Internet use and television viewing in children and its association with vision loss: a major public health problem

Abdulbari Bener,[1,2,3] Huda S. Al-Mahdi[4]

[1]Department of Medical Statistics and Epidemiology, Hamad Medical Corporation, Hamad General Hospital, Qatar; [2]Department Evidence for Population Health Unit, School of Epidemiology and Health Sciences, The University of Manchester, UK; [3]Departments of Public Health and Medical Education, Weill Cornell Medical College, Qatar; [4]Department of Ophthalmology, Rumailah and Hamad General Hospitals, Hamad Medical Corporation, Qatar

Abstract

Little is known about the distribution of eye and vision conditions among school children in Qatar. The aim of the study was to examine the effects of excessive internet use and television viewing on low vision and its prevalence with socio-demographic characteristics. This is a cross-sectional study which was carried out in the public and private schools of the Ministry of Education and Higher Education of the State of Qatar from September 2009 to April 2010. A total of 3200 students aged 6-18 years were invited to take part of whom 2586 (80.8%) agreed. A questionnaire, that included questions about socio-demographic factors, internet use, and television viewing and computer games, co-morbid factors, and family history and vision assessment, was designed to collect information from the students. This was distributed by the school authorities. Of the school children studied (n=2586), 52.8% were girls and 47.2% boys. The overall prevalence of low vision was 15.2%. The prevalence of low vision was significantly higher in the age group 6-10 years (17.1%; P=0.05). Low vision was more prevalent among television viewers (17.2%) than in infrequent viewers (14.0%). The proportion of children wearing glasses was higher in frequent internet users and television viewers (21.3%). Also, low vision without aid was higher in frequent viewers. The study findings revealed a greater prevalence of low vision among frequent internet users and television viewers. The proportion of children wearing glasses was higher among frequent viewers. The prevalence of low vision decreased with increasing age.

Introduction

Visual impairment is a global public health problem. Children with low vision may suffer delayed developmental growth and education problems.[1] Over 285 million people in the world are visually impaired, of whom 39 million are blind and 246 million have moderate to severe visual impairment.[2] The World Health Organization[3] reported that every minute somewhere in the world, a child goes blind. For most of them, there is no prospect of curative treatment of the underlying pathology. Vision plays a vital role in a child's interpretation of the world. Visual impairment has a serious impact on a child's physical and emotional development.[4] However, visual function changes with age and most changes are amenable to correction with glasses and do not affect daily activities.

Controlling the problem of visual impairment is a priority for every country because failure to detect visual impairment early may have a permanent effect on long-term vision outcomes, education achievement and self esteem. Therefore, the American Academy of Ophthalmology and the American Association of Paediatric Ophthalmology and Strabismus has recommended that children be examined for eye problems at four stages: as newborns in the nursery, at 6 months, at 3 years, and 5 years of age and older.[5]

A revolution in information technology (IT) is rapidly taking place worldwide. Across all generations, children and adults are spending an increasing amount of time in front of the computer and on the internet. Television and the internet are now recognized as a powerful source of information for people of all ages. For many children, internet use and television viewing are an inevitable part of their daily lives. Sutherland[6] reported that along with the benefits of television and internet, there are also various factors that can have a harmful impact upon children. It was reported that daily television viewing and internet use for long hours at a time will damage children's eyesight from eye strain.

Very few studies have been published on the prevalence of visual impairment in the Arabian population, but no surveys have been carried out to determine the adverse effects of internet use and television viewing on visual impairment of children. Therefore, this study aimed to determine the effects of excessive use of the internet and television viewing on children's low vision and its prevalence.

Correspondence: Abdulbari Bener, Advisor to the WHO, Consultant and Head, Department of Medical Statistics & Epidemiology, Hamad Medical Corporation and Department of Public Health, Weill Cornell Medical College, PO Box 3050, Doha, State of Qatar.
Tel. +974.439.3765/439.3766 - Fax: +974.439.3769.
E-mail: abener@hmc.org.qa; abb2007@qatar-med.cornell.edu

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Materials and Methods

This is a cross-sectional study including schoolchildren and adolescents aged 6-18 years, studying at state and private primary, preparatory and secondary schools in the State of Qatar. A multi-stage stratified random sampling technique was used and the schoolchildren were randomly selected to take part. The list of names of schools in urban and semi-urban areas was obtained from the Supreme Council for Education and Higher Education. A total of 151,050 students are studying in primary, preparatory and secondary schools. There are 299 schools, of which 152 are for boys and 147 for girls, located in 21 different districts. During the first stage, one school from each of these 5 districts was selected randomly, thus overcoming the so-called *cluster effect*. Similarly, the classrooms and schoolchildren were selected in the second and third stages of the study using the same simple random sampling procedure. This resulted in the final selection of 3200 students who were a true random sample of the study population; this is 2.1% of the total student population in Qatar.

