

THE VISION ISSUES AND RELATED FACTORS OF CHILDREN RESIDING IN TWO PROVINCES IN WESTERN TURKEY*

Nukhet Kirag¹, Adile Tumer²

¹Adnan Menderes University, Faculty of Nursing

²Mugla University, Faculty of Health Sciences

Author correspondent: **Nukhet Kirag**, email nukhetbal85@gmail.com

* This study was presented as poster presentation at Ist International and IInd National Women's Diseases and Mother-Child Health Congress (7-8 October 2016).

Abstract:

Around the world, approximately 285 million people are visually impaired, and 19 million of them are children. The objective of this study is to determine the prevalence of vision problems experienced by children residing in two provinces in western Turkey, and to evaluate the characteristics of their protective behaviors addressed to eye health as well as the relationship between these behaviors and eye health problems. This is a cross-sectional study. The study data were collected between May and October 2016. The population of the study comprised 355 parents that had children and were registered in a total of 22 primary healthcare centers in two provinces in western Turkey. Vision problems were significantly more common in students who had received an eye examination and had family members with vision problems. Having been examined by an ophthalmologist (OR=0.031; 95% CI: 0.004-0.226) and having family members with vision problems (OR=2.76; 95% CI: 1.47-5.18) are independent variables that are related to having a vision problem. It was remarkable in the study that developing protective behaviors is necessary for eye health.

Key-words: Child, Health, Parents, Vision, Eye, Turkey

Introduction

Around the world, approximately 285 million people are visually impaired, and 19 million of them are children. Among these children, 12 million became visually impaired due to refractive errors that could easily have been diagnosed and treated [29].

In 2013, the World Health Assembly confirmed the 2014-2019 action plan for universal access to eye healthcare. Within the framework of this plan, the objective was to reduce visual impairment by 25% by 2019. Of the total population of visually impaired people, approximately 90% live in developing countries. Myopia, the most prominent visual disorders, is regarded as a multi-factor condition affected by both genetic and environmental factors. Near work seem to be the most common environmental factor determined in animal studies on monkeys as well as in epidemiological studies [10].

Previous clinical study shows that there is a strong relationship between near work and pediatric myopia [21]. Past studies found that increased education levels led to higher rates of near work and myopia [5, 18, 19, 27]. Studies carried out in different countries found that

there was a significant relationship between refractive errors and near work behaviors, socioeconomic status, duration of outdoor activities, exposure to cigarette smoke, family history and ethnic background [8, 9, 24, 30].

The relevant literature indicates that few studies on protective eye health behaviors and possible related factors for children in developing countries, including Turkey. For this reason, the objective of this study is to determine the prevalence of vision problems in children residing in two provinces in western Turkey, and examine to evaluate the characteristics of their protective eye health behaviors as well as the relationship between these behaviors and vision problems.

Materials and methods

Study design, setting and sample

This is a cross-sectional study. The study data were collected between May and October 2016. The population of the study comprised 355 parents that had children and were registered in a total of 22 primary healthcare centers in two provinces in western Turkey. In this study, it was determined that it was necessary to include a minimum of 114

individuals based on the calculation that was made using G*Power software within a confidence interval of 95%, an effect size of .472 (based on the result of a similar study and a power of $\alpha=.05$ ($1-\beta$) $=.80$). The researcher aimed to contact all individuals in the population considering that there could be participants lost during the data collection process. All parents were called on the phone and invited to the primary healthcare centers in which they were registered. Since the researcher could not contact six of the parents, the data of 349 parents were collected during individual interviews in a primary healthcare center they were registered in. In total, the researcher contacted 98.3% of the targeted population.

Data collection tools

The study data were collected using the Descriptive Characteristics Form, which included questions related to sociodemographic characteristics, Pediatric Eye Health Form, which included questions related to children's eye health and the Parents' Pediatric Eye Health Information Form, which included questions about parents' knowledge and behaviors around pediatric eye health.

