



## Prevalence and demographic distribution of refractory error in school children of Pune, India

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### Abstract:

**Aim:** To find out the prevalence of refractive error in school children and common morbid conditions present amongst them. **Material and Methods:** It was a cross sectional study. The present study was planned to know the prevalence of refractive in school children in Pune city, and their correlation with socio demographic profile if any. The study was conducted in urban field practice area of a Medical College in Pune. School children of age 6-16 years of selected urban schools in the field practice area were the study population. The sample size calculated was 866 but 1157 were covered in this study. **Results:** Prevalence of refractory error was 6.22%. Myopia was most common (94.44%) type of refractive errors. Most commonly occur in age group of belonged to 9-11 years, females (52.78%). Only 12(16.67%) were diagnosed early having refractive error other remained undiagnosed /undetected. Amongst them only 33.33% were wearing spectacles Most common reason for not wearing spectacles was not made 25%, 52.78 % students had refractory error who have history of watching TV/or computer more than 3 hours. **Conclusion:** So to conclude present study highlights important problem of ocular morbidity in school children Refractory error. Refractory error was commonest form of ocular morbidity amongst them but most of it was undetected previously.

**Key words:** Demographic profile; Ocular morbidity; Pune; Refractory error; School children

## Introduction

Ocular Morbidity is one of the recognized causes of poor performance of a child. It may be a source of performance anxiety among school children [1].

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. Children in the school-going age group (6-16 years) represent 25% of the population in the developing countries. They offer significantly representative material for these studies as they fall best in the preventable blindness age group, are a controlled population i.e. they belong to a certain age group and are easily accessible and schools are the best forum for imparting health education to the children. Schools are also one of the best centers for effectively implementing the comprehensive eye healthcare programme [2]. A study of the pattern of ocular diseases in children is very important because while some eye conditions are just causes of ocular morbidity, others invariably lead to blindness. Also while some conditions such as refractive errors and cataract are treatable others like measles and vitamin A deficiency are largely preventable. Many ocular diseases have their origin in childhood and the morbidity may go unnoticed and adversely affect the child's performance in school and may also cause severe ocular disability in the later part of life [3]. Childhood eye morbidity is defined as "Any eye disease or condition that requires ophthalmic care and treatment which if untreated can often progress to serious and sight-threatening disease" [4]. The pattern of ocular diseases varies in different part of the world and is influenced by racial, geographic, socioeconomic and cultural factors [5].

In the light of above facts and with very little data available on refractive error in children especially in Maharashtra the present study was conducted to find out the prevalence of refractive error in school children and common morbid conditions present amongst them. Early detection of refractive error will thus prevent future progression of disease.

## Material and Methods

It was a cross sectional study. The present study was planned to know the prevalence of Vitamin A in school children in Pune city, and their

correlation with socio demographic profile if any. The study was conducted in urban field practice area of a Medical College in Pune. The UHTC caters about 60,000 population. The study was done in one of the municipal school and one of the private English medium school randomly chosen. There are 4 municipal schools and 5 private schools in the Urban Health Training Centre field practice area. One municipal school and one private school were selected randomly by lottery method. Institutional Ethical Committee approval was taken. **Study population:** School children of age 6-16 years of selected urban schools in the field practice area. **Inclusion criteria:** All the Children in the age group of 6-16 years in the selected schools of urban field practice area. **Exclusion criteria:** Those who are not willing to participate and absentees on the day of examination. The Sample size was calculated by taking the prevalence of ocular morbidity in school children in 6-16 years age group i.e.31.6% [4]. Using this prevalence for finding out sample size following method is used.

**Formula** [6].  $n = 4PQ/L^2$  is used

$$P = 31.6\% \quad Q = 100 - 31.6 = 68.4$$

$$L = \text{allowable error } 10\% \text{ of } P = 3.16$$

$$\begin{aligned} \text{Sample size} &= 4PQ/L^2 \\ &= 4 \times 31.6 \times 68.4 / (3.16)^2 \\ &= 865.82 = 866 \end{aligned}$$

The sample size calculated was 866 but 1157 were covered in this study.