Data collection took place from September

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2009 to April 2010. Of the 3200 students approached, 2586 students participated in the study and completed the questionnaires with a response rate of 80.8%. The survey instrument was tested and validated on 125 students.

The questionnaire was in three parts. The first part included the socio-demographic details of the students, the second with questions concerning internet use, television viewing and computer games, the third with co-morbid factors and family history of the children, and the last part with vision assessment made by nurses. The children studied were classified into frequent and infrequent viewers of TV/internet. The questions concerning the frequent TV/internet viewers were: i) *How often do you watch TV/use the internet?* with three possible answers*, daily, week days* and *weekends;* and ii) *How many hours do you watch TV/internet every day?* From these two questions, frequent TV/internet viewers were classified as children watching television or internet for more than three hours a day.

The International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) was used to define visual impairment categories. Eye examination was carried out using a Slit Lamp, (Topcon) and visual acuity with tumbling E letters at a distance of 20 feet (6 meters). The participants' visual acuity without correction was measured separately for each eye. Visual acuity was then tested with best spectacle correction. Visual acuity was recorded as the smallest line in which the patient could read the four letters correctly. If the person was unable to read the largest E letters in the chart (20/400 E letters) at 20 feet (6 meters), then finger counting was performed at 1 meter or more. Low vision was defined as having best corrected vision in the good eye worse than 20/60, lower than 20/400, and worse than 20/400, respectively.

Student's t-test was used to verify the significance of differences between mean values of two continuous variables and confirmed by non-parametric Mann-Whitney test. χ^2 and Fisher's exact tests (two-tailed) were performed to test for differences in proportions of categorical variables between two or more groups. One-way analysis of variance (ANOVA) was used to compare several group means and to determine the presence of significant differences between group means. P<0.05 was considered significant.

Results

Table 1 shows the socio-demographic characteristics of the school children studied according to gender. Most of the participants were in the 6-10 year old age group (37.6%) and girls (52.8%) outnumbered boys (47.2%). A significant difference was observed between both genders in terms of their nationality (P<0.001), age group (P<0.001), academic performance (P=0.008), father's occupation (P<0.001) and family income (P=0.032).

Table 2 examines the socio-demographic characteristics of the children studied with low vision according to gender. The overall prevalence of low vision in children was 15.2%. The mean age±SD of boys with low vision was 11.5±4.0 and of girls 12.3±4.1 (range 6-18) years, with a significant difference between boys and girls (P=0.04). The proportion of children with low vision was significantly higher in the 6-10 year old age group (42.2%; P=0.006). Nearly half of the studied children with low vision were excessive internet users and TV viewers (50.6%). A good proportion of the parents of the children were in a consanguineous marriage (34.6%).

Table 3 compares the low vision and co-morbid factors between frequent and infrequent internet users and TV viewers. Of the total number of children studied, 36.8% were frequent TV/internet viewers. Low vision was significantly more prevalent among excessive

Table 1. Socio-demographic characteristics of the studied children according to gender (n=2586).