The first section was designed to analyze participants' demographic characteristics such as age, sex of their children, income level of the family, level of social insurance, parents' education levels and parents' occupations. The second section included questions that were written based on the relevant literature. The questions were about any diagnosed eye disease in child, the family members that have eye diseases, any glass wearers in the family, any use of sunglasses, having been examined by an ophthalmologist, near work behaviors of the child (as daily hours), duration of outdoor activities and average duration of daily sleep [9,10]. The responses to the question about diagnosed eye diseases were checked on the records of the primary healthcare center. The spherical equivalent for myopia was accepted to be (SE) ≤ -5 D. Hypermetropia, strabismus, and other eye diseases were confirmed on the files. The last section were about the intervals that should be taken between a child's ophthalmologist visits, how often a child should wear his or her glasses, eye issues that the parent is informed of, the

situations that require wearing sunglasses, the locations where sunglasses should be purchased, and the importance of spending time in outdoor for eye health.

The researcher filled out the survey forms by creating appointments for parents in the primary healthcare centers they were registered in to make sure that they would come to the center in groups of five. The duration spared for each individual interview with the parents was approximately 20 minutes long. It facilitated the collection of the study data to create appointments beforehand and running interviews with a small number of parents in each session.

Ethical considerations

This study was determined suitable and approved by the Ethical Committee of Muğla University's Medical School in Turkey. [code number:73] The researcher also obtained the verbal consent of the individuals who participated in the study before collecting the data. Data privacy and reliability were ensured for all participants. Participants in the study were also given the right to withdraw from the study at any time on a voluntary basis.

Data analysis

Statistical analyses of the data were conducted using the Statistical Package for the Social Sciences SPSS for Windows, version 20.0 (SPSS Inc.; Chicago, IL, USA). The variables were investigated using visual (histograms, probability plots) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk test) to determine whether they are normally distributed. Categorical variables were provided in the form of numbers and percentages and the chi-squared test was used for the comparison between groups. The quantitative variables were presented in means and standard deviations (SD). The two-step logistic regression analysis was used to determine the independent variables of the vision problem. The variable found to be significant according to the bivariate analysis was included in the logistic regression analysis using the Wald test, which is one step further. The Odds Ratios (Ors) and 95% confidence intervals (CIs) were calculated. The statistical significance level of the P value was accepted to be $\leq .05$.

Results

The children included in the study were aged between 2 and 12 years (7.3±3.2). Of them 51% were females and 98% had social security. Also, 13.5% of the children had a diagnosed vision problem while the most common vision problem was myopia with 7.7% and 63.9% of the children saw an ophthalmologist for examination. (Table 1)

Variables Age (7.2±3.2)	n	%
<7	160	5.8
7-10	116	3.2
>10	73	0.9
Sex		
Female	178	1.0
Male	171	9.0
Social Security		
Yes	342	8
No	7	2
Monthly Income		
Income lower than expenses	126	36.1
Income equal to expenses	168	8.1
Income higher than expenses	55	5.8
Diagnosed Vision Problem		
Yes	47	3.5
No	302	6.5

Existing Vision Problem		
Myopia	27	.7
Hypermetropia	7	.2
Being astigmatic	9	.6
Strabismus	1	.4
Lazy Eye	2	.6
Any Visits To the Ophthalmologist For Examination		
Those that do the visit	223	63.9
Those that do not do the visit	126	36.1
Total	349	100

Table no.1 Sociodemographic characteristics of the students

Vision problems were significantly more common in students who had the behavior of going through eye examination and had family history. There was no significant relationship between having a vision problem and sex, monthly income, having family members who smoked, the frequency of the child being present near smokers, child’s time of birth and the use of sunglasses (Table 2).

