



A Meta-analysis of the Influence of Eye Exercise on Chinese Children and Adolescents' Myopia

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INTRODUCTION

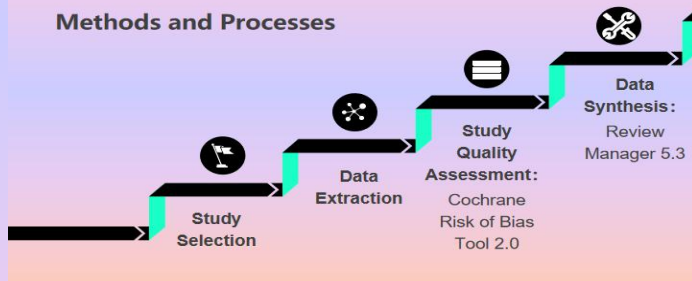
In recent years, the prevalence of myopia among children and adolescents in China has been high. Interventions that can effectively prevent and control myopia are particularly important. As one of the school health prevention and control policies promulgated by the country, eye exercise has been a mandatory measure to prevent myopia for school-age children since 1963 and has been promoted for more than 50 years. However, there is still no consistent evidence on the effectiveness of eye exercise in preventing and controlling myopia. Due to the differences in the design of research, the selection of experimental subjects, the selection of observation indexes and the criteria for judging the curative effect in various clinical studies, there are some differences in the results of the studies.

PURPOSE

- analyze the effect of eye exercise on myopia in Chinese adolescents and children by using the meta-analysis method
- provide a reference for the prevention and control of myopia

METHODS

Methods and Processes



Study Selection

Research methods and processes

Databases

- Web of Science
- Google Scholar
- CNKI
- EBSCO
- PubMed
- Cochrane Library
- Science Direct
- Scopus
- Embase
- inception to April 30, 2020

Searching Strategy

● **CNKI:** the title or keywords or abstract or topic contains "eye exercise" and "myopia"

● **PubMed and Google Scholars:** ("myopia" OR "short sightedness" OR "nearsightedness") AND ("ocular gymnastics" OR "eye exercises" OR "eye exercise")

● **Other English databases:** title OR keyword OR abstract OR topic contains ("myopia" OR "short sightedness" OR "nearsightedness") AND ("ocular gymnastics" OR "eye exercises" OR "eye exercise")

Inclusion Criteria

- Publicly published Chinese or English journals or dissertations;
- The study design are controlled trials or case-control studies. Eye exercise is the main intervention method for the eye exercise group;
- There are clear observation indicators, such as visual acuity, myopia refraction, efficacy, etc.

Exclusion Criteria

- Without experimental intervention, such as reviews, conference abstracts, etc.;
- Full-text information cannot be obtained;
- Unclear data information, such as an unclear description of outcome indicators before and after intervention;
- Repeated publications;
- Non-Chinese or English.