Variable	Total n=2586 n(%)	Boys n=1220 n(%)	Girls n=1366 n(%)	P
Nationality				
Qatari	1854 (71.7)	833 (68.3)	1021 (74.7)	<0.001
Non-Qatari	732 (28.3)	387 (31.7)	345 (25.3)	
Age group				
6-10	973 (37.6)	510 (41.8)	463 (33.9)	<0.001
11-14	870 (33.6)	435 (35.7)	435 (31.8)	
15-18	743 (28.7)	275 (22.5)	468 (34.3)	
Academic performance				
Very good	804 (31.1)	342 (28.0)	462 (33.8)	0.008
Good	1040 (40.2)	507 (41.6)	533 (39.0)	
Average	614 (23.7)	301 (24.7)	313 (22.9)	
Poor	128 (4.9)	70 (5.7)	58 (4.2)	
Father's education				
Illiterate	138 (5.3)	67 (5.5)	71 (5.2)	0.528
Primary	360 (13.9)	181 (14.8)	179 (13.1)	
Intermediate	538 (20.8)	262 (21.5)	276 (20.2)	
Secondary	745 (28.8)	340 (27.9)	405 (29.6)	
University	805 (31.1)	370 (30.3)	435 (31.8)	
Father's occupation				
Not working	227 (8.8)	116 (9.5)	111 (8.1)	<0.001
Sedentary/professional	835 (32.3)	434 (35.6)	401 (29.4)	
Manual	310 (12.0)	117 (9.6)	193 (14.1)	
Business man	647 (25.0)	283 (23.2)	364 (26.6)	
Government officer	567 (21.9)	270 (22.1)	297 (21.7)	
Mother's education				
Illiterate	449 (17.4)	229 (18.8)	220 (16.1)	0.496
Primary	471 (18.2)	221 (18.1)	250 (18.3)	
Intermediate	628 (24.3)	287 (23.5)	341 (25.0)	
Secondary	610 (23.6)	283 (23.2)	327 (23.9)	
University	428 (16.6)	200 (16.4)	228 (16.7)	
Mother's occupation				
Sedentary/professional	562 (21.7)	259 (21.2)	303 (22.2)	0.620
Manual	556 (21.5)	258 (21.1)	298 (21.8)	
Business man	521 (20.1)	240 (19.7)	281 (20.6)	
Housewife	947 (36.6)	463 (38.0)	484 (35.4)	
Family income				
< 5000	19 (0.7)	10 (0.8)	9 (0.7)	0.032
5000 – 9999	834 (32.3)	413 (33.9)	421 (30.8)	
10,000 – 14,999	988 (38.2)	479 (39.3)	509 (37.3)	
>15,000	745 (28.8)	318 (26.1)	427 (31.3)	
Do you have the following at home?*				
Computer	2046 (79.1)	944 (77.4)	1102 (80.7)	0.040
Television	2105 (81.4)	972 (79.7)	1133 (82.9)	0.033
Internet	2147 (83.0)	994 (81.5)	1153 (84.4)	0.047

*Multiple options therefore the percentage does not add to 100%.

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internet users and television viewers (17.2%) than among infrequent viewers (14.0%) (P=0.03). The proportion of children wearing glasses among the frequent viewers (21.3%) was greater than among infrequent viewers (18.1%). Low vision without aid was higher in frequent viewers (8.6%). A significant difference was observed in co-morbid factors between frequent and infrequent television/internet viewers; double vision (P=0.009), painful eyes (P<0.001), tired eyes (P=0.042) and hearing (P=0.01).

Table 4 shows the prevalence of low vision among school children according to demographic characteristics and family history. The overall prevalence of low vision was higher in girls (15.8%) compared to boys (14.5%). Low vision was significantly more prevalent in children in the 6-10 year old age group (17.1%; P=0.05), and also in children with a family history of hypertension (22.6%; P<0.001) and diabetes mellitus (17.5%; P=0.04).

Discussion

The burden of visual impairment is not distributed uniformly throughout the world; the least developed regions carry the largest burden. Low vision and blindness are important public health problems.[7] This is the first survey In Qatar to examine the impact of internet use and television viewing on eyesight and the prevalence of low vision. The present study revealed that the overall prevalence of low vision in children (15.2%) was similar to other studies which reported 15% of prevalence of low vision among 4-15 year old children.[8,9] Some studies demonstrated that 5-10% of preschool children have visual impairment and 13% of children will have some defect in visual acuity by the age of seven years.[10,11] In the US,[12] a lower rate was reported; here approximately 6.8% of children under the age of 18 years have a diagnosed eye and vision condition ranging from 8.6% in 1996 to 5.8% in 2001. The low vision rate in our study was higher than the rate in the US, a developed country. However, higher rates of frequency (6.4-22.3%) have also been reported in other studies.[13] Consistent with another study by Sutherland,[6] the average age of the studied children with low vision was 11.9 years. An explanation for this difference in prevalence could be due to the different policy implications for modifying or improving existing school services.

