

# Influence of daily eye care on the prevention and control of Myopia in adolescents

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## Abstract

According to the World Health Organization (WHO), more than 2.2 billion people around the world suffer from myopia, including many teenagers and children, especially teenagers. Among them, the situation is particularly serious in Asia. For example, myopia is extremely high in China, South Korea and Singapore. The prevalence of myopia in China has exceeded 70%; in Singapore, nearly 70% and 96% in South Korea. This trend is not limited to Asia, and the prevalence of myopia in western countries is also increasing year by year. Myopia, also known as shortsightedness or weak farsightedness, is a common vision problem that affects a large number of people worldwide and has become a global public health problem, especially in the adolescent population. In recent years In China, the incidence of myopia in teenagers is rising sharply, this study, aiming for the daily eye care, behavioral habits and nutritional status of adolescents, so as to effectively improve the problem of myopia in adolescents.

**Keywords:** youth myopia, daily eye care, myopia prevention and control

## Influence of daily eye care on the prevention and control of Myopia in adolescents

### 1. Introduction

According to the World Vision Report released by the World Health Organization (WHO) in October 2019, the number of myopia worldwide is expected to be 2.62 billion in 2020 and is expected to increase further to 3.361 billion by 2030. The number of high myopia is also expected to increase significantly from 399 million in 2020 to 516 million in 2030.<sup>46</sup> Both estimates assume that the intervention has no effect on slowing the progression of myopia. This means that pathological myopia is expected to be the most common cause of irreversible visual impairment and blindness worldwide, demonstrating the importance of reducing the global burden of myopia through interventions. By 2050, the projected myopia rate is 65% in Asian populations, 56% in Western Europe, 54% in Central Europe, and 50% in Eastern Europe.

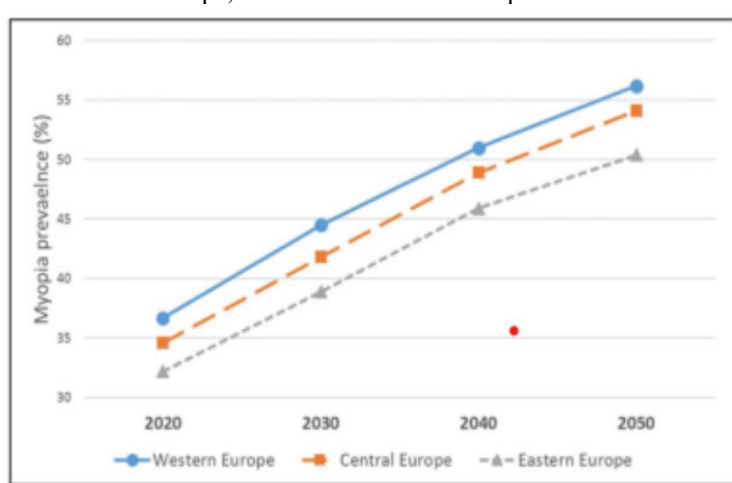


Figure 1 The incidence of myopia in three European regions is estimated to increase in (%)

Myopia, also known as shortsightedness or weak farsightedness, is a common vision problem that affects a large number of people worldwide and has become a global public health problem, especially in the adolescent population. Professor Huang Rui of Chinese Ophthalmology has said, The cause of myopia, which may be largely related to the changes in modern lifestyle, especially the long close reading and the use of electronic equipment, especially in the eyes of bad light conditions, can lead to excessive eye fatigue, and then accelerate the development of myopia. The essence of myopia is that the axis of the eyeball is too long, causing the light to be unable to accurately focus on the retina, thus affecting the vision.

Adolescence is a critical stage of visual development, therefore, it is particularly important for the prevention and care of myopia. Misvision habits, excessive eye fatigue, and inappropriate light exposure may all accelerate the development of myopia. The current state of myopia in adolescents worldwide is alarming, and without appropriate prevention and interventions, it is expected that half of the global population will have myopia by 2050. Therefore, the prevention and nursing of myopia in adolescents is particularly important, which involves complex problems in multiple fields and requires the joint efforts of family, school and society. We believe that only through the joint efforts of the whole society can this increasingly serious visual health problem be effectively addressed. It is hoped that the prevention and control of myopia among teenagers will become the attention of the whole society. Myopia will not only affect the academic performance and quality of life of teenagers, but also may lead to other vision problems, such as retinal detachment and macular degeneration.

**Objectives of the Study** - The main goal of this study is to explore and study the care strategies for myopia in adolescents with hope to help slow the development of myopia and protect the visual health of adolescents.