RESULTS

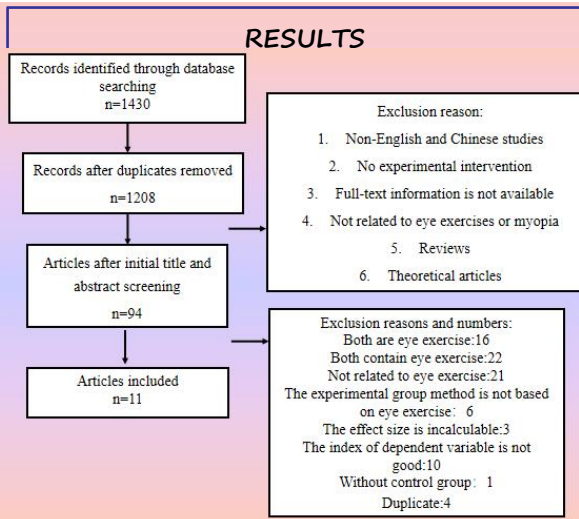


Figure 1. Study Selection Process and Results

First author	Year	Study design	Sample size (T/C)	Control group intervention	Time	Outcome indicators
Luo	2018	RCT	55/55	3D vision Training + ciliary muscle exercise training	3 months	vision
Wu	2013	RCT	20/20/20/20	Point massageDazhui vibration3. Dazhui vibrating manipulation + point massage	30 days	vision, diopter, curative effect
Sun	2008	CT	30/30	Massage	3 months	curative effect
Lv	2014	RCT	47/55	TCM diet + auricular application + sticking around the eye + the fog of the four combined methods treatment	3 months	curative effect
Song	2015	RCT	24/24	pressure	3 months	diopter
Zhang	2013	RCT	7/7	Without eye exercise	1 day	vision
Han	2015	RCT	25/25	Badminton training	3 months	vision
He	2014	RCT	68/68	YOGA eye exercise	3 months	vision
Ma	2017	RCT	62/61	Physical health and eyesight Gymnastics	4 months	vision
Wang	2019	CT	30/30/30/30	Eye muscle massage2.Head and neck massage and scraping3.Eye muscle massage with head and neck massage and scraping	30 days	vision
Kang	2016	RCT	98/103	Without eye exercise	2 years	axial length, SER

Table 1. Characteristics of Included Studies

Studies	SMD	95% CI	I ²	p1*	p2*
All	-1.39	-1.96, -0.83	92%	<0.00001	<0.00001
Delete Han	-1.23	-1.76, -0.69	91%	<0.00001	<0.00001
Delete He	-1.42	-2.07, -0.77	93%	<0.00001	<0.00001
Delete Luo	-1.5	-2.14, -0.86	92%	<0.00001	<0.00001
Delete Ma	-1.52	-2.15, -0.88	91%	<0.00001	<0.00001
Delete	-1.48	-2.1, -0.85	93%	<0.00001	<0.00001
Delete Wang2	-1.48	-2.1, -0.86	93%	<0.00001	<0.00001
Delete Wang3	-1.35	-1.94, -0.75	92%	<0.00001	<0.00001
Delete Wu1	-1.25	-1.81, -0.7	91%	<0.00001	<0.00001
Delete Wu2	-1.16	-1.68, -0.65	90%	<0.00001	<0.00001
Delete Wu3	-1.38	-1.98, -0.77	92%	<0.00001	<0.00001
Delete Zhang	-1.58	-2.15, -1.01	92%	<0.00001	<0.00001

*Note: p1 is the p-value of the heterogeneity test and p2 is the p-value of the overall effect.

Table 2. The Sensitivity Analyses Results of Visual Acuity

Studies	SMD	95% CI	I ²	p1*	p2*
All	-8.14	-14.85, -1.43	98%	<0.00001	0.02
Delete Song	-10.57	-12.95, -8.18	62%	0.07	<0.00001
Delete Wu1	-7.93	-16.64, 0.78	98%	<0.00001	0.07
Delete Wu2	-7.45	-15.37, 0.46	98%	<0.00001	0.06
Delete Wu3	-6.47	-13.53, 0.59	98%	<0.00001	0.07

*Note: p1 is the p-value of the heterogeneity test and p2 is the p-value of the overall effect.

Table 3. The Sensitivity Analyses Results of Diopter

Studies	RR	95%CI	I ²	p1*	p2*
All	0.34	0.18, 0.65	91%	<0.00001	0.001
Delete Lv	0.47	0.31, 0.72	79%	0.002	0.0004
Delete Sun	0.38	0.18, 0.79	92%	<0.00001	0.009
Delete Wu1	0.28	0.12, 0.66	93%	<0.00001	0.003
Delete Wu2	0.29	0.12, 0.68	93%	<0.00001	0.005
Delete Wu3	0.29	0.12, 0.72	93%	<0.00001	0.008

*Note: p1 is the p-value of the heterogeneity test and p2 is the p-value of the overall effect.

Table 4. The Sensitivity Analyses Results of Curative Effect

Axial Length and Cycloplegic Spherical Equivalent Refraction (SER)

Kang et al. (2016):

3 groups: high-quality, low-quality eye exercise and no exercise group
no statistically significant difference in their mean change among different groups (p > 0.05)
all 3 groups showed a trend of increasing axial length and more myopic SER

DISCUSSION

- when compared to the eye exercise group, the superior effect for vision improvement, diopter improvement and efficacy was showed of other interventions.
- Limitations: number of included articles was too small, languages of studies was limited to Chinese and English, no high-quality study was included
- Future: experimental design should be more rigorous to improve the quality of the study

CONCLUSIONS

- The overall findings suggested that eye exercise had some effect, but might not as effective as other interventions in improving myopia.
- In the future, more myopia interventions that are easy to promote can be explored for adolescents and children.
- However, due to the limitations of the type and quantity of included studies, more high-quality studies are needed to verify the conclusions.