Sociodemographic characteristics	Total number	Number of participants with Vision Problems (%)	Significance Test	OR 95%CI
Sex				
Masculine	171	19 (11.1%)	$\chi^2=1.5, p>.999$	1.49(.80-2.78)
Feminine	178	28(15.7%)		
Being examined by an ophthalmologist				
Yes	223	46(20.6%)	$\chi^2= 27.1, *p<.001$	32.4(4.42-238)
No	126	1(0.79%)		
Monthly Income				
1.000 TRY or less	294	37(12.5%)	$\chi^2= 1.2, p>.999$.64(.30-1.39)
1.000 TRY or more	55	10(18.1%)		
Family history of eye diseases				
Yes	116	25(21.5%)	$\chi^2= 9.7,*p<.001$	2.63(1.41-4.91)
No	233	22(9.4%)		
Any smokers in the family				
Yes	214	30(14.0%)	$\chi^2= .14, p>.999$	1.13(.59-2.14)
No	135	17(12.5%)		
Child’s frequency to be present near smokers				
Always	34	2(5.8%)	$\chi^2= 1.86, p>.999$.37(.08-1.6)
Never	315	45(14.2%)		
Child’s time of birth				
Premature	35	4(11.4%)	$\chi^2= .13, p>.999$.81(.27-2.41)
In-time (term) and postmature	314	43(13.6%)		
Wearing sunglasses				
Yes	162	22(13.5%)	$\chi^2= .01, p>.999$	1.01(.54-1.87)
No	187	25(13.3%)		

Table 2. Popularity of the Students with Vision Problems and Related Sociodemographic Characteristics

According to the results of logistic regression analysis, having been examined by an ophthalmologist (OR=.031; %95 CI: .004-.226) and having family members with vision problems (OR=2.76;%95 CI: 1.47 - 5.18) are independent variables that are related to having a vision problem (Table 3).

Variable	β	P-value	Adjusted OR (95%CI)
Being examined by an ophthalmologist			
Yes (R)	-3.48	* p<.001	.031 (.004-.226)
No	4.82	*p<.001	-
Family history of eye diseases			
Yes (R)	1.01	* p<.001	2.76 (1.47-5.18)
No	-22.49	1.0	-
Constant	-	* p<.001	-
Percent correctly predicted	-		-
Model χ^2	-	45.7;* p<.001	-

Table 3. Logistic regression analysis for the independent variables of students with vision problems

Accordingly, 47.3% of the parents in this study stated that they never smoked at home, 69.1%, the rate of mothers who smoked during pregnancy was 14.9%. An analysis of parents' levels of knowledge and behaviors that affect pediatric eye health revealed that 40.8% believed children should be taken to an ophthalmologist for eye examination once a year and 84.2% believed that glasses wearing children should wear their glasses all the time. Of the parents 34.4% stated the desire to look closer to TV, which is a symptom of vision issue. Also 53.6% of the children didn't have sunglasses and 84.2% of the parents believed that children should always wear sunglasses in sunny weather. Finally, 69.1% of the parents believed that children's sunglasses should be purchased from optic stores and 45% thought that spending time outdoors is moderately important for eye health (Table 4).

Frequency of Smoking at Home	n	%
Always	41	11.7
Sometimes	73	20.9
Rarely	70	20.1
Never	165	47.3

Child's frequency to be present near smokers		
Always	2	0.6
Sometimes	32	9.2
Rarely	74	21.2
Never	241	69.1
Smoking During Pregnancy		
Smokers	52	14.9
Non-smokers	297	85.1

Table 4. The characteristics of families' knowledge and behaviors that affect pediatric eye health

Discussion

The frequency of vision problems in children in this study was 13.5%. Even though there were few children in this study's sample, the results were consistent with those of the relevant studies showing that vision problems have increased compared to the past years. Similarly, a study conducted with Indian children concluded that the most common vision issue was myopic refractive error with 4.7% and this rate was higher in urban children compared to rural children [22]. A study in Taiwan carried out with children found that the most prevalent disorder was refractive errors [13]. A Turkish study stated that 8% had refractive errors [11]. The researcher believes that the inclusion of 2 to 12 years old children in the sample affected this rate.

Vision problems were significantly more common in students who had family history. Preschool children found whose both parents had refractive errors compared to the children whose parents didn't have refractive errors [16]. A study in Singapore found that there was an increase in the frequency of myopia in the children with a family history of myopic refractive error [25]. The habit of seeing an ophthalmologist for an eye examination is a protective health behavior in determining eye issues. In the sample of this study, the rate of the students who had their eyes examined is high (63.9%), which shows a positive behavior has been developed regarding eye health.