Specifically, this study determined the influence of daily eye care and prevention control of myopia among adolescents, specifically, it will determine the epidemiologic pattern of myopia among adolescents in Weifang, Shandong; determined the proficient and daily eye care on the prevention and control of myopia; determine the factors influencing compliance of daily eye care; and proposed effective myopia care strategies for adolescents.

### 1.1 Theoretical Framework

The theoretical framework of this study is based on an understanding of the effects of lifestyle, genetic factors and environmental factors on myopia, aiming to elaborate how these factors influence the development of myopia in adolescents and explore how to slow the progression of myopia through effective care strategies. We will discuss these three aspects in depth respectively.

*Lifestyle factors.* In recent years, with the progress of science and technology, electronic devices have penetrated into our daily life, which brings challenges to the visual health of adolescents. Long close eye use, such as reading and using electronic devices, may cause eye overuse and fatigue, which can accelerate the development of myopia. At the same time, teenagers are significantly less due to the popularity of electronic devices, and adequate outdoor activities have been shown to prevent the development of myopia. Therefore, we need to focus on the lifestyle of adolescents, including their reading habits, the use of electronic devices, and the time of outdoor activities, which may have important effects on their visual health.

*Genetic factors.* Although environmental factors have significant effects on myopia, genetic factors also play an important role in the development of myopia. Studies have shown that if both parents have myopia, their children will have a significantly increased risk of myopia. Therefore, we cannot ignore the influence of genetic factors in the development of myopia. Understanding these genetic factors may help us to better predict and understand the development of myopia, as well as to develop more effective prevention and care strategies.

*Environmental factors.* Environmental factors also have an important influence on the development of myopia in adolescents. On the one hand, the light conditions may influence the development of myopia. Studies have shown that reading or working in a low-light environment may accelerate the development of myopia. Therefore, we need to focus on the adolescent's learning environment, including the light conditions, and their reading distance, etc. On the other hand, the school environment may also affect the vision of the adolescents. For example, excessive learning burden may cause teenagers to use their eyes for long hours, thus accelerating the development of myopia.

*Nursing strategy.* Based on the above theoretical framework, we can develop a targeted care strategy. For lifestyle factors, we can prevent the development of myopia by educating teenagers to establish correct vision habits, such as proper reading distance and time, as well as regular eye rest. At the same time, we can also slow down the development of myopia by increasing the outdoor activity time of teenagers. For genetic factors, we can detect and treat myopia early with regular vision examination to prevent the further development of myopia. For environmental factors, we can protect the visual health of adolescents by improving the learning environment, such as providing enough light, and Reducing the burden of learning.

### 1.2 Conceptual Framework

Myopia has become a global public health problem, especially among adolescent groups, and its incidence is rising sharply. Constructing a conceptual framework for adolescent myopia care is critical. Problem Definition Myopia, make a person see the distant object is blurred, and near the object is clear. Myopia not only affects individual study and quality of life, but also brings social and economic burden.

*The factors of adolescent myopia* - The occurrence of myopia is influenced by genetic, environmental, and behavioral factors. Excessive close proximity activities (such as reading, writing, and using electronic devices) and a small amount of outdoor activities, as well as poor vision habits, may increase the risk of myopia.

*Nursing care strategies for adolescents* - The strategies of myopia care in adolescents mainly include prevention, early detection, and management. Prevention strategies include a healthy lifestyle and good vision habits. Early detection strategies include regular vision examinations and early recognition of myopia. Management strategies include vision correction and myopia control.

*Evaluation of the effects of myopia care in adolescents* - The effect of myopia care in adolescents can be assessed by the incidence, severity of myopia, and the quality of life and academic performance of adolescents.

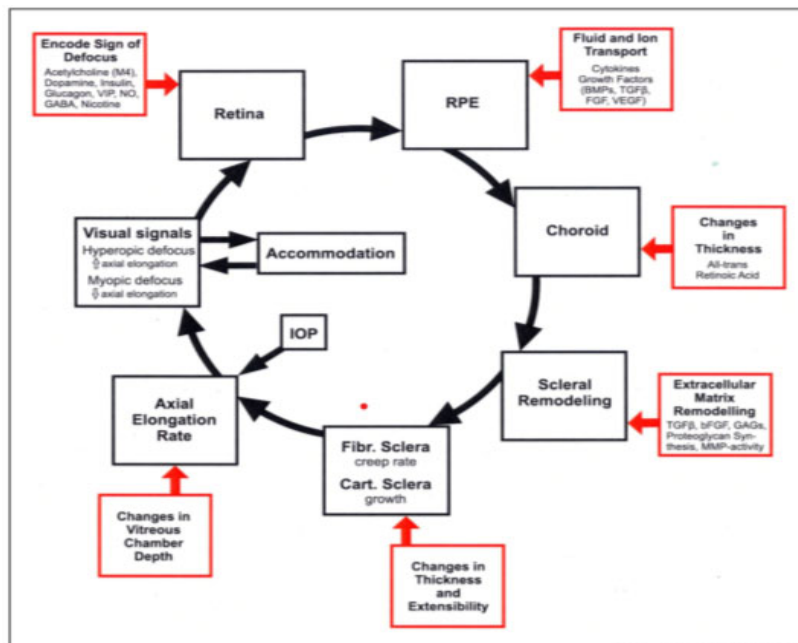


Figure 2 Model of visual regulation controlling ocular growth and refractive status

Overall, this framework provides a comprehensive perspective that helps to better understand and address the problem of myopia in adolescents.

