

Influence of Poor Vision on Sports Ability of College Students

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ABSTRACT. *Objective* Investigate the current situation of poor vision within the college students and confirm the influence of poor vision on their sports ability. *Methods* Data from physique and health survey data students in Inner Mongolia Autonomous Region in 2014 were used and 5760 college students aged 19-22 were selected as the research object. Six indices of sports ability were selected, including vision, grip strength (strength), pull-ups/sit-ups (muscle endurance), standing long jump (explosive force), 50-meter running (speed), sit-and-reach (flexibility), 800/1000-meter running (systemic endurance). The software, SPSS25. 0, was used to calculate the detection rate of impaired vision in college students with different attributes. Students were divided into the normal vision group and the poor vision group according to the criteria of poor vision ($P < 0. 05$). The independent-sample *T* test was used to analyze the difference of the athletic ability of college students under the conditions of different vision, and the significance level was determined as $P < 0. 05$. *Results* The detection rate of poor vision was higher in girls than in boys, higher in urban areas than in rural areas, and higher in Han than in Mongolian. In the comparison of gender classification, the speed, explosive force, muscle endurance, systemic endurance and flexibility of boys with normal vision were better than those with poor vision, and the strength, speed, muscle endurance and systemic endurance of girls were better than those with poor vision also, the differences were statistically significant ($P < 0. 05$); In the comparison of urban and rural classification, the speed, explosive force, muscle endurance, systemic endurance and flexibility of urban boys with normal vision were better than those with poor vision ;The speed, muscle endurance and systemic endurance of rural boys with normal vision were better than those with poor vision; The strength, speed, muscle endurance and systemic endurance of urban and rural girls with normal vision were better than those with poor vision, the differences were statistically significant ($P < 0. 05$). In the ethnic classification comparison, the speed, muscle endurance and systemic endurance of Han boys and the speed, muscle endurance and explosive force of Mongolian boys with normal vision were better than those with poor vision; The strength, speed, muscle endurance, systemic endurance and flexibility of Han girls and the strength, speed, muscle endurance and systemic endurance of Mongolian girls with normal vision were better than those with poor vision, the differences were statistically significant ($P < 0. 05$). *Conclusion* The rate of poor vision is higher in urban areas than in rural areas, higher in girls than in boys, and higher in Han than in Mongolian in general. The sports ability of the students with normal vision is generally better than those with poor vision.

KEYWORDS: *College students, Poor vision, Sports ability*

1. Research Purpose

The detection rate of poor vision of Chinese adolescent students increases continually, which has become an important problem threatening the healthy growth of students. On August 30, 2018, the Ministry of education and other eight departments jointly issued a plan: *the implementation plan for comprehensive prevention and control of myopia in children and adolescents*, which clearly put forward the work goal that the excellent rate reaching the physical health standards within national students should reach more than 25% by 2023. Studies have confirmed that the influence of heredity and acquired environment are the important factors of poor vision. Among the acquired factors, the formation of poor vision is related to physical exercise, outdoor activities and other factors [1]. Physical exercise plays a unique role in protecting the vision health of students[2]. Based on the investigation of the vision within College Students in Inner Mongolia Autonomous Region, the current situations of poor vision in college students were clarified, the differences of poor vision in ethnic, gender and urban-rural were discussed, the differences of sports ability in College Students under different vision conditions were analyzed, and the influence of poor vision on sports ability of college Students was determined, which provide reference materials for promoting good vision and physical health of college students.

2. Research Methods

1) Data sources Data from physique and health survey data students in Inner Mongolia Autonomous Region in 2014 were used. A total of 5760 college students aged 19-22 were selected. There were 2307 boys (40. 1%) and 3453 girls (59. 9%) among them. the average age was 20.37 ± 1.00 years old. The standard logarithmic visual chart was used to check the naked eye vision of the students. The grading standard of poor vision is in accordance with the requirements of *Detailed rules for the investigation of physical health in national students*. The vision ≥ 5.0 is considered in a normal scope and < 5.0 is poor. Six sports ability indices were selected, including vision, grip strength (strength), pull-ups/sit-ups (muscle endurance), standing long jump (explosive force), 50-meter running (speed), sit-and-reach (flexibility), 800/1000-meter running (systemic endurance). According to the requirements of *2014 national student physique and health research manual*, the indicators of every sports ability were tested, and the national uniform software for entry data was used to input the data for sorting and analyzing.