The study that included the children in Turkish population reported that 18.4% of the children had received an eye examination for any reason until that day. These rates could be related to socioeconomic status, having social security and the popularity of the health services provided in the area as well as the age, number and the method of selecting study groups [1].

Lowe's (2013) study on Ghana the data of that study indicated that were aged or under 17 and 93 (61%) parents said that their children had never been to an eye examination [17].

In that study, the rate of undergoing an eye examination in children was higher than the results of other studies. The researcher believes that the difference between these rates was affected by a number of factors, including socioeconomic status, having social security, and the popularity of the health services provided in the area as well as the age [1].

The results of this study ascertained that there was no statistically significant relationship between children's vision issues and their parents' smoking habits their time of birth and the habit of wearing sunglasses for protection from the sun. Stone et al. (2006) reported in their study results that there was a significant increase in the myopia and hypermetropia prevalence in the children of the parents who smoked compared to the parents who didn't smoke [28]. A previous study found that the rate of refractive errors were significantly higher in premature infants than the infants having been born in time [14]. These results might have been affected by the differences among the participant children in ethnic background and race.

The responses to the questions that aim to determine parents' level of awareness about their children's eye health indicated that 40.8% of the participant parents said a child should be taken to an ophthalmologist for examination every six months. Senthilkumar et al. (2013) performed focus group interviews; the parents stated that they did not take their children for eye examinations since they might be told that their children needed to wear glasses [2,26]. The results of the study by Hobday et al. (2014) found that the improvement in parents' awareness about eye health was insufficient despite the fact that eye health education program were included in the program's content [6]. The study found that the parents were accurately informed about how often they should take their children to an ophthalmologist.

The parents in this study have a higher awareness than those in the other studies, despite not being trained on this subject. Of the parents in this group, 84.2% stated that children

with glasses should wear them at all times. Pavithra et al. (2014) analyzed the reasons that prevented children from wearing glasses found that 31.4% forgot their glasses at home, 14.3% lost their glasses, 11.4% had broken glasses and 11.4% had parents that did not approve of them wearing glasses [23].

Other results also show that the negative attitude of parents is an influential factor that prevents children from wearing glasses [3,7,15]. As a response to the question about vision issue symptoms, 34.4% stated the need to look closer at different objects such as the TV and blackboard and 21.2% stated that they squinted. Noertojojo et al. (2006) determined that only 0.6% of the participants accurately described the symptoms and possible risks of eye diseases [20]. The results of the study by Kırığ and Bayık (2018) indicated that 55% of the control group parents had correct information about their children's vision issues [12].

Although 69.1% of the parents believed that children's sunglasses should be purchased from optic stores, 46.4% of the children had sunglasses. It is noteworthy that there are few sunglasses with sun protection features when these sunglasses are thought to be purchased from elsewhere. The findings of the Kırığ and Bayık study, which was an education intervention indicated that 73.2% of the experimental group parents made their purchases from optic stores before the education program [12]. A study conducted with a Turkish population reported that 8% purchased their sunglasses from sellers in the street and 11% had sunglasses with insufficient ultraviolet protection [4].

An investigation on the importance of spending time outdoors for eye health revealed that 45% of the parents found it moderately important. The researchers believed that the parents in this study have an insufficient awareness about the importance of spending time outdoors for children. Presumably, this is affected by the fact that Turkish people do not spend enough time on outdoor activities [12].

Conclusion

In summation, vision issues are common in the children who reside in two provinces in western Turkey. The level at which children are

taken to be examined by an ophthalmologist can be described as good. However, the researcher believes that the behaviors to protect eye health should be popularized by studies that have the quality of education intervention. It is anticipated that intervention studies aiming to popularize protective eye health behaviors in children are beneficial. It may be appropriate to incorporate eye-health protective and informative lessons in school curricula tailored for every age group, starting with younger students. Further studies that have large populations and cover different areas should be conducted, as they will allow for comparisons to be made.