## 2. Methods

**Research Design** - In the text, we used a mixed-methods study design, combining both quantitative and qualitative research methods. First, we conducted a quantitative analysis of myopia prevalence trends and collected and analyzed a large amount of prevalence data to reveal the incidence and development trend of myopia worldwide, especially in adolescents. Then, using qualitative research methods, we explored various possible factors contributing to myopia, including genetic, environmental and lifestyle, through in-depth interviews and focus group discussions. In addition, we also conducted a comprehensive review of the prevention and treatment methods of myopia, including lifestyle changes, photo-therapy, drug treatment, and corrective surgery. Finally, we integrated and analyzed these findings to provide care strategies and recommendations for myopia in adolescents.

**Setting and Participants** - The background and participants of this study included five secondary schools from Weifang, Shandong Province, China. These schools were chosen because of their representative student population, covering different socioeconomic backgrounds. Participants included students aged between 12 and 15 years at the beginning of the study who were randomly selected to participate in the study. Each school had a random class from each grade to ensure representativeness of the study sample. All participating students need to complete a questionnaire including their personal information (e. g., age, gender), visual status, lifestyle (e. g., reading, time of electronic device use and time of outdoor activities) and family background (e. g., parental education level and occupation). In addition, all participating students were required to undergo visual

examination to determine their visual status. To explore the causes of myopia in adolescents, we also interviewed the students' parents to understand their genetic background and family environment. At the same time, we also interviewed the students' teachers to understand the students' learning pressure and the school environment.

### ***Instrument of the Study***

Multiple tools were used to collect and analyze data. First, we used a structured questionnaire that contained questions about the students' personal information, living habits, learning environment, and family background. This questionnaire was pre-tested and revised to ensure the validity and reliability of its content. In addition, we used a visual acuity instrument to assess the students. This instrument allows for an accurate measurement of student vision, including naked eye vision and corrected vision. For in-depth interviews and focus group discussions, we developed a set of interview guides including a series of open-ended questions to guide discussion and gather information about genetic factors, environmental factors and lifestyle factors that may influence myopia. Finally, all the collected data were entered into the SPSS statistical software for analysis. We used descriptive statistics, chi-square tests, and multiple logistic regression to analyze the data to identify risk factors and preventive measures affecting the onset of myopia.

***Data Gathering Procedures*** - The procedures for this study began with an initial meeting with the school management to discuss the study objectives, processes, and expected outcomes. After receiving approval from the school, we introduced the study to the selected classes and sent an invitation to students and parents to participate. After receiving informed consent from parents and students, we performed a visual examination to assess the visual status. Vision examination was performed by a trained ophthalmologist and included measurements of naked and corrected visual acuity. Subsequently, students were asked to fill out a structured questionnaire containing their personal information, living habits, learning environment, and family background. The process of students filling out the questionnaire was conducted under the supervision of the teacher to ensure the accurate filling of the questionnaire. In addition, we conducted in-depth interviews and focus group discussions with students' parents and faculty. These interviews and discussions aim to gather more in-depth information about genetic factors, environmental factors and lifestyle factors that may influence myopia. All the collected data were anonymized. After the study of basic information about students and vision status, we fed back the results to schools, students and parents, and proposed care strategies and suggestions for myopia in adolescents.

***Data Analysis*** - In this study, the researcher performed the data analysis using the SPSS statistical software. Firstly, conducted a questionnaire for students aged 12-15, and conducted descriptive statistical analysis based on the data to understand students' basic information, living habits, learning environment, family background and visual status. Secondly, the students' parents and teachers were interviewed to understand the students' environment and health and nutrition status, which helped the researcher to determine whether these variables were significantly associated with the incidence of myopia. Finally, present all the statistical results in tabular and graphical form to help the reader better understand and interpret the study results. All statistical tests were set to a significant level of 0.05.