2) Statistical methods the software, SPSS 25. 0, was used to calculate the detection rate of poor vision of college students with different attributes. According to the judgment criteria of poor vision, the research objects were divided into the normal vision group and the poor vision group. The differences of sports ability of College Students under different vision conditions were analyzed, and the influence of poor vision on sports ability was demonstrated. The independent-sample T test

whose significance level was determined as $P < 0.05$ was used.

4. Results and Analyses

4.1 Basic Situation of Vision in College Students

4.1.1 Comparison of Poor Vision Rate between Urban and Rural Areas

The results showed that the rate of poor vision of urban and rural students was 79.10% and 70.80% respectively, and the difference was statistically significant ($\chi^2=51.29$, $P<0.01$). Due to the rapid development of urban economy compared with rural economy, the popularity of electronic products was also greater than that of rural areas, resulting in more opportunities, contacting mobile phones and other electronic products, of urban students than rural students. Some studies have shown that reading by screen has become the main reading mode of college students. Reading with electronic products for a long time can lead to the occurrence and development of poor vision in students, and this trend has become more obvious [3] with the increase of reading by screen time.

4.1.2 Comparison of Poor Vision Rate between Male and Female Students

As shown in table. 1, the rate of poor vision of male and female college students were 69.40% and 78.20% respectively, and differences were statistically significant ($\chi^2=59.96$, $P<0.01$). Male students took part in more sports activities in their spare time, like basketball, football and other extracurricular sports, while female students had less time for sports activities and spent more time on teleplay, which was easy to cause eyestrain. Studies had shown that eyestrain caused by excessive using of eyes is an important factor in the recent increase in myopia incidence rate [4]. For female students, in addition, participation in less sports than male students, learning pressure, excessive tension, study for a long time and physiological characteristics, may cause the higher myopia rate than the male [5].

4.1.3 Comparison of Poor Vision between Mongolian and Han Students

The rates of poor eyesight of Han and Mongolian students were 82.70% and 65.40%, respectively. The difference was statistically significant ($\chi^2=226.4$, $P<0.01$). Mongolian students, most of them came from rural pastoral areas, living in a wide environment since childhood, and ate mainly beef, mutton, milk and other foods rich in vitamin D, which might promote the nutrition of visual cells. In particular, Mongolian students enjoyed participating in sports activities, which might play a certain role in the protection of vision of students [6].

Table 1 the Vision Situation of College Students

Classification		Poor vision(N)	%	Normal vision(N)	%	χ^2	P
Urban/Rural	Urban	2133	79.10%	565	20.90%	51.29	0.00
	Rural	2169	70.80%	893	29.20%		
Gender	Male	1601	69.40%	706	30.60%	56.96	0.00
	Female	2701	78.20%	752	21.80%		
Nationality	Han	2551	82.70%	533	17.30%	226.4	0.00
	Mongolian	1751	65.40%	925	34.60%		
Age	19	1002	73.00%	370	27.00%	3.88	0.275
	20	1292	74.60%	440	25.40%		
	21	1349	75.10%	447	24.90%		
	22	659	76.60%	201	23.40%		

4.2 Comparison of Sports Ability under Different Vision Conditions

4.2.1 Comparison of Sports Ability between Male and Female Students under Different Vision Conditions

The results showed that the speed, explosive force, muscle endurance, systemic endurance and flexibility of males with normal vision were significantly better than those of males with poor vision; the strength, speed, muscle endurance and systemic endurance of females with normal vision were better than those of females with poor vision, and the difference was statistically significant ($P < 0.05$), as shown in Table. 2.

