidity than those from higher status. Other variables were found to be insignificant in multivariate analysis

DISCUSSION

In this study, 36.9% belonged to 13 -16 years of age, 34. 1% belonged to 10 - 12 years and 28. 9% belonged to 6 - 9 years of age. In a study by Desai S 67% were distributed in the age group of 7 to 12 years , 84.9% were in the age group of 13 to 18 years. In a similar study done by PrasannaKamath , 15 53% were in the age group of 6 to 10 years, 26.9 % were in the age group of 11 to 12 years , 20 % were in the age group of 15 -20 years. This variation in the age groups is due to the different study setting and variation in the socio- demographic characteristics of the study population. The mean age of the study population was found to be 11 years wherein the subjects varied from 6 to 16 years of age. In a study done by Kishore Tripura, 16 the mean age was found to be 8±2. 5 years. In a study done by SumitaSethi , 17 the mean age was found to be 9. 5±4. 9 years. According to the modified kuppusamy' s scale , 48.6% belonged to upper middle class , 22. 9% belonged to upper class whereas only 2.8% belonged to lower class. In a study done by Deshpande, 6 30.1 % belonged to upper lower and 26 .8 % belonged to lower middle class, whereas only 7 .4 % belonged to upper class. In a similar study done by Prajapati, 18 32 .1 % belonged to upper lower class and 23 .3% belonged to lower middle cl ass, and only 6.1% belonged to upper class.

Almost half of them(452) hailed from a nuclear family, whereas 188 of them were from a joint family and 32 of them from a 3 generation family. In a study done by Prajapati , 19 50.3 % belonged to nuclear family category, 49 .7 % belonged to joint family category. In a similar

study done by Deshpande, 4 42.2 % belonged to nuclear family category, 57.8 % belonged to joint family category. 47.3% students were from private schools and 52.7% students were from government schools. In a study done by P Kumar, 20 12.92% belonged to government schools,9. 8% belonged to private schools. In a similar study done by M Gupta , 21 50.8 % belonged to government school category, 49 .1 % belonged to private school category. In this study, the prevalence of ophthalmic morbidity is 41.4%, similar to a study done by P Kamath, 22 where the prevalence of ocular morbidity was 44. 77 % , also comparable to the one reported by Chaturvedi , 23-24

In a study done by Kalikivayi,25 the prevalence of amblyopia was found to be 1.1 %. In a study done by P Jamali , 26 prevalence of amblyopia was found to be 1. 7%. In a study done by Deshpande, 13 prevalence of Xerophthalmia was found to be 44%. In a study done by P Kamath , 2 1 prevalence of xerophthalmia was found to be 33.8 %. In a study done by Harpalsingh , 1 3 prevalence of xerophthalmia was found to be 13.6 %. Family history of eye morbidity (p value<0. 000 - OR value- 5.378).Other selected variables are not significantly associated with ophthalmic morbidity. In a study done by V Kalikivayi , 18 family history was found to be significantly associated with ophthalmic morbidity.

In this study, the variables that are significant in multivariate analysis are sex , school type, socio economic status , Vitamin A intake and regular fruit vegetable intake. However after controlling for all factors, multivariate regression showed no significant association between household incomes and the development of myopia.27

CONCLUSION

This study assessed the prevalence of ophthalmic morbidity among the school going population of Kancheepuram District, Tamil Nadu. The study reveals that among the study participants ,36.9% belonged to 13 -16 years of age and about 54.1% of the study participants were females. According to the modified Kuppusamy scale, socio economic classification, 48.6% belonged to upper middle socio economic category.   Among the study participants , 26. 2% were overweight,22.% were underweight and 12.6% belonged to obese category. 64. 7% had a positive family history of refractive error, 4. 1% are suffering from co morbidities of the lung and heart. Selected variables that are significantly associated with ophthalmic morbidity by univariate analysis are difficult If these morbidities are not attended at the right time they may progress to severe disabilities or blindness and may also affect the child's performance in the school. The burden of blindness is already high in our country we have to have a blindness prevention approach, beginning right from the childhood and school eye- screening programme should be an integral part of it.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

ACKNOWLEDGMENTS

BIBLIOGRAPHY

[1] Definition of key terms, Consolidated ARV guidelines, June 2013, age groups and populations. Available at: http:// www. who.int/ hiv/pub/ guidelines/arv2013/ intro/keyterms/e n/ (last accessed on 21/09/2018)

[2] UNICEF,for every child; monitoring situation of child and women; child mortality age 5 -14.Available at: https://data.unicef.org/ topic/ child- survival/child-mortality- aged- 5-14/.(last accessed on 24/09/2018)

[3] World Health Organisation:Regional office for South East Asia; child and adolescent health and development.Available at: http:// www. searo. who.int/ entity/ child_ adolescent/ en/ (last accessed on 27/09/ 2018)

[4] Gilbert C, Muhit M. Eye conditions and blindness in children: Priorities for research, programs, and policy with a focus on childhood cataract. Indian Journal of Ophthalmology . 2012; 60(5):451 -455. doi:10.4103/ 0301 - 4738.100548.