***Ethical Consideration*** - In this study, we strictly adhered to the ethical guidelines. First, the study has already been approved by the relevant ethics committees. Prior to study initiation, we provided all participants and their parents with detailed information about the study, including the purpose of the study, the process, potential risks and benefits, and the rights of the participants. All participants signed an informed consent form confirming their voluntary participation in the study and the understanding that they could withdraw from the study at any time without any negative impact. Because the research direction was teenagers, written consent was obtained from their parents. We respected the participant privacy and confidentiality during the data collection and analysis process. All data were anonymized to protect participant identities. All data were properly stored and accessible only to members of the research team. Finally, we promise to report the results fairly and truthfully without any data manipulation or selective reporting that could lead to misinformation. We are also

committed to providing feedback of the findings to participants and relevant stakeholders.

### 3. Results and discussion

The results of this study show variables and multiple corresponding and cross-square procedures for data analysis. According to the research question, the study results are integrated and presented.

Myopia in children and adolescents has become a global public health problem, and the prevalence of myopia in children and adolescents in China is currently high. Current studies suggest that behavioral and environmental factors are the main causes of myopia in children and adolescents. (Dong et. al., 2020) Prevent myopia should be before 6 years of old, prevent high myopia should be before 10 years old. Long-term wearing of orthokeratology lenses in adolescents can effectively improve visual quality, but it can also increase the incidence of bacterial infections. Ischemia and hypoxia in the optic 17 brain leads to the damage of hyperopia functional cells, which is the main cause of the high incidence of myopia. Students look up at the teacher in class, which not only increases the blood supply in the skull, but also achieves the purpose of overlooking the distance, and exercises the growth and development of the functional cells of the brain tissue.

According to the age of onset, high myopia can be divided into late onset high myopia (loHM) after school age and early onset high myopia (eoHM) before school age. Numerous genetic studies have shown that eoHM differs from loHM. The age of onset of oHM is preschool (<7 years) and is least affected by environmental factors (such as close work), mainly determined by genetic factors. Therefore, eoHM is an ideal model for studying the pathogenesis of high myopia and a unique resource for finding genes involved in high myopia. GeoHM can be divided into only simple (non-syndromic) forms with only high myopia and syndromic forms with other ocular diseases or other systemic abnormalities throughout the body. EoHM is closely related to some genetic eye diseases, which is often the earliest feature of some hereditary eye diseases. It is the main reason for children to see the doctor and an important clue for clinicians to find underlying eye diseases. Therefore, in addition to the detailed ocular structural and functional examination, eoHM should attach great importance to genetic screening and identify the pathogenic genes, which can contribute to the early diagnosis, effective intervention and long-term follow-up evaluation of these diseases. (Meguro, et. al., 2020)

Clinical studies have confirmed that various concentrations of atropine from 0.01% to 1% can control the progression of myopia, among which 0.01% atropine eye drops are widely used due to small adverse reactions and less rebound. Although there are many hypotheses that atropine controlling myopia progression, the specific molecular mechanism of action is not fully elucidated. Studies show that atropine may affect the retina and posterior sclera, including M1-M5-  $\gamma$ -acid, aminobutyric acid, dopamine receptor,  $\alpha$  2 adrenergic receptor, through cholinergic and G-protein, mainly in the scleral collagen and retinal pigment epithelium and choroid. Clinical studies have also shown that low concentration of atropine eye drops combined with orthokeratology has better control of myopia progression than orthokeratology alone. (Xie-He et. al., 2021)

According to table 1 analysis results, the numerical characteristics of the variables can be seen, which reflects the distribution of the investigated objects. Where the mean represents the central trend and the standard deviation represents the fluctuating situation. According to the results of the frequency analysis of each variable, Distribution basically meets the requirements of the sampling survey, For example, 21% 12 years 13,19% 13,25% 14 and 36% 15, It can be seen that the teenagers are 12-15 years old, Among them, it is mainly 15 years old; Daily electronic products use 0.5h 31%, 1h 30%, 2h 22%, 2h above 18%, It can be seen that most of the time teenagers use electronic products is more than 1h; Continuous eye time 0.5h 31%, 1h 14%, 2h 27%, more than 2h 28%, It can be seen that the continuous use of the eyes every day is basically about 2h; Eye exercise time accounts for 34% per day, often 21%, occasionally 24%, never 21%, It can be seen that most of them can ensure the daily eye exercises; Daily sleep time less than 8h accounted for 31%, 8-9h accounted for 43%, more than 9h accounted for 26%, It can be seen that the daily sleep time can be maintained for 8-9h; The interval of ophthalmic examination accounted for 22% in 3 months, 18% in 6 months, 12 months for 18%, 23% for

uncertain time, never for 19%, It can be seen that the examination interval for ophthalmology is biased toward uncertainty.

