

Observation of the Clinical Efficacy of Traditional Chinese Medicine Eye Patching Combined with Acupuncture for the Treatment of Amblyopia in Children and Adolescents

Li Jin ^{1, *}

^{1.} Department of ophthalmology, Jinzhong Traditional Chinese Medicine Hospital, 030600 Jinzhong, Shanxi, China

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* Correspondence

Li Jin

Department of ophthalmology, Jinzhong

Traditional Chinese Medicine Hospital, 030600

Jinzhong, Shanxi, China

E-mail: YUjkl89uui@163.com

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Abstract

Background: Amblyopia is an eye disease related to visual development. If it is not treated properly or in a timely manner, it will have a serious impact on the patient's vision and quality of life. This study observed the clinical efficacy of traditional Chinese medicine (TCM) eye patching combined with acupuncture for the treatment of amblyopia in children and adolescents. **Methods:** Patients aged 5 to 8 years (including 5 and 8 years old) with anisometropic amblyopia who visited the Ophthalmology Department of Jinzhong City Traditional Chinese Medicine Hospital from 2018 to 2025 were selected. These patients were randomly divided into the experimental group and control group, with 20 cases in each group using random number table methods. Both groups used the conventional correction-based occlusion method, while the experimental group additionally employed TCM eye patching combined with acupuncture therapy (local acupoints: Sibai, Taiyang, Zanzhu, Yintang, and Sizhukong; distal acupoints: Hegu, Neiguan, and Zusanli). The acupuncture therapy was performed once daily, with the needles retained for 30 min, based on the balanced reinforcing and reducing principle. The treatment course was 10 days, with vision and refraction rechecked weekly, for a total of three courses. After the experiment, the indicators and therapeutic effects of the two groups were compared. **Results:** Prior to the experiment, there was no significant difference in age and gender between the experimental and control groups ($p > 0.05$). After the treatment course, in the experimental group, 2 patients' eyes were cured, 14 patients' eyes were improved, and 4 patients' eyes showed no changes, with a total effective rate of 80%, while in the control group, 8 patients' eyes were improved, 12 patients' eyes showed no changes, and 0 patient's eyes were cured, with a total effective rate of 40%. The therapeutic effect of the experimental group was superior to that of the control group ($p < 0.05$). After treatment, the best corrected visual acuity of the two groups was significantly higher than that before treatment, and that of the experimental group was higher than that of the control group ($p < 0.05$). **Conclusion:** Both the experimental and control groups showed some improvement in vision after treatment. Acupuncture around the eyes combined with TCM external application can effectively improve the corrected visual acuity of children with anisometropic amblyopia.



1 Introduction

Amblyopia is considered a key issue in the field of visual development. It refers to the decline in monocular or binocular best corrected visual acuity due to abnormal visual experience during the critical stage of visual development (namely 0-12 years old, especially 3-6 years old) and without organic lesions in the eyes [1]. A variety of intervention strategies have been leveraged for amblyopia. Traditional methods, such as occlusion therapy, force the use of the amblyopic eye by covering the preferred eye, while optical correction with glasses are used to ensure clear imaging [2]. Innovative therapies are also emerging, including low-concentration atropine eye drops to relax eyes, computer-based visual training programs, and transcranial magnetic stimulation to stimulate the visual cortex [3,4]. However, current treatments for amblyopia are not sufficient to achieve normal visual acuity for 15-50% of amblyopic children. Even when normal visual acuity is achieved, amblyopia often recurs [5]. The high prevalence of persistent residual amblyopia and recurrent amblyopia underscore the need for more effective treatments.

Despite no direct term, the traditional medicine categorizes “amblyopia” under “pediatric dim vision” and “near-sighted but far-sighted syndrome” based on relevant theories and explains it from a unique perspective [6]. Traditional medicine offers a variety of treatment methods for amblyopia. Acupuncture is a commonly used method, which stimulates specific acupoints such as Jingming, Chengqi, Zanzhu, Sibai, and other acupoints around eyes, as well as distal acupoints like Zusanli, Sanyinjiao, Ganshu, and Shenshu, to unblock meridians, harmonize qi and blood, stimulate the qi of meridians, improve the blood supply to the eyes, and promote the recovery of visual function [7]. Acupuncture has the advantages of simple operation, low cost, few or no side effects, and the ability to be carried out simultaneously with other

treatment methods [8]. Meanwhile, the combined TCM is used according to the patient's specific symptoms and signs and based on syndrome differentiation. The treatment is performed based on the principles of strengthening the spleen and invigorating qi, tonifying the liver and kidney, and nourishing blood to improve vision. For example, Guipi Decoction and Qi Ju Di Huang Pill are used to improve overall bodily functions and provide a favorable internal environment for eye development, contributing to the rehabilitation of amblyopia [9]. The clinical case reports have also affirmed the therapeutic effect of acupuncture in the clinical treatment of amblyopia. In addition, the combination of acupuncture with traditional therapy, Chinese herbal medicine treatment and laser treatment has also achieved good therapeutic effects in treating amblyopia [10-13].