[5] Nirmalan PK, Vijayalakshmi P,Sheeladevi S, Kothari MB, Sundaresan K, Rahmathullah L. The Kariapatti pediatric eye evaluation project: baseline ophthalmic data of children aged 15 years or younger in Southern India. American journal of ophthalmology. 2003;136(4):703 -9.

[6] Gupta M, Gupta BP, Chauhan A, Bhardwaj A. Ocular morbidity prevalence among school children in Shimla, Himachal, North India. Indian journal of ophthalmology. 2009;57(2):133.

[7] Global Health Estimates 2013: deaths by cause, age and sex; estimates for 2000 – 2012. Geneva: World Health Organization; 2014.Available at http:// www. who.int/ healthinfo/Global_ burden_ disease/en, accesse d on 15 April 2018.

[8] Gupta N, Arya SK, Walia D, Mallik A, Sood S. Ocular morbidity among school- going children in the Union Territory of Chandigarh. International ophthalmology. 2014 ;34(2):251 - 7.

[9] Kamath P, Guruprasad BS, Deepthi R, Munninarayana C. Prevalence of ocular morbidity among school going children (6 - 15 years) in rural area of Karnataka, South India. Int J Pharm Biomed Res. 2012; 3(4):209 -12.

[10] Rahi JS, Gilbert CE, Foster A, Minassian D. Measuring the burden of childhood blindness. British j ournal of ophthalmology. 1999; 83(4):387 -8.

[11] National Programme for Control of Blindness and visual impairment.Directorate general of health services,Ministry of health and family welfare,Government of India, statistics,can be assessed at: http:// npcb. nic.in/ index1. asp? linkid=29&langid=1

[12] Madhavi MR, Kesuraju V, Nagrale P, Poka A. Ocular morbidity among school aged children in Indian scenario. International Journal of Research in Medical Sciences. 2017; 3(6):1431 -4.

[13] Wright KW. Visual development and AMBLYOPIA. In: Wright KW, Spiegel PH. Paediatric Ophthalmology And Strabismus. Newyork: Springer 2002;157 -71.

[14] DeshpandeJayant D, Malathi K. Prevalence of ocular morbidities among school children in rural area of North Maharashtra in India. National Journal of Community Medicine. 2011; 2(2):302 - 4.

[15] Prajapati P, OzaJ ,Prajapati J, Kedia G, Chudasama RK. Prevalence of ocular morbidity among school adolescents of Gandhinagar district, Gujarat. Online Journal of Health and Allied Sciences. 2011;9(4).

[16] Kumar P, Pore P, Dixit AK, Jha AK, Ahmad A, Chauhan N. Demographic profile of ocular morbidity in school children in India. Sch J App Med Sci. 2013;1(5):645 -52.

[17] Chaturvedi S, Aggarwal OP. Pattern and distribution of ocular morbidity in primary school children of rural Delhi. Asia Pacific Journal of Public Health. 1999;(1): 30 - 3.

[18] Kalikivayi V, Naduvilath TJ, Bansal AK, Dandona L. Visual impairment in school children in Southern India. Indian Journal of Ophthalmology. 1997;45(2):129

[19] Kumar R, Dabas P, Mehra M, Ingle GK, Saha R, Kamlesh R. Ocular morbidity amongst primary school children in Delhi. Health PopulPerspect Issues. 2007;30:222 -9.

[20] Wedner SH, Ross DA, Balira R, Kaji L, Foster A. Prevalence of eye diseases in primary school children in a rural area of Tanzania. British Journal of Ophthalmology. 2000;84(11):1291 7.

[21] Singh H. Pattern of ocular morbidity in school children in central India. Strabismus. 2011;63(2.08):0 -30.

[22] Nepal BP, Koirala S, Adhikary S, Sharma AK. Ocular morbidity in schoolchildren in Kathmandu. British journal of ophthalmology. 2003;87(5):531 - 4.

[23] Jamali P, Fotouhi A, Hashemi H, Younesian M, Jafari A. Refractive errors and amblyopia in children entering school: Shahrood, Iran. Optometry and Vision Science. 2009;86(4):364 9.

[24] Desai S, Desai R, Desai NC, Lohiya S, Bhargava G, Kumar K. School eye health appraisal. Indian journal of ophthalmology. 1989; 37(4):173.

[25] Shrestha RK, Joshi MR, Ghising R, Pradhan P, Shakya S, Rizyal A. Ocular morbidity among children studying in private schools of Kathmandu valley: A prospective cross sectional study. Nepal Med Coll J. 2006;(1):43 - 6.

[26] Kishore S, Aggrawal P, Muzammil K, Singh S, Bhaskar Y, Bhaskar R. Ophthalmic morbidity in school children in hilly areas of Uttarakhand. Indian Journal of Community Health. 2014; 26(1):56 - 60.

[27] Hashim SE, Tan HK, Wan- Hazabbah WH, Ibrahim M. Prevalence of refractive error in malay primary school children in suburban area of Kota Bharu, Kelantan, Malaysia. Annals Academy of Medicine Singapore. 2008;37(11):940.