Table 2 Indicators of Sports Ability under Different Vision Conditions

Gender	Vision condition	Grip strength(kg)	50-meter running(m/s)	standing long jump(cm)	pull-ups/sit-ups(time)	800/1000-meter running(m/s)	sit-and-reach(cm)
Male	Poor vision	46.08±8.91	7.58±0.84	218.23±20.48	4.67±4.00	263.41±34.14	12.91±6.77

	Normal vision	45. 97±9.34	7. 40±0.80*	221. 17±20. 36*	5. 92±4.32*	254. 48±33.53*	13. 70±6.74*
	t	0. 28	5. 01	-3. 18	-6. 75	5. 82	-2. 58
	P	0. 77	0. 00	0. 00	0. 00	0. 00	0. 01
Female	Poor vision	30. 13±6.05	9. 20±0.97	160. 41±16. 51	26. 60±8.80	249. 54±26.68	15. 28±6.01
	Normal vision	31. 67±6.16*	9. 04±0.98*	160. 88±16. 50	27. 62±9.04*	243. 49±27.47*	15. 44±5.85
	t	-6. 11	4. 03	-0. 68	-2. 81	5. 46	-0. 66
	P	0. 00	0. 00	0. 49	0. 01	0. 00	0. 51

Note: Compared with poor vision *:P<0. 05.

4.2.2 Comparison of Sports Ability under Different Vision Conditions in Urban and Rural Areas

As shown in table. 3, the speed, explosive force, muscle endurance, systemic endurance and flexibility of urban males with normal vision were better than those of urban males with poor vision;the speed, explosive force and systemic endurance of rural males with normal vision were better than those of rural males with poor vision;the strength, speed, muscle endurance and systemic endurance of urban females with normal vision were better than those of urban females with poor vision;The strength, speed, muscle endurance and systemic endurance of rural females with normal vision were better than those of rural females with poor vision (P < 0. 05).

Table 3 Sports Ability Indicators of Urban/Rural Male/Females under Different Vision Conditions

Urban/Rural	Vision conditions	Grip strength(kg)	50-meter running(m/s)	standing long jump(cm)	pull-ups/sit-ups(time)	800/1000-meter running(m/s)	sit-and-reach(cm)
Urban male	Poor vision	45. 45±8.80	7. 65±0.88	216. 26±21. 28	4. 08±3. 90	267. 30±34.18	12. 23±6.77
	Normal vision	44. 68±9.87	7. 38±0.87*	219. 55±20. 54*	5. 89±4.73*	256. 18±35.74*	13. 73±7.07*
	t	1. 18	4. 19	-2. 17	-6. 13	4. 49	-3. 06
	P	0. 24	0. 00	0. 03	0. 00	0. 00	0. 00
Rural male	Poor vision	46. 72±8.98	7. 52±0.80	220. 20±19. 47	5. 26±4. 01	259. 55±33.68	13. 59±6.72
	Normal vision	46. 70±8.94	7. 40±0.76*	222. 10±20. 22	5. 94±4.06*	253. 50±32.19*	13. 68±6.56
	t	0. 02	2. 56	-1. 63	-2. 85	3. 10	-0. 23
	P	0. 98	0. 01	0. 10	0. 00	0. 00	0. 82
Urban female	Poor vision	29. 83±6.08	9. 17±0.98	160. 62±16. 24	27. 51±8.79	251. 18±26.79	15. 11±5.94

	Normal vision	31.26±6.73*	9.02±0.99*	162.47±17.19	28.82±8.94*	245.86±28.31*	15.75±5.99
	t	-3.64	2.41	-1.78	-2.36	3.11	-1.7
	P	0.00	0.02	0.08	0.02	0.002	0.09
Rural female	Poor vision	30.43±6.00	9.24±0.95	160.20±16.78	25.71±8.72	247.94±26.48	15.45±6.08
	Normal vision	31.95±5.72*	9.06±0.98*	159.77±15.93	26.79±9.03*	241.85±26.78*	15.23±5.75
	t	-4.67	3.4	0.48	-2.25	4.2	0.66
P	0.00	0.00	0.63	0.02	0.00	0.51	

Note: Compared with poor vision *:P<0.05.

4.2.3 Comparison of Sports Ability between the Mongolian and the Han under Different Vision Conditions

The results showed that the speed, muscle endurance and systemic endurance of the Han males students with normal vision were better than those of the Han males with poor vision. The strength, speed, muscle endurance, systemic endurance and flexibility of Han females with normal vision were better than those of Han females with poor vision (P<0.05). The speed, explosive force and muscle endurance of Mongolian males with normal vision were better than those of Mongolian males with poor vision; the strength, speed and systemic of Mongolian females with normal vision were better than those of Mongolian female with poor vision (P<0.05), and the difference was statistically significant (P < 0.05).