**Table 1**  
*Questionnaire on myopia prevention and control among adolescents*

variable	option	frequency	percentage	average value	standard deviation
age	12 Years old	123	21%	2.77	1.15
	13 Years old	112	19%		
	14 Years old	147	25%		
	15 Years old	219	36%		
Time spent on electronic products	0.5hour	184	31%	2.27	1.08
	1hour	178	30%		
	2hour	130	22%		
	greater than 2hour	109	18%		
Continuous eye time	0.5hour	189	31%	2.51	1.20
	1hour	83	14%		
	2hour	161	27%		
	greater than 2hour	168	28%		
Eye exercise time	every day	205	34%	2.31	1.14
	often	127	21%		
	once in a while	146	24%		
hour of sleep	never	123	21%	1.95	0.75
	Less than 8 hours	187	31%		
	8-9hour	259	43%		
	greater than 9hour	155	26%		
Check the interval	3 months	134	22%	2.97	1.43
	6months	110	18%		
	12months	109	18%		
	uncertain	137	23%		
	Never consciously	111	19%		

In China, the main object of myopia research is simple myopia (prevention and epidemiological studies), while in other countries, it is mainly pathological myopia (treatment studies of etiology and complications). Because the Chinese administrative department lists distant vision as an important basis for enrollment, employment and choice of work, so people's demand for the prevention and treatment of myopia is very urgent, and the slogan "protect vision, prevent myopia" is well known. The recently held 8th (Boston, 2000) and 9th (Hong Kong-Guangzhou, 2002) International Myopia Conference reported some new research developments. In order to further understand the dynamics of myopia research, the relevant problems are summarized now.

There are more than 300 million myopic patients in China, among which > 10 million are degenerative

myopic patients. In 1995, more than 2 million people were surveyed nationwide, among which the prevalence of myopia among primary school students was 20%, 30%~40% for junior high school students, 50%~60% for high school students, and 60%~70% for college students. The statistical results of myopia prevalence in 2000 showed that the prevalence of myopia was 30.04% among primary school students, 41.81% in middle school students and 60.28% in high school students. According to the 2000 survey by the Ministry of Education and the Ministry of Health in 2000, the rate of myopia among Chinese students has ranked second in the world. The prevalence of myopia in primary and middle school students in Europe and America is 12%~28%; 48.8%~62.3% in Japan: China: 27.63%~53.80%. The prevalence of myopia in preschool children in China is 2%~6%.12.3% of children aged 6 to 7 years in New Zealand, 12% in Taiwan, 5% in the United States and 6% in Canada. The prevalence of myopia in 6-year-old children in Taiwan was 5%, which ranged from 31% to 35% at 12 years, and increased to 60% to 70% at 15 years.11% for children aged 7 and 55% at 12. The average number of myopia refraction in Hong Kong students was 5.05D, much higher than that in Norway (2.34D). The prevalence of myopia in Singapore was 25.8%, 32.8% at 9 years and 51.5% at 12 years.

The analysis method for multi-choice problems is also a multi-option analysis. The problem of setting several options is decomposed into several problems, and several SPSS recognizable variables are set accordingly, respectively to store several options describing these problems, so as to transform data for analysis.

**Table 2**  
*Whether there are any causes of myopia Frequencies*

	Responses		Percent of Cases
	N	Percent	
( inherent cause )	284	18.5%	47.3%
Whether there are (Use your eyes for too long)	549	35.8%	91.3%
any causes of myopia (Incorrect eye posture)	243	15.8%	40.4%
(Environmental light problems)	458	29.9%	76.2%
Total	1534	100.0%	255.2%

*Dichotomy group tabulated at value 1.*

According to the above data, analyzing the causes of myopia, 91.3% of Use of the eyes for too long; 76.2% had environmental light problems; 47.3% had parental genetic factors; and 40.4% had improper eye posture.

In recent years, with the rapid development of electronic technology, more electronic products are widely used, such as TV, computer and mobile phone, which has a great impact on the visual health of primary school students. At the same time, the continuous aggravation of students' studies, making the incidence of myopia among Chinese teenagers increase year by year.

The incidence of myopia in children and adolescents in China is high, and shows the trend of low age, and the epidemic situation is very severe, among which environmental factors are the hot spots in the etiology of myopia. In this paper, the relationship between etiology of myopia. In this paper, the relationship between close use of eyes, outdoor activities, sleep duration, lighting conditions, eating habits and myopia, was conducted to maximize the eyesight protection of children and adolescents.