In view of the therapeutic effect of TCM in amblyopia, in this study, we observed the clinical efficacy of TCM eye patching combined with acupuncture for the treatment of amblyopia in children and adolescents.

2 Methods

2.1 General information

Forty patients with anisometropic amblyopia aged 3 to 10 years (including 3 and 10 years old) who visited the Ophthalmology Department of Jinzhong City Traditional Chinese Medicine Hospital from 2018 to 2025 were selected. Patients were randomly grouped and assigned numbers using random number table methods. Those with an odd number at the end of their number were distributed to the experimental group, and those with an even number at the end were distributed to the control group. Among them, there were 20 cases in the experimental group and 20 cases in the control group. Routine examinations were conducted before enrollment, including visual acuity, slit lamp, fundus camera, etc. This study was approved by the ethics committee of our hospital and

informed consent forms were signed with the parents of the patients., and this study was conducted in accordance with the Declaration of Helsinki.

2.2 Inclusion and exclusion criteria

Inclusion criteria: (1) Patients who met the diagnostic criteria for anisometropic amblyopia; (2) Patients aged 3 to 10 years (including 3 and 10 years old). Exclusion criteria: (1) Patients with sensory deprivation and other organic eye lesions; (2) Patients with a history of intraocular surgery or refractive surgery; (3) Patients allergic to tropicamide eye drops.

2.3 Treatment methods

The control group adopted wearing glasses and occlusion treatment, based on which the experimental group performed acupuncture treatment with local acupoints combined with TCM external application. The acupoints selected were based on the clinical experience of ophthalmologists.

Local acupoints: Sibai, Taiyang, Zanzhu, Yintang, Sizhukong, etc. around the eyes and on the face; Distal acupoints: Hegu, Sanyinjiao, Zusanli, etc. The acupuncture therapy was performed once daily, with the needles retained for 30 min, based on the balanced reinforcing and reducing principle.

Acupoint selection and operation method: before needling, the acupoint area was disinfected with a cotton swab dipped in iodine. Acupuncture needles of 1 inch or 1.5 inches were selected. Sibai, Taiyang, and Neiguan acupoints were needled vertically at 0.5-1 inch; Hegu and Zusanli acupoints were needled vertically at 1-1.5 inches; Zanzhu, Yintang, and Sizhukong acupoints were needled horizontally at 0.5-1 inch.

TCM external application method: the formula for TCM external application included *vinegar-processed frankincense*, *vinegar-processed myrrh*, *Flos chrysanthemi*, *Herba taraxaci*, *Herba lycopi*, *Radix*

angelicae sinensis, *Herba menthae*, and *Borneolum syntheticum*. The medicine was applied to the acupoints around the eyes (such as Zanzhu, Sibai, and Taiyang) to regulate the blood and qi of the eyes through the bladder meridian of foot-Taiyang and the liver meridian.

Treatment period: a 10-day period was considered one treatment cycle, with a total treatment duration of 30 days.

2.4 Evaluation criteria

Best corrected visual acuity (BCVA): throughout the experiment, the same professional staff member performed refraction, measurement, and information recording. The same international standard logarithmic visual acuity chart was used to measure visual acuity. The measurement was performed at a distance of 5 meters, with the healthy eye measured first, followed by the diseased eye. If more than 3/4 of a line could be recognized, it was considered the visual acuity; if less than 1/4 of a line could be recognized, the previous line was recorded as the visual acuity. For visual acuity less than 0.1, the patient was moved forward until they could see 0.1. The visual acuity was calculated as: $0.1 \times m/50$. Measurements were conducted before treatment and after each treatment course.

Diopter D measurement: cycloplegia was induced using 0.5% tropicamide eye drops (thrice, a 5-minute interval between each drop) before measurement. 30 min after the last drop, the examiner ensured that the pupil diameter of the examined child reached more than 6 mm and that the light reflex was negative. Then, the refractive power of both eyes was measured using an autorefractor, with the average of at least three measurements recorded as the result. The type and degree of refractive error were obtained and promptly recorded [14]. Based on the examination results, optometrists provided scientific and rational spectacle correction and recorded the refraction

2.5 Clinical efficacy evaluation

The efficacy evaluation criteria specified by the National Children’s Strabismus and Amblyopia Prevention and Treatment Study Group were used as follows: Essentially cured: visual acuity restores to 0.9 or above. For children aged 3 years, visual acuity reaches 0.4 or above; for those aged 4 years, visual acuity reaches 0.6 or above; for those aged 5 years, visual acuity reaches 0.8 or above. Completely cured: the visual acuity is greater than 1.0. Improvement: vision has been increased by two or more lines. Invalid: vision has not changed, even decreased or increased by less than one line. In this study, both essentially cured and completely cured cases were considered as cured.