In our survey, the prevalence of low vision significantly declined with advancing age (P=0.006); this contradicts the results of other studies.[14,15] A study by Peckham[16] reported that 13% of children will have some defect in visual acuity by the age of seven years. In contrast, a high prevalence rate was observed in the children in our study in the 6-10 year age group (17.1%); this then declined with increasing age: 15.2% in the 11-14 and 12.8% in the 15-18 year age groups, respectively. This shows that screening for eye diseases in school children has been carried out as part of routine care by the school health department in the State of Qatar. In the current study, the prevalence of low vision was very high in the age group 6-7 years. A few studies[17,18] have reported that both prematurity and low birth weight have been associated with an increased incidence of poor vision in later years. A review of the vision screening of children in Iran[19] also

Table 2. Socio-demographic characteristics of the studied children with low vision according to gender (n=393).

Variable	Total n=393 n(%)	Boys n=177 n(%)	Girls n=216 n(%)	P
Age group±SD	11.9±4.1	11.5±4.0	12.3±4.1	0.044
Age group				0.006
6-10	166 (42.2)	90 (50.8)	76 (35.2)	
11-14	132 (33.6)	46 (27.1)	84 (38.9)	
15-18	95 (24.2)	41 (22.0)	56 (25.9)	
Nationality				
Qatari	279 (71.0)	118 (66.7)	161 (74.5)	0.087
Non-Qatari	114 (29.0)	59 (33.3)	55 (25.5)	
Rank of student in school exam				
Very good	106 (27.0)	39 (22.0)	67 (31.0)	0.177
Good	174 (44.3)	80 (45.2)	94 (43.5)	
Average	98 (24.9)	51 (28.8)	47 (21.8)	
Poor	15 (3.8)	7 (4.0)	8 (3.7)	
Father's education				
Illiterate	10 (2.5)	6 (3.4)	4 (1.9)	0.865
Primary	48 (12.2)	23 (13.0)	25 (11.6)	
Intermediate	64 (16.3)	29 (16.4)	35 (16.2)	
Secondary	130 (33.1)	56 (31.6)	74 (34.3)	
University	141 (35.9)	63 (35.6)	78 (36.1)	
Father's occupation				
Not working	31 (7.9)	17 (9.6)	14 (6.5)	0.001
Sedentary/professional	142 (36.1)	79 (44.6)	63 (29.2)	
Manual	54 (13.7)	17 (9.6)	37 (17.1)	
Business man	89 (22.6)	28 (15.8)	61 (28.2)	
Government officer	77 (19.6)	36 (20.3)	41 (19.0)	
Mother's education				
Illiterate	71 (18.1)	31 (17.5)	40 (18.5)	0.305
Primary	80 (20.4)	31 (17.5)	49 (22.7)	
Intermediate	89 (22.6)	36 (20.3)	53 (24.5)	
Secondary	102 (26.0)	52 (29.4)	50 (23.1)	
University	51 (13.0)	27 (15.3)	24 (11.1)	
Mother's occupation				
Sedentary/professional	87 (22.1)	37 (20.9)	50 (23.1)	0.278
Manual	86 (21.9)	32 (18.1)	54 (25.0)	
Business	89 (22.6)	43 (24.3)	46 (21.3)	
Housewife	131 (33.3)	65 (36.7)	66 (30.6)	
Family income				
< 5000	3 (0.8)	1 (0.6)	2 (0.9)	0.021
5000-9999	138 (35.1)	72 (40.7)	66 (30.6)	
10,000 – 14,999	153 (38.9)	72 (40.7)	81 (37.5)	
>15,000	99 (25.2)	32 (18.1)	67 (31.0)	
Television viewing/internet use				
Always	199 (50.6)	79 (44.6)	120 (55.6)	0.40
Seldom	194 (49.4)	98 (55.4)	96 (44.4)	
Watching television/internet (h/day)				
<3 h	293 (74.6)	138 (78.0)	155 (71.8)	0.160
≥3 h	100 (25.4)	39 (22.0)	61 (28.2)	
Consanguinity				
Yes	136 (34.6)	56 (31.6)	80 (37.0)	0.263
No	257 (65.4)	121 (68.4)	136 (63.0)	

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reported a successful yield of 1:21 from screening and useful exercise. These study findings show that screening and surveillance for visual defects throughout childhood will help the early detection and treatment of relevant ophthalmic disorders.