References:

1. Akyol N, Sezer E, Aslan L, Oğuzöncül F, Dinç E. A Prevalence Study On Amblyopia And amblyogenic Factors In Elazığ Provincial Center. *Türkiye Klinikleri. J Ophthalmol.* 2000; 9(2): 77-82.Turkish.
2. Cheng CY, Huang W, Su KC, Peng ML, Sun HY, Cheng HM. Myopization factors affecting urban elementary school students in Taiwan. *Optom Vis Sci.* 2013; 90(4): 400-406. <https://doi.org/10.1097/OPX.0b013e3182873449>.
3. Congdon NG, Patel N, Estes P et. al. The association between refractive cut offs for spectacle provision and visual improvement among school-aged children in South Africa. *Br J Ophthalmol.* 2008;92(7):8-13. <http://dx.doi.org/10.1136/bjo.2007.122028>.
4. Eser İ, Kömür B, Çömez A. Ultraviolet Permeability of Sunglasses in the Market. *The Global Information Resource for Medicine and Sci.* 2009; 16(4):289. Available from: http://www.istanbul saglik.gov.tr/w/tez/pdf/goz/dr_ okan_oral.pdf. Turkish.
5. Gwiazda J, Thorn F, Held R. Accommodation, accommodative convergence, and response AC/A ratios before and at the onset of myopia in children. *Optom Vis Sci.* 2005;82(3):273-78. <https://doi.org/10.1097/01.OPX.0000159363.07082.7D>.
6. Hobday K, Ramke J, Du Toit R, Pereira SM. Healthy Eyes in Schools: An evaluation of a school and community-based intervention to promote eye health in rural Timor-Leste. *Health Education Journal.* 2015;74(4):392-402. <https://doi.org/10.1177/0017896914540896>.
7. Holguin AMC, Congdon N, Patel N et. al. Factors associated with spectacle-wear compliance in school-aged Mexican children. *Invest Ophthalmol Vis Sci.* 2006; 47(3): 925-28. <https://doi.org/10.1167/iovs.05-0895>.
8. Huynh SC, Kifley A, Rose KA, Morgan I, Heller GZ, Mitchell P. Astigmatism and its components in 6-year-old children. *Invest Ophthalmol Vis Sci.* 2006; 47(1): 55-64. <https://doi.org/10.1167/iovs.05-0182>.
9. Jones LA, Sinnott LT, Mutti DO, Mitchell GL, Moeschberger ML, Zadnik K. Parental history of myopia, sports and outdoor activities, and future myopia. *Invest Ophthalmol Vis Sci.* 2007; 48(8): 3524-32. <https://doi.org/10.1167/iovs.06-1118>.
10. Khader YS, Batayha WQ, Abdul-Aziz SMI, Al-Shiekh-Khalil MI. Prevalence and risk indicators of myopia among schoolchildren in Amman, Jordan. *East Mediterr. Health J.* 2006;12(3/4): 434. Available from: <http://apps.who.int/iris/handle/10665/117104>.
11. Kırağ N, Temel AB. Primary School Age Children Determination of Eye Health Problems with Vision Screening. *Florence Nightingale Hemşirelik Dergisi.* 2016; 24(1):10-15. Available from: <http://dergipark.gov.tr/download/article-file/332671>.Turkish.
12. Kirag N, Temel AB. The effect of an eye health promotion program on the health protective behaviors of primary school students. *J Educ Health Promot.* 2018; 7(37):1-5. https://doi.org/10.4103/jehp.jehp_67_17.
13. Lai YH, Hsu HT, Wang HZ, Chang SJ, Wu WC. The visual status of children ages 3 to 6 years in the vision screening program in Taiwan. *J APPOS.* 2009;13(1):58-62. <https://doi.org/10.1016/j.jaapos.2008.07.006>.
14. Larsson EK, Rydberg A, Holmström GE. A population-based study of the refractive outcome in 10-year-old preterm and full-term children. *Arch Ophthalmol.* 2003; 121(10):1430-36. <https://doi.org/10.1001/archophth.121.10.1430>.
15. Li L, Lam J, Lu Y et. al. Attitudes of students, parents, and teachers toward glasses use in rural China. *Arch Ophthalmol.* 2010; 128(6):759-765. <https://doi.org/10.1001/archophthalmol.2010.73>.
16. Low W, Dirani M, Gazzard G et al. Family history, near work, outdoor activity, and myopia in Singapore Chinese preschool children. *Br. J. Ophthalmol.* 2010; 94(8): 1012-16. <http://dx.doi.org/10.1136/bjo.2009.173187>.
17. Lowe L, M. Mothers and Caretakers' Perception of Childhood Eye Care in the Ashanti Region of Ghana. *Diss.* 2013. Available from: https://ir.library.oregonstate.edu/concern/honors_college_theses/gt54kp82r.
18. Mutti DO, Mitchell GL, Moeschberger ML, Jones LA, Zadnik K. Parental myopia, near work, school achievement, and children's refractive error. *Invest Ophthalmol Vis Sci.* 2002; 43(2):3633-40.