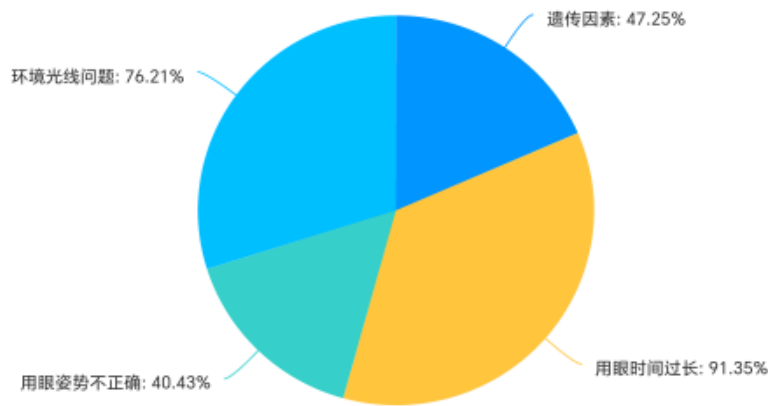


Figure 3. A percentage of causes of myopia exists

According to Figure 3, 91.3% of people had too long eyes; 76.2% had environmental light problems; 47.3% had parental genetic factors; 40.4% had improper eye posture.

In table 3, it can be seen that in the data analysis of the influence of daily behavior habits on myopia prevention and control, 92.8% of the people eat more food containing vitamin A; 57.1% of the people pay attention to daily eye hygiene; 58.9% of the people look far away after reading for A long time; 48.4% of the people develop A good sitting position.

Since ancient times in China, there has been a saying that "medical food is the same" and "medicinal food is the same work", that is, food has the effect of medicine and the same use. Many foods are drugs themselves, but they are not as strong as ordinary drugs. In the Tang Dynasty, Sun Simiao wrote in his "Food Treatment": "For medicine, we must first know the source of the disease, know its crime, and treat it with food, and the food can not heal, and then kill medicine." Here the so-called "food treatment", is diet therapy, namely according to the patient's personal constitution or illness, scientific and reasonable eating of some food with a certain protection or therapeutic effect, can achieve the purpose of disease prevention and treatment. So young youth myopia can also be prevented through diet.

**Table 3**  
*The effect of daily habits on myopia*

		Responses		Percent of Cases
		N	Percent	
The effect of daily habits on myopia	(Pay attention to eye hygiene)	343	22.5%	57.1%
	(Develop a good sitting posture)	291	19.1%	48.4%
	(Eat more foods containing vitamin and vitamin A)	540	61.2%	92.8%
	(After a long time, reading must look into the distance)	343	38.8%	58.9%
Total		1525	100.0%	253.7%

a. Dichotomy group tabulated at value 1.

In recent years, due to online classes, too much electronic products, the phenomenon of school-age children with excessive eyes is very common, children's eyeball in the growth and development process, need careful care, there are many ways to protect children's vision, among which the role of dietary nutrition is also important. Is conducive to eye care food calcium calcium children calcium deficiency, maintain the elasticity of the sclera in the shape of the eye will decrease, the eyeball will be easy to elongate, for a long time easy to myopia. Food rich in calcium include kelp, shrimp, milk, cheese, peanuts, egg yolk, soy products, spinach, oysters and so on.

**Table 4**  
*Usually eye-protecting behavior*

		Responses		Percent of Cases
		N	Percent	
Usually eye-protecting behavior	(Look to the distance)	434	20.8%	72.2%
	(Cold hot compress eyes)	378	18.1%	62.9%
	(Eye drops)	258	12.4%	42.9%
	(Do eye exercises)	357	17.1%	59.4%
	(Other ways)	319	15.3%	53.1%
Total		2083	100.0%	346.6%

*a. Dichotomy group tabulated at value 1.*

According to the above data, 72.2% of the people looked far away; 69.2% had hot compress; 59.4% had eye exercises; 42.9% used eye drops; 53.1% did not take special care for their eyes in daily life. In recent years, the population myopia is getting more and more younger, the degree of myopia is getting higher and higher, the prevention of myopia should start as soon as possible, need to keep the children's eyes health, increase the time of outdoor activities every day. Before going to school, parents can establish refractive development files for children, and regularly take the child to the hospital do hyperopia reserve check, through the child axial length, corneal curvature, vision condition check, detect the child's vision reserve, predict the occurrence and development of myopia, scientific intervention in the development of myopia, delay the occurrence of myopia.