Before conduction of study training in Ophthalmology Department was undertaken to diagnose the Vitamin A in children till inter-observer error is minimized. It was of 15 days duration.

A pilot study was conducted in the same municipal school which is selected for study (50 students) and a questionnaire was finalized in order to collect information from the students and from parents.

The list of municipal and private school in field practice area of UHTC was obtained. There were 4 municipal and 5 private (English medium) schools. One municipal school and one private school were selected randomly by lottery method. Two different types of school were chosen to get different socio economic class of students. Permission of school authority was obtained. School authority was explained about nature of study. An informed consent from school authority was obtained. The

information was collected in a predesigned and pretested proforma.

All the students in the age group of 6 to 16 years present on the days of examination in that school were examined. The students who were not present on the day of examination was covered in next visit and examination was done. Bitots spot was noted, if gray or white, brown lesion involving the exposed portion of the bulbar conjunctiva with triangular shape and base of triangle facing toward temporal bone of same site was present. Height was measured in nearest centimeter by drawing a metric

scale on the wall by standard measuring tape. Weight was measured in nearest 100 grams with the help of standardized weighing machine. The machine was standardized from time to time with the help of standard weight. Before taking weight zero was adjusted properly. Once BMI is determined, the student's age and gender were used to select the appropriate growth chart. After collection and editing of data, classification and tabulation was done under appropriate heading so as to obtain the summary values for further statistical treatment.

## Results & Discussion

In present study prevalence of refractive error in students was 6.22 %.The prevalence was more in Private English Medium School 8.22 % while in Municipal Corporation School it was 4.71%.

Similar prevalence was observed in: A study conducted by Jha K N [7] in Leh, Jammu and Kashmir, India and they found that the prevalence of refractive error was 5.69% of the total (843) study population.

A study conducted by Niroula, et al. [8] from Nepal in which they found that prevalence of refractive error was 6.43% i.e. 62 schools children out of 964. The refractive error was found more in Private school children (9.29%) than Government school children (4.23%). Ayanniyi A et al. [9] found in their study among primary school children in Ilorin, Nigeria, prevalence of refractive error was the 6.9% of total study population.

In a population based study on prevalence of refractive errors in children (Age Group 7-15 Years) of Gujarat conducted by Vivek T et al. [10] found that prevalence of refractive error in urban area was 7.5%. Lower prevalence was observed by: Kalkivayi V et al. [11], in Hyderabad where they found that prevalence of refractive error was observed in 115 (3.13%) students out of 3669 students.

A study conducted in Mahabubnagar district, Andhra Pradesh by Dandona R et al. [12] found that the prevalence of refractory error was only 2.7% of school students. Pokharel G P et al. [13] found in their study in Nepal the prevalence of refractive error was 2.9%. Susanne H Wedner et al. [14] in a study on prevalence of eye diseases in primary school children in a rural area of Tanzania reported that prevalence of refractive errors were 1.01%.

Bhattacharya R N et al. [15] in their study on visual acuity and vitamin A deficiency amongst

primary school students in Naxalbari village, Darjeeling district of West Bengal they observed that prevalence of refractory error was 3.65%.

A higher prevalence was observed by Sethi S, et al. [16] in their study they found that refractive error was 25.32% of the school children. In Kampala district, Uganda Midi Kawaka, Robert Meek [17].they found that prevalence of refractory error was 11.6 %. Matta S et al. [18] observed in their study that the overall prevalence of refractive error was 12.5%.

Study done by Lu P, et al. [19] showed a higher prevalence of refractive error in school children as 18.36 %. Madhu Gupta, et al. [20] conducted study on ocular morbidity prevalence among school children and observed that refractive errors (22.0%) constitute the major cause of ocular morbidity. A study conducted to determine the magnitude of refractive errors among school children of 6-15 years of age in rural block of Haryana by Sharma Seema, et al [21] they found that out of 1265, 172 children (13.6 %) were found to had refractory error.