All over the world, there are difference in distribution according to gender. Our results are consistent with previous studies[20,21] that reported that girls have significantly higher risks of having low vision than boys. Visual impairment was associated with the level of education of the parents. The proportion of the study group with low vision whose fathers had a university degree was 35.9%, but was lower for the same level in their mothers (13%). Also, low vision was higher in children of working women (66.7%). A similar result was found in a study by Unsal *et al.*[5] who reported that visual impairment was associated with gender, educational status of parents and working women. Many studies[5,22] have reported that there were significant relationships between the parents' educational and occupational status and visual acuity. Another important finding noted in the present survey is that parental consanguinity was present in almost one-third of the children with low vision (34.6%); this is similar to reports from a study carried out in India.[23]

In recent years, the prevalence of internet use and television viewing has increased remarkably worldwide. Medical journals have not given much space to discussion of the possible adverse effects of excessive internet use and television viewing on the physical, social and mental development of children.[24-29] The present study has been carried out to determine whether or not internet use and television viewing impairs children's eyesight and the study findings revealed that the internet/television has an enormous influence on school children. Our results showed that low vision was more prevalent in frequent internet/television viewers (17.2%). Furthermore, half of the children with low vision were always watching television (50.6%). It is evident from these results that internet use and television viewing as practiced by school children today causes eye strain sufficient to affect their eyesight. The study also found a higher proportion of children wearing glasses (21.2%) among the frequent internet/television viewers than among the non-viewers (18.1%). The current study shows that internet use and television viewing does affect children's vision and health. Furthermore, there is indirect evidence to suggest that there is an association between low vision and internet use and television viewing. This is consistent with the previous reported studies.[24-29] Recently, researchers have been turning their attention to the question of the possible effects of television on children.

Table 3. Comparison of low vision and co-morbid factors between frequent and infrequent internet users and television viewers (n=2586).

Variable	Internet/TV viewers		P
	Frequent viewers n=952 n(%)	Infrequent viewers n=1634 n(%)	
Low vision (both eyes)			
Normal vision	788 (82.8)	1405 (86.0)	0.028
Low vision	164 (17.2)	229 (14.0)	
Vision			
With glasses	203 (21.3)	295 (18.1)	0.033
Unaided	667 (70.1)	1222 (74.8)	
Low vision without aid	82 (8.6)	117 (7.2)	
Co-morbid factors			
Headaches	328 (34.5)	569 (34.8)	0.849
Blurred vision	302 (31.7)	519 (31.8)	0.983
Double vision	63 (6.6)	157 (9.6)	0.009
Eyes hurt	119 (12.5)	119 (7.3)	<0.001
Eye tired	151 (15.9)	212 (13.0)	0.042
Dizziness	220 (23.1)	359 (22.0)	0.503
Hearing	190 (20.0)	398 (24.4)	0.010

Table 4. Prevalence of low vision among school children according to demographic characteristics and family history.

Variable	No. examined n=2586	Children with low vision n=393		P
		n	%	
Gender				
Male	1220	177	14.5	0.356
Female	1366	216	15.8	
Age Group				
6-10	973	166	17.1	0.050
11-14	870	132	15.2	
15-18	743	95	12.8	
Parents consanguinity				
Yes	940	136	14.5	0.435
No	1646	257	15.6	
Family history				
Diabetes	773	135	17.5	0.036
Glaucoma	542	70	17.8	0.096
High blood pressure	473	107	22.6	<0.001
Amblyopic (lazy eye)	196	22	11.2	0.107
Epilepsy or seizures	132	14	10.6	0.131
Multiple scleroses	161	20	12.5	0.311
Other chronic disease	15	2	13.3	0.279
Frequent Internet/TV viewers				
Frequent	952	164	17.2	0.028
Infrequent	1634	229	14.0	

Conclusions

The study findings revealed that the prevalence of low vision decreased with increasing age. Girls had a higher prevalence of low vision compared to boys. Low vision was more prevalent among frequent internet and television viewers, and the proportion of children wearing glasses was higher among frequent viewers. It is evident from these results that there is an association between internet use and television viewing and low vision. Health education programs need to raise public awareness of this association in order to facilitate the prevention and control of low vision.