Table 4 Sports Ability Indicators of Mongolian/Han Men/Women under Different Vision Conditions

Nationality	Vision conditions	Grip strength(kg)	50-meter running(m/s)	standing long jump(cm)	pull-ups/sit-ups(time)	800/1000-meter running(m/s)	sit-and-reach(cm)
Han males	Poor vision	46.87±8.85	7.59±0.82	218.01±20.42	4.08±3.81	267.55±34.65	12.54±7.03
	Normal vision	46.24±8.96	7.35±0.88*	219.37±21.11	5.58±4.58*	254.42±35.16*	13.36±6.72
	t	0.96	3.95	-0.91	-5.18	5.18	-1.63
	P	0.34	0.00	0.36	0.00	0.00	0.10
Mongolian males	Poor vision	44.88±8.88	7.57±0.88	218.59±20.59	5.59±4.11	257.03±32.34	13.49±6.32
	Normal vision	45.83±9.52	7.42±0.77*	222.06±19.95*	6.09±4.18*	254.51±32.73	13.86±6.76
	t	-1.72	3.08	-2.81	-1.99	1.27	-0.94
	P	0.09	0.00	0.01	0.05	0.20	0.35
Han females	Poor vision	30.11±5.94	9.14±0.95	162.69±15.74	27.59±8.58	249.70±26.21	15.15±6.01

	Normal vision	32.17±6.65*	8.92±0.97*	164.44±16.12	29.91±8.56*	243.13±29.09*	16.36±5.98*
	t	-5.40	3.65	-1.76	-4.30	3.91	-3.19
	P	0.00	0.00	0.08	0.00	0.00	0.00
Mongolian females	Poor vision	30.18±6.20	9.29±0.99	157.20±17.04	25.20±8.91	249.32±27.33	15.46±6.02
	Normal vision	31.34±5.80*	9.12±0.99*	158.51±16.35	26.10±9.04	243.73±26.37*	14.84±5.68
	t	-3.41	3.04	-1.40	-1.81	3.70	1.90
	P	0.00	0.00	0.16	0.07	0.00	0.06

Note: Compared with poor vision *:P<0.05.

4.3 Comparative Analysis of Sports Ability under Different Vision Conditions

Poor vision, bringing a lot of harm to college students, not only affects the normal study and life, but also impact negatively their work in the future. Many studies believe that physical exercise can effectively reduce eyestrain and pressure, and play a key role in protecting vision health of students [7-8]. Other studies have confirmed that the poor vision attribute to many factors, and lack of physical exercise has become an important factor leading to poor vision of students [9]. The development of vision and physical quality may related. With the increase of age, the physical quality and vision condition of students will also increase to varying degrees [10], while the physical quality and vision condition level of college students are basically stable [11]. The results of this study show that the sports ability of students with normal vision is better than that of students with poor vision, which indicates that vision is an important factor affecting sports ability. It can also be considered that physical exercise can not only prevent the poor vision, but enhance the physique. Therefore, the sports ability of students with normal vision is better than that of students with poor vision.

5. Conclusions and Suggestions

5.1 Conclusions

Generally speaking, the rate of poor vision of college students is higher than that of female students, that of students in urban areas is higher than that of students in rural areas, and that of Han students is higher than that of Mongolian students.

5.2 Suggestions

Schools and colleges, on the one hand, should attach great importance to eye health of students, reduce their extracurricular learning burden, improve the

environment relating the vision, implement the measures to eye care such as eye exercises, perfect the stadium facilities, deepen the educational reforms of physical education and health education, promote the construction of campus sports projects actively, urge students to "leave the seat, go out of the classroom", and carry out more outdoor sports^[12]. On the other hand, guide the parents to support students to carry out extracurricular sports, pay attention to the nutrition and eye-health of students, and take students for vision examination regularly. In addition, students themselves should maintain good habits of eye-using and physical exercise, maintain correct sitting posture, keep doing eye-exercises, participate in physical exercise actively, ensure good quality of sleep, reduce the use of electronic products, and promote the development of physical and mental health.

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