- Available from: <https://iovs.arvojournals.org/article.aspx?articleid=2162292>.
19. Mutti DO, Mitchell GL, Hayes JR. Accommodative lag before and after the onset of myopia. *Invest Ophthalmol Vis Sci.* 2006; 47(3): 837–46. <https://doi.org/10.1167/iovs.05-0888>.
 20. Noertjojo K, Maberley D, Bassett K, Courtright P. Awareness of eye diseases and risk factors: identifying needs for health education and promotion in Canada. *Can J Ophthalmol.* 2006; 41(5):617-23. [https://doi.org/10.1016/S0008-4182\(06\)80035-9](https://doi.org/10.1016/S0008-4182(06)80035-9).
 21. Norton TT, Siegwart JT, Amedo AO. Effectiveness of hyperopic defocus, minimal defocus, or myopic defocus in competition with a myopiagenic stimulus in tree shrew eyes. *Invest Ophthalmol Vis Sci.* 2006; 47(5): 4687–99. <https://doi.org/10.1167/iovs.05-1369>.
 22. 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. <https://doi.org/10.4103/0974-9233.53864>.
 23. Pavithra MB, Hamsa L, Madhukumar S. Factors associated with spectacle-wear compliance among school children of 7-15 years in South India. *Int J Med Public Health.* 2014;4(2):146. <https://doi.org/10.4103/2230-8598.133110>.
 24. Saw SM, Tong L, Chua WH et al. Incidence and progression of myopia in Singaporean school children. *Invest Ophthalmol Vis Sci.* 2005; 46(1): 51-7. <https://doi.org/10.1167/iovs.04-0565>.
 25. Saw S. M, Javier Nieto F, Katz J, Schein OD, Levy B, Chew SJ. Familial clustering and myopia progression in Singapore school children. *Ophthalmic Epidemiol.* 2001; 8(4): 227-36. <https://doi.org/10.1076/opep.8.4.227.1609>.
 26. Senthilkumar D, Balasubramaniam SM, Kumaran SE, Ramani KK. Parents' Awareness and Perception of Children's Eye Diseases in Chennai, India. *Optom Vis Sci.* 2013; 90(12): 1462-1466. <https://doi.org/10.1097/OPX.0000000000000084>.
 27. Shen W, Sivak JG. Eyes of a lower vertebrate are susceptible to the visual environment. *Invest Ophthalmol Vis Sci.* 2007;48(6):4829–37. <https://doi.org/10.1167/iovs.06-1273>.
 28. Stone RA, Wilson LB, Ying GS et al. Associations between childhood refraction and parental smoking. *Invest Ophthalmol Vis Sci.* 2006; 47(10): 4277-87. <https://doi.org/10.1167/iovs.05-1625>.
 29. Universal eye health. A global action plan;2014-2019 [cited 2015 May 15] Available from:http://www.who.int/blindness/AP2014_19_English.pdf.
 30. Wedner SH, Ross DA, Todd J, Anemona A, Balira R, Foster A. Myopia in secondary school students in Mwanza City, Tanzania: the need for a national screening programme. *Br. J. Ophthalmol.* 2002; 86 (11): 1200-1206. <http://dx.doi.org/10.1136/bjo.86.11.1200>.