Gauri Shankar Shrestha, et al. [22] in their study they found that prevalence of refractive error among school children in Jhapa, Nepal was 8.58%. In another study by Harpal Singh [23] in Bhopal Madhyapradesh, found that of the total 3016 students examined refractory error was 47.91%. Rathod Hetal K, et al. [24] in profile of school going children with refractive error in Pune found that overall prevalence was 37.6%. Maul E, et al. [25] from La Florida, Chile they found that prevalence of refractory error was 15.8%. Zhao J, et al. [26] in their study on refractive error in children in Shunyi district in China reported a prevalence of 12.8%.

**Table 1: Distribution of students based on morbidity**

S.No	Variables	Number (n=1157)	Percentage (%)	P value
<b>Distribution of students with refractory error according to gender</b>				
1	Male	571	49.35	
2	Female	586	50.65	
<b>Refractive error</b>				
1	Present	72	6.22	
2	Absent	1085	93.78	
<b>Distribution of students according to refractive error diagnosed or not diagnosed.</b>				
1	Already diagnosed	12	16.67	
2	Not diagnosed before	60	83.33	
<b>Distribution of students according to types of refractive errors.</b>				
1	Myopia	68	94.44(100)	
2	Hypermetropia (hyperopia)	2	2.78(100)	
3	Astigmatism	2	2.78(100)	
<b>Age wise distribution of students with refractive error.</b>				
1	6-8	13	18.06	$\chi^2=6.13$ , df =3, p value=0.105
2	9-11	25	34.72	
3	12-14	19	26.39	
4	15-16	15	20.83	
<b>Distribution of students with refractory error according to gender.</b>				
1	Male	30	41.67	$\chi^2= 1.81$ , df =1, p value= 0.178
2	Female	42	58.33	

**Table 2: Distribution of students based on socio demographic profile**

<b>Distribution of students with refractory error according to religion</b>				
1	Hindu(N=1094)	67	93.6	$\chi^2= 0.34$ , df = 1, p value=0.5625
2	Muslim(N=63)	5	6.4	
<b>Distribution of the students with refractory error according to the type of family</b>				
1	Nuclear (N=626)	44	61.11	$\chi^2= 1.8$ , df =2, p value=0.4069
2	Joint family N=520)	27	37.5	
3	Three generation (N=11)	1	1.39	
<b>Distribution of students with refractory error according to Socioeconomic status</b>				
1	Class I(N=66)	5	6.94	$\chi^2= 37.224$ , df =4, p value=0.00001
2	Class II(N=460)	49	68.06	
3	Class III(N=184)	15	20.83	
4	Class IV(N=334)	1	1.39	
5	Class V(N=113)	2	2.78	
<b>Distribution of the students with refractory error according to the type of diet</b>				

1	<b>Mixed(N=1031)</b>	64	88.89	$\chi^2= 0.001, df =1, p$ value=0.95
2	<b>Vegetarians(N=126)</b>	8	11.11	
<b>Distribution of students with refractory error according to nutritional status of students</b>				
1	<b>Under weight</b>	31	43.06	$\chi^2=4.29, df = 2, p$ value= 0.117
2	<b>Normal</b>	20	27.78	
3	<b>Over weight</b>	20	27.78	
4	<b>Obese</b>	1	1.39	
<b>Compliance among school children who have spectacles</b>				
1	<b>Wearing spectacles at the time of visit</b>	4	33.33	
2	<b>Not Wearing spectacles at the time of visit</b>	8	66.67	
<b>Distribution of student according to cause of noncompliance for wearing spectacles</b>				
1	<b>Headache</b>	1	12.5	
2	<b>Heavy</b>	2	25	
3	<b>Not made spectacles</b>	2	25	
4	<b>Broken</b>	1	12.5	
	<b>Not look good</b>	1	12.5	
	<b>No reason</b>	1	12.5	
<b>Distribution of students with refractory error according to duration of watching Television and computer (Hour/day)</b>				
1	<b>&lt; 1 (N= 42)</b>	2	2.78	$\chi^2= 0.04, df=2,$ p value=0.9787
2	<b>1-2 (N=125)</b>	9	12.5	
3	<b>2-3 (N=373)</b>	23	31.94	
4	<b>&gt;3 (N=617)</b>	38	52.78	

These differences in prevalence of refractive error might be due to students belonging to different geographical location, different socioeconomic class, different race, gender etc.