**Table 5**  
*Diet situation in daily life*

		Responses		Percent of Cases
		N	Percent	
Diet situation in daily life	( don't like meat)	331	19.2%	55.1%
	(Do not like to eat vegetables)	524	30.4%	87.2%
	(Do not love to eat fruit)	441	25.6%	73.4%
	(not picky eater)	219	12.7%	36.4%
Total		1723	100.0%	286.7%

*a. Dichotomy group tabulated at value 1.*

According to the above data, the analysis shows that 87.2% of the population do not eat vegetables; 73.4% do not eat fruit; 55.1% do not eat meat; 36.4% are not picky eaters. In the daily diet, we should pay attention to reasonable collocation, balanced diet, in order to give full play to the synergistic effect of various nutrients. Teenagers usually diet to do: (1) appropriate increase in fish, meat, milk, eggs, to ensure adequate protein supply.(2) Ensure the calcium supply. Spribs soup, shrimp skin, soy products, milk is not only rich in calcium, and the utilization rate is quite high.(3) Meet the body's demand for zinc and chromium. Moderate increase the intake of lean meat, beef, animal liver, adhere to eat coarse grain brown rice and fresh vegetables, fruits. Using fresh fruit as a perfect snack before and after meals, such as oranges, apples, and dried fruit (such as raisins). But it should be noted that about half an hour after meals can give full play to its nutritional function.(4) Ensure adequate vitamins. Animal liver, fresh vegetables, fruits and fruits can be appropriately increased according to individual nutritional status. With the eye excessive especially should eat more animal liver, carrot, egg yolk and other vitamin A content rich food.

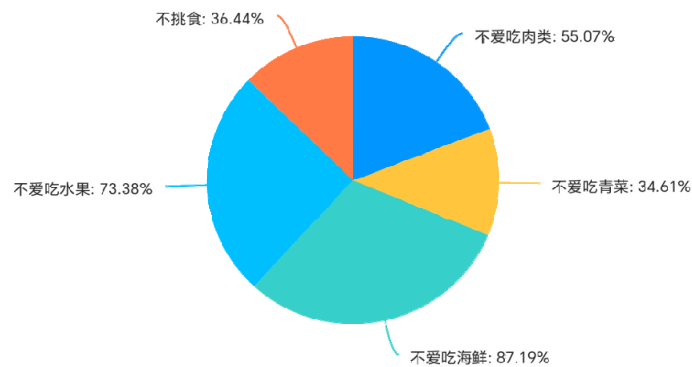


Figure 4 Diet situation in daily life

According to figure 4, 36.44% were not picky eaters ; 55.07% do not eat meat; 73.38% do not eat fruit; 34.61% did not eat vegetables ; 87.19% did not like eating seafood.

The analysis method for multi-choice problems is also a multi-option analysis. The problem of setting several options is decomposed into several problems, and several SPSS recognizable variables are set accordingly, several options of these problems are stored respectively, and the association between the transformed data and the existence of myopia is conducted for data analysis.

**Table 6**

*Does the cause that causes myopia \* exist myopia problem? Cross-tabulation*

		Is there a myopia problem?		Total	
		no	yes		
The cause of myopia <sup>a</sup>	(inherent cause)	Count	177	107	284
		% within The cause of myopia	62.3%	37.7%	
		% within Is there a myopia problem?	50.7%	42.5%	
	(Use your eyes for too long)	Count	316	233	549
		% within The cause of myopia	57.6%	42.4%	
		% within Is there a myopia problem?	90.5%	92.5%	
	(Incorrect eye posture)	Count	140	103	243
		% within The cause of myopia	57.6%	42.4%	
		% within Is there a myopia problem?	40.1%	40.9%	
	(Environmental light problems)	Count	265	193	458
		% within The cause of myopia	57.9%	42.1%	
		% within Is there a myopia problem?	75.9%	76.6%	
Total	Count	349	252	601	

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

According to the above data, it can be seen that 37.7% of the causes of myopia have 37.7%, 92.5% of the people have 42.4%, 40.9% of the people with myopia 42.4%, 76.6% of the people have environmental light problems with myopia 42.1%.

**Table 7***Chi-Square Tests*

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.002 <sup>a</sup>	1	.045		
Continuity Correction <sup>b</sup>	3.677	1	.055		
Likelihood Ratio	4.011	1	.045		
Fisher's Exact Test				.047	.027
Linear-by-Linear Association	3.995	1	.046		
N of Valid Cases	601				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 119.08.

b. Computed only for a 2x2 table

P=0.045 < 0.05, indicating an association between the cause of myopia and the presence of myopia.

**Table 8***Does the behavior that protects the eye normally \* exist myopia problem? Crosstabulation*

		Is there a myopia problem?		Total
		no	yes	
(Look to the distance)	Count	248	186	434
	% within Normal eye-protection behavior	57.1%	42.9%	
	% within Is there a myopia problem?	71.1%	73.8%	
(Cold hot compress eyes)	Count	229	149	378
	% within Normal eye-protection behavior	60.6%	39.4%	
	% within Is there a myopia problem?	65.6%	59.1%	
(Eye drops)	Count	155	103	258
	% within Normal eye-protection behavior	60.1%	39.9%	
	% within Is there a myopia problem?	44.4%	40.9%	
(Do eye exercises)	Count	211	146	357
	% within Normal eye-protection behavior	59.1%	40.9%	

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

According to the above data, it can be seen that 57.1% of the people look to the distance without myopia 71.1%, 60.6% of the people have myopia for cold and hot eyes 65.6%, 60.1% of the people have eye drops without myopia 44.4%, 59.1% of the people have eye exercises 60.5%.