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References

1. Lu Q, Zheng Y, Sun B, et al. A population based study of visual impairment among pre-school children in Beijing: the Beijing study of visual impairment in children. Am J Ophthalmol 2009;147:1075-81.
2. The Lighthouse Inc. The Lighthouse National survey on Vision loss: the experience, attitude and knowledge of middle-aged and older Americans, New York. The Lighthouse Inc 1995;11-3.
3. World Health Organization. Programme for the prevention of blindness and deafness, Global initiative for the elimination of avoidable blindness. Geneva: WHO 1997;1-7.
4. Robaei D, Rose K, Ojaimi E, et al. Visual acuity and the causes of visual loss in a population-based sample of 6-year-old Australian children. Ophthalmology 2005;112:1275-82.
5. Unsal A, Ayranci U, Tozun M. Vision Screening among children in primary schools in a district of Western Turkey: An Epidemiological study. Pak J Med Sci 2009;25:976-81.
6. Sutherland K. What's on the box? Ratter 2004;70:13-5.
7. Bener A, Al-Bakr S, Billing B. The prevalence and causes of visual impairment and common ocular disorders in United Arab Emirates: Hospital based Emirati study. Asian J Ophthalmol 2006;8:105-9.
8. Roth SC, Baudin J, McCormick DC, et al. Relation between ultrasound appearance of the brain of very preterm infants and neurodevelopmental impairment at eight years. Dev Med Child Neural 1993;35:755-68.
9. Gross SJ, Slagle TA. Impact of a matched term control group on interpretation of developmental performance in preterm infants. Pediatrics 1992;90:681-7.
10. Mohammadzadeh A, Derakhshan A, Ahmadshah F, et al. Prevalence of visual impairment in low birth weight and normal birth weight school age children, Iran. J Pediatr 2009;19:271-6.
11. Hack M, Flannery DJ, Schluchter M, et al. Outcomes in young adulthood for very-low-birth-weight infants. N Engl J Med 2002; 346:149-57.
12. Ganz M, Xuan Z, Hunter D. Prevalence and correlates of children's diagnosed eye and vision conditions. Ophthalmology 2006;12: 2298-306.
13. He M, Zeng J, Liu Y, et al. Refractive error and visual impairment in urban children in southern China. Invest Opthalmol Vis Sci 2004;45:793-9.
14. Khandekar R, Mohammed AJ, Negrel AD, et al. The prevalence and causes of blindness in the Sultanate of Oman: the Oman Eye Study (OES). Br J Ophthalmol 2002; 86:957-62.
15. Moser CL, Martin-Baranera M, Vega F, et al. Survey of blindness and visual impairment in Bioko, Equational Guinea. Br J Ophthalmol 2002;86:505-12.
16. Peckham CS. Vision in childhood. Br Med Bull 1986;42:150-4.
17. Cats BP, Tan KE. Premature with and without regressed retinopathy of prematurity: comparison of long-term (6-10) years ophthalmological morbidity. J Pediatr Ophthalmol Strabismus 1989;26:271-5.
18. Repka MX. Ophthalmological problems of the premature infant. Ment Retard Dev Disabil Res Rev 2002;8:249-57.
19. Khandekar R, Parast N, Arabi A. Evaluation of vision screening program for three to six year old children in the Republic of Iran. Indian J Ophthalmol 2009;57:437-42.
20. Resnikoff S, Pascolini D, Etyaale D, et al. Global data on visual impairment in the year 2002. Bull World Health Organ 2004;82:11.
21. Bener A, Al-Mahdi H, Warid F, Darwish S. Correlation between Vision Loss and its risk factors in elderly people in a rapidly developed Arabian society. Asian J Ophthalmol 2008;10:126-9.
22. Shi Y, Xu Z. An investigation on causes of blindness of children in seven blind schools in East China. Zhonghua Yan Ke Za Zhi 2002;38:747-9.
23. Khan SA. A retrospective study of low-vision cases in an Indian tertiary eye-care hospital. Indian J Ophthalmol 2000;48:201-7.
24. Bener A, Al-Mahdi HS, Ali AI, et al. Obesity and low vision as a result of excessive internet use and television viewing. Int J Food Sci Nutr 2011;62:60-2.
25. Gillespie RM. The physical impact of computers and electronic game use on children and adolescents. a review of the current literature. Work 2002;18:249-59.
26. Young KS, Rogers RC. The relationship between depression and Internet addiction. Cyber Psychol Behav 1998;1;25-8.
27. Bener A, Al-Mahdi HS, Vachhani PJ, et al. Do excessive internet use, television viewing and poor life-style habits affect low vision in school children? J Child Health Care 2010;14:375-85.
28. Robinson TN, Wilde ML, Navracruz LC, et al. Effects of reducing children's television and video game use on aggressive behaviour: a randomized controlled trial. Arch Pediatr Adolesc Med 2001:155:17-23.
29. Morrison CM, Gore H. The relationship between excessive Internet use and depression: a questionnaire-based study of 1,319 young people and adults. Psychopathology 2010;43:121-6.

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