Out of the total 72 students with refractory error 16.67% of male and female were diagnosed while 83.33% remained undiagnosed till the study. Numbers of students undiagnosed were more in Private English Medium School (87.80%) as compared to municipal corporation school (77.47%). More than 4/5<sup>th</sup> cases of refractory error remained undiagnosed revealed again the importance of regular screening for ocular morbidity specially refractory error in schools. Myopia was more commonly seen which constitutes for 94.44% of the refractive errors. Astigmatism was seen in only 2.78% of the students and hypermetropia is seen in 2.78% of the students. Myopia is prevalent in both municipal (93.55%) and Private school (95.12%). Lower prevalence was found in following study:

A study conducted by Medi Kawuma et al. [17] in Kampala district they found that the commonest refractive error was astigmatism with 38 (52%) children, followed by hypermetropia with 27 (37%) children, and myopia with 8 (11%) children. In a study of Prevalence of refractive errors in school children of Tafila city conducted by Hussein A, et al. [27] they found that Myopia (63.5%) was the most common type of refractive errors followed by Hypermetropia 11.2% and astigmatism 20.4%.

A study by Matta S, et al. [18] in their study they found that out of 124 children with refractive error, 55.6% had myopia, hypermetropia was seen in 16.9% and astigmatism was prevalent in 27.4% of children. A study on refractive errors in primary school children of Qazvin city in Iran was conducted by Mohammad Khalaj, et al. [28] they found that amongst the 5913 children with visual impairment the distribution of refractive errors were as follows. Myopia found in 65.03%, hyperopia was found in 12.52% and

astigmatism was prevalent in 16.1% and amblyopia was seen in 6.36% of the children with refractive error in the study population.

A higher prevalence was found in a study Susanne H, et al. [14] in Tanzania reported that all the 14(100%) students with refractive errors were myopic. A study was conducted by Sonam Sethi and G P Kartha [16] and they found that 63.3% students had myopia, 16.3% had hypermetropia and 20.4% of the students had astigmatism. In another study by Padhye AS, et al. [29] they found that the prevalence of myopia, hyperopia and astigmatism in urban children was 3.16%, 1.06% and 0.16%, respectively. Whereas Murthy GVS, et al. [30] in their community based study on refractive error in children of 5-15 years age group in the urban population in New Delhi reported the prevalence of myopia as 7.4% and hyperopia as 7.7%. They found that astigmatism was seen in 5.4% of the cases.

Niroula DR, [8] conducted a study on refractive errors of school children of Pokhara city in Nepal and found that myopia was the most common form of refractive error accounting for 4.05% of refractive error whereas hyperopia was seen in only 1.24% and astigmatism in 1.14% of the students. A study conducted by Zhao J, et al. [26] in school children of Shunyi district in China found a higher prevalence of myopia of 16.2% and hypermetropia was seen in 3.5% of the children. Astigmatism also showed a higher prevalence of 15%.

Maul E, et al. [25] in their population based study on Refractive Error from La Florida, Chile they found that hyperopia prevalence was 14.5% and myopia prevalence was 5.8%. They found a high prevalence of astigmatism which was seen in 19% of the children in the age group of 5-15 years in that geographical area. Vitale S, et al. [31] in their study they found that in United States myopia was more prevalent in 33.1% of total school children whereas hyperopia was seen in only 3.6%. In a study conducted in Mechi, Nepal by Pokharel GP, et al [13] the prevalence of myopia and hyperopia was only 1.2% and 1.4% respectively in a sample of children 5-15 yrs of age.