According to the data in Table 9, it can be seen that the causes of daily diet myopia 41.4% of people do not like to eat meat myopia accounted for 54%, 42% of people do not love to eat vegetables myopia accounted for 87.3%, 41.5% of people do not love to eat fruit myopia accounted for 72.6%, 42% of people do not picky about myopia accounted for 36.5%.

**Table 9**

*Is the influence of daily diet to myopia \* exists the problem of myopia? Crosstabulation*

		Myopia?		Total	
		no	yes		
diet		Count	195	136	331
	(I don't like meat)	% within diet	58.9%	41.1%	
		% within Myopia?	55.9%	54.0%	
		Count	304	220	524
	(Do not like to eat vegetables)	% within diet	58.0%	42.0%	
		% within Myopia?	87.1%	87.3%	
		Count	258	183	441
	(Do not love to eat fruit)	% within diet	58.5%	41.5%	
		% within Myopia?	73.9%	72.6%	
		Count	127	92	219
	(not picky eater)	% within diet	58.0%	42.0%	
		% within Myopia?	36.4%	36.5%	
Count		349	252	601	

Percentages and totals are based on respondents.

a. Dichotomy group tabulated at value 1.

According to the data in table 10, it can be seen that 59.8% of the people pay attention to eye hygiene without myopia 59.8%, and 60.1% of the people develop good sitting posture without myopia 50.1%. It can also be seen that 58.3% of the people eat vitamin A food without myopia 92.4%, 59.8% of the people are 60.1%.

**Table 10**

*Is daily eye protection \* myopia? Cross-tabulation*

		Myopia?		Total	
		no	yes		
Daily eye- Protection behavior		Count	205	138	343
	(Pay attention to eye hygiene)	% within behavior	59.8%	40.2%	
		% within Myopia?	58.7%	54.8%	
		Count	175	116	291
	(Develop a good sitting posture)	% within behavior	60.1%	39.9%	
		% within Myopia?	50.1%	46.0%	
Count		349	252	601	
Daily eye- Protection behavior		Count	315	225	540
	(Eat more foods containing vitamin A)	% within behavior	58.3%	41.7%	
		% within Myopia?	92.4%	93.4%	
		Count	205	138	343
	(After a long time, reading must look into the distance)	% within behavior	59.8%	40.2%	
		% within Myopia?	60.1%	57.3%	
Count		341	241	582	

Percentages and totals are based on respondents.

#### 4. Conclusion and recommendations

Cultivation of vision protection awareness: there is a need to strengthen the eye health education for teenagers, and let them understand the importance of vision protection. This needs the joint efforts of the family, the school and the society, through lectures, practice activities and other ways, let the teenagers understand the causes of myopia, harm and prevention and control methods. Regular eye examination: schools and parents should regularly organize or encourage teenagers to have a vision examination, so that myopia can be detected as early as possible and take timely measures. Eye examinations should be performed at least annually. Control of screen time: With the development of technology, electronic devices have become a part of teenage life. But prolonged use of electronic devices increases the risk of myopia. Therefore, parents and schools should limit their children's screen time, such as no more than two hours a day. Moderate outdoor activities: Studies found that more outdoor activities can effectively prevent myopia. This may be because outdoor activities can expose the eye to more distance and reduce the burden of close work. At least 2 hours of outdoor activity per day is recommended. Good reading habits: When reading, you should keep a good posture, and the distance between your books and your eyes should be kept at about 30 cm. At the same time, the reading environment should maintain sufficient lighting to avoid reading in a low-light environment. For every 40-50 minutes of reading, rest your eyes for 10-15 minutes. Healthy diet: The diet should be balanced with enough vegetables and fruits containing vitamins and minerals that are good for eye health. For example, foods such as carrots, sweet red peppers, spinach and mango are rich in vitamins A and C, which are good for eye health. Eye exercise: Regular eye exercise can help relieve eye fatigue and prevent myopia. Eye movement can include eye rotation, distance and distance, eyelid relaxation and so on. The researchers suggest further evaluating the effects of myopia at different age, lifestyle habits, genetic factors and dietary factors based on the history of myopia. This model can be used as a decision-making tool for the study program. If myopia can be intervened through daily care, it will be crucial for the future prevention and control of myopia in adolescents. Identified factors, such as evidence-based eye use, regular examination and vitamin-related reports, can be further explored in future studies.

#### 5. References

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