A study conducted to determine the magnitude of refractive errors among school children of 6-15 years of age in rural block of Haryana by Sharma Seema, et al. [32] they found that myopia was seen in 10.36% of students. Hyperopia 1.34% and astigmatism was found in 5.14 % students. Gauri Shankar Shrestha, et al. [22] found in their study that out of total 6.9% refractory error 44.78% of students were diagnosed as myopia 20.31% had hypermetropia and 34.9% had astigmatism. In another population based study in (age group 7-15

years) of Rural and Urban Area of Gujarat conducted by Vivek T, et al. [10] they found that the overall prevalence of myopia of in this study was 4.1%, and hyperopia of was 0.78%.

Jha K N [7] in his Baseline ophthalmic data of school children aged 15 years or younger in Leh, Jammu and Kashmir, India found that Myopia was the commonest refractive error. Out of the total diagnosed refractory error (48), myopia accounted for 4.1% (34) of the total (843) students and rest 1.66% was astigmatism. Kalkivayi V, et al. [11] in Hyderabad they found that hypermetropia was the common type of refractive error which was prevalent in 22.6% of the school children, myopia was seen in 8.6% and astigmatism in 10.3%. Though myopia was found more common as compare to other refractory error its Prevalence differed from study to study. These difference might be due to students belonging to different age, racial group and study i.e. were from different areas.

The age wise distribution of the prevalence of refractive errors in the students shared most (34.72%) of children with refractive error were in the age group which belonged to 9-11 years, followed by 26.39 % were in the age group of 12-14 years and 20.83% were in the age group of 15-16 years. Refractory error was more common in private school (8.22%) than municipal corporation school (4.71 %). There was no association found between age of students and refractory error. A study conducted by Sethi S, et al. [16] the prevalence of refractive errors among school children of Ahmadabad city who found that prevalence of refractive errors was highest (40%) in 17 years old students compared to only 6.7% in 11 year old children. The trend of refractory error was increasing with age that is at the age of 11 year the prevalence was 6.7%, 12 years - 24.5%, 13 years - 22.5%, 14 years -25.9%, 15 years - 36% and at 16 years 31.9%.

Bhattacharya RN, et al. [15] in a study on visual acuity and vitamin A deficiency among primary school students in Naxalbari village, Darjeeling district of West Bengal found that out of total school students examined (329) refractory error was more prevalent in 7-8 year of age that is 9 students (2.74%), followed by 5-6 year of age 2 students ( 0.61%) and 11-12 year only 1 student (0.3%) and no student were found in age group of 9-10 year with refractory error. In a study of Prevalence of Refractive Errors in School Children of Tafila city conducted by Hussein A, et al.[27] it was found that refractory error was more prevalent in 12-14 years of age students (80.81%) followed by 15-16 years of age students 18.71% and only 0.48% in 9-11 years of age.

Padhye AS, et al. [29] in their study on refractive error and other eye problems among urban and rural school children in Pune they found that refractory error was more (7.22%) in age group 9-12 years followed by (3.13%) 6-8 year and (4.63%) in 13-15 years students. In another study by Harpal Singh [23] in Bhopal Madhyapradesh, he found that age wise distribution of refractory error was as follows 26.6% in 6-8 years of age groups, 8- 10 years of age group had 26.8% refractory error, 10- 12 years of students had 21.0%, 12-14 years of students had 17.0% and 14-16 years of students had 16.8% refractory errors. Rathod Hetal K, et al. found in their study that [24] the trend of refractory error was increasing with age that is out of total 160 students with refractory error the prevalence was more in > 13 year of students 28.75% followed by 11-13 year the prevalence was 26.25 %, 8-10 years 22.5% and at 5-7 years 22.5%.

Refractive error was more prevalent in the female children (58.33%) compared to male children (41.67%). The prevalence of refractory error amongst total 1157 students in females was 3.63 % and in male 2.59 %. The more number of female affected than male was found in many other studies though prevalence varies from present study. Although association between gender and refractive error was not found but this high prevalence in female might be due to the higher rate of growth in girls and also because girls attain puberty earlier than boys. In a study by Seema Sharma et al. [21] in their study conducted in rural blocks of Haryana they found that prevalence of refractive error was 23.7% in girls and only 12.2% in boys. Padhye AS, et al. [29] in their study on refractive error and other eye problems among urban and rural school children in Pune found that refractory error was slightly higher in female 5.72% students than male 5.27%. Rathod Hetal K, et al. [24] in Profile of School Going Children with Visual Impairment in Pune found in their study that defective vision was more in boys (55.62%) than in girls (41.38%) but the difference was not statistically significant. In a study of Prevalence of refractive errors in school children (12-17 yrs) of Tafil city conducted by Hussein A, [27] and they found that out of total 417 (38.78%) students with refractory error 221(53%) were male and 196 (47%) were female.

Bhattacharya RN, et al. [15].in their study they found that refractory error was more in male (2.13%) than female (1.52%). A study conducted by Niroula DR, et al [8] on the refractive errors of school going children of Pokhara city of Nepal in which the refractive errors were found more in boys (7.59%) than girls (5.31%). In a study conducted in school children of 12-17 years of Ahmadabad city by Sethi S, et al. [16]

it was observed that in the study 417 students were found to have refractory error of these 196 (47%) were females and 221(53%) were males. When types of refractive error were considered myopia was more found in females (57.35%) as compared to males (42.65%). Hypermetropia was same in both sexes (50%) and astigmatism was found only in females (100%).

Amongst students with refractory error maximum (93.6%) were Hindus and 6.4% were Muslims. This might be because of more Hindu students in present study. No single student was belonged to other religion. The prevalence of refractory error was found more in Muslims students 7.93% i.e. 5 out of 63 than Hindu students 6.12% (i.e. 67out of 1094). Although association between religion and refractive error was not found to be significant but this higher prevalence in Muslims might be due to lower percentage of Muslim students in this study. Similar observation was found by Bhattacharya RN, et al. [15] in their study where they found that refractory error was more in Hindu that is 91.67% than Muslims 8.33% and no student from other religion (Christian and Shikh) were found refractory error.

Rathod Hetal K, et al. [24] in their study they found that out of total (160) students with refractory error, 149 (93.13%) were belongs to Hindu and 6.87% from other religions but the difference was not significant statistically. Dandona R, et al. [12] in Southern India, they found that 20.4% of Hindu and 22.5% Muslim students were having refractory error which is more than present study. Refractory error was most common in 61.11% students from nuclear family followed by 37.5% in joint and 1.39% in three generation family. The prevalence of refractory error was more in three generation family (9.09%, 1 out of 11) followed by nuclear family (7.02%, 44 out of 626) than joint family (5.19%, 27 out of 520).

In municipal school refractive error is more common in the students from joint family. While the student in Private English Medium School prevalence of refractive error is 100% in nuclear family. There was no significant association found between Refractory error and type of family of student. Out of total 72 students with refractory error maximum that is (68.06%) belonged to class II followed by class III (20.83%), class I (6.94%) class V (2.78%) and class IV (1.39%). In both the types of schools refractory error was more common in class II the reason might be more number of students belonging to class II socio economic status. Prevalence of refractory error was maximum in class V (100%) followed by class III

(11.11%), class II (5.57%), class I (4.39%) and class IV (3.85%).

A significant association was found between socioeconomic status and refractory error. Rakhi Dandona, et al.[12] in their study found that extreme lower socio economic class have refractive error 2.09%, lower class have refractive error 12.2%, while middle and upper have 15.62 %, 4.65% respectively. Socioeconomic status determines nutritional status, health care availability, utilization of services etc .So this association is important with refractive error.

Amongst student with refractory error 88.89% had history of consuming mixed diet and only 11.11% were vegetarian. The prevalence of refractory error was almost similar in both the type of diet that is 6.21% (64 out of 1031) in mixed diet and 6.34% (8 out of 126) in vegetarian diet. Similar observation was found by Viswa Teja et al. [33] in their study where they mentioned that 87.9 % students were on mixed diet have refractive error and 12.1% were vegetarian have refractive error.

A study conducted by Niroula DR, et al. [8] in Nepal they found that children with vegetarian diet (10.52%) had greater number of refractive error than non-vegetarian diet children (6.17%). In this study there was no association found between type of diet and refractory error. Total 43.06 % of students with refractory error were underweight means underweight students, were having more refractory error which is followed by normal and overweight i.e. 27.78% each respectively. In municipal school refractory error was more in over weight (51.61%) followed by underweight and normal students who have refractive error 35.48% and 12.90% respectively. On the other hand in private school the refractory error was more in underweight (48.78%) followed by normal (39.02 %). There was no association found between nutritional status of student and refractory error.

Total 12 students stated that they were having spectacles and already diagnosed as having refractory error. But only 33.33% students were wearing spectacles at the time of examination. The wearing of spectacles was similar in both males and females. Lower compliance was found by, Villarreal GM, et al. [34] found in Northern Mexico found only 28% compliance among children with refractive error.

In a study on Refractive Error and Patterns of Spectacle Use in 12-Year-Old Australian Children conducted by Robaei D, et al. [35] found that only 19.0% of children were using spectacles. A study conducted by Castanon Holguin AM, et al. [36] found that at the time of unannounced follow up, 13.4% of children had the spectacles and 34% had the spectacles

with them but not wearing them. Congdon N, et al. [37] in Chinese secondary school children found that 17.9% of the children who owned spectacles did not wear them. In Oman 71.6% of school children were wearing their spectacles at a one year follow-up visit. This was noticed in a study in Omani school children by Khandekar R, et al. [38].

When students who were not wearing spectacles were asked about reasons for not wearing of spectacles most common (25%) cause was spectacles not made followed by 25% mentioned heaviness after applying spectacles. Other causes of noncompliance were headache (12.5%), spectacles broken (12.5%), not looking good (12.5%) and one student replied that there were no reason (12.5%) for non-compliance. A study conducted by Castanon Holguin AM, et al. [36] on the factors associated with spectacle wear compliance in school aged Mexican children showed that the children who did not wear spectacles gave the following reasons.

Glasses broken or lost (14%), Glasses cause headache (6.1%), forgot glasses at home- 16.6% Concerned or teased about the appearance- 16.6%. C Yabumoto, et al.[39] in their study on children from Southern Brazil showed some of the reasons for non-wear as lost the spectacles-40%, not getting used to- 64%, and unattractive in 13.5% of the children not wearing the spectacle. Nita Odedraa, et al. [14] in their study on barriers to spectacle use in Tanzanian secondary school students found that peer pressure and parental concerns about safety of spectacle use, cost of purchasing spectacles and difficulties in accessing good local optical services were identified as the main barriers.

Out of Total 72 students the refractive error was more common in the students who have history of watching TV/or computer more than 3 hours i.e. 52.78 %.The student not having history of watching TV have 2.78 % refractory error only. Though the number of students with refractory error was more in students who watch TV/Computer > 3 hours. Significant association was not found between duration of TV watching and / or computer by students and refractory error. A study by S Seema, et al. [32] shows the prevalence of refractory error was found to be more in students who watched TV for 3-5 hours 16.4%. as compare to child who were watching 1-2 hours 11.5% and not watching television 11.8% and it was observed that prevalence of defective vision was more in cases of longer duration of TV watching, but the association of duration was not found to be significant with defective vision.

Rathod H et al. [24] in their study found that number of hours watching TV and defective vision

have statistically significant difference and out of total the defective eye problem was more in that students who had history of watching TV for duration of 1-2 hour (33.82 %) followed by students who were watching TV <1 hour (32.35 %) and > 3 hours (26.47%).

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