2.6 Statistical analysis

Statistical analysis was performed using SPSS 26.0. Normality was tested using the Shapiro-Wilk test. Quantitative data that did not conform to the normal

distribution were expressed by the quinterle method [M (P25, P75)]. The Mann Whitney U test was used for comparison between the two groups, and the generalized estimating equation was used for comparison of repeated measurement data. Multiple comparisons between groups were conducted using the Bonferroni method; Qualitative data were expressed as rates or constituent ratios and compared using the χ^2 test. The comparison between two groups of graded data was performed using the Mann Whitney U test. p value < 0.05 was considered statistically significant.

3 Results

3.1 Basic information of patients

This study included 40 eligible patients, all of whom completed the trial, with the age of 5-8 years, as well as 19 males and 21 females. There are 8 males and 12 females in the experimental group, there are 11 males and 9 females in the control group. There was no significant difference in gender and age between the two groups of patients ($p > 0.05$, [Table 1](#)).

Table 1 Comparison of the general data in two groups.

Group	Cases	Gender [cases (%)]		Age (years old)
		Male	Female	
Experimental group	20	8 (40.00)	12 (60.00)	7.00 (6.00, 7.00)
Control group	20	11 (55.00)	9 (45.00)	7.00 (6.00, 8.00)
χ^2		0.902		-1.084
p		0.342		0.278

3.2 Comparison of total effective rate

The total effective rate of the control group was 40%, and that of the experimental group was 80%, the total effective rate of the experimental group was

significantly higher than that of the control group ($p < 0.05$, [Table 2](#)), implying that the combination of acupuncture around eyes and eye external application had better therapeutic effects than the conventional therapy.

Table 2 Comparison of therapeutic efficacy [cases (%)].

Group	Cases	Cured	Improvement	Invalid	Effective rate
Experimental group	20	2 (10.00)	14 (70.00)	4 (20.00)	16 (80)
Control group	20	0 (0.00)	8 (40.00)	12 (60.00)	8 (40)
χ^2			-2.713		6.667
p			0.007		0.010

3.3 Comparison of visual acuity improvement

At the end of the treatment course, the best corrected visual acuity in the amblyopic eyes of both groups was observed. Before treatment, there was no significant difference in the best corrected visual acuity between the two groups ($p > 0.05$, Table 3). After treatment,

the best corrected visual acuity of the two groups was significantly higher than that before treatment, and that of the experimental group was higher than that of the control group ($p < 0.05$, Table 3). It indicated that the combination of acupuncture around the eyes and external eye application had an evident therapeutic effect.

Table 3 Comparison of the best corrected visual acuity before and after treatment [M (P25, P75)].

Group	Number of eyes	The best corrected visual acuity before treatment	The best corrected visual acuity after treatment
Experimental group	40	0.40 (0.30, 0.40)	0.60 (0.50, 0.70) *
Control group	40	0.30 (0.25, 0.40)	0.50 (0.40, 0.50) *
Wald χ^2		3.573	17.993
p		0.059	< 0.001

Note: Compared with before treatment, * $p < 0.05$.

4 Discussion

Amblyopia is a neurodevelopmental disorder characterized by functional deficits in the visual cortex. In TCM theory, the eye is closely connected to the meridians of viscera. The Spiritual Pivot-Da Huo Lun states that the essence of the five Zang organs and six Fu organs all ascend to the eyes and become their essence. This means that the essence of the zang-fu organs is the material basis for maintaining normal eye function [15]. Meridians act as pathways for the

circulation of qi and blood. If the meridians are blocked, the flow of qi and blood will be impeded, and the eyes will not receive adequate nourishment, which may lay the groundwork for amblyopia. In recent years, TCM has made significant progress in the treatment of various diseases [16,17]. TCM, acupuncture, auricular point application and TCM iontophoresis are commonly used methods for treating amblyopia [16,18,19]. Previous studies have found that for the treatment of amblyopia, the total effective rate of acupuncture treatment is higher than that of

conventional treatment [20,21]. In this study, we found that acupuncture therapy combined with TCM external application in treating amblyopia is prominently effective, it can effectively improve the corrected visual acuity of children with anisometropic amblyopia.

In this study, the selected acupoints were as follows: local acupoints on the head and face (Sibai, Taiyang, Zanzhu, Yintang, and Sizhukong); distal acupoints (Hegu, Neiguan, and Zusanli). The local acupoints selection mainly reflected the principle of "the location of Shu-stream points is where the treatment is effective". They actively promote the circulation of essence and blood around the eyes while unblocking the flow of energy using the proximal effects. Zanzhu is located at the intersection of the bladder meridian of foot-Taiyang and the Du meridian and at the depression of the tip of eyebrows, and is a starting point for the flow of meridian qi. Sizhukong, also known as Muqie, is the end point of the Sanjiao meridian, is situated at the depression behind the eyebrows, and is a vital point for the flow of qi from the meridian of foot-Shaoyang. Together, these two acupoints can unblock the meridians and relieve eye fatigue. Yintang and Taiyang are extraordinary points outside the meridians. Taiyang, anatomically located at the intersection of multiple skull bones at the wing gap, is a convergence point of the trigeminal nerve and the ciliary ganglion, and has a rich vascular distribution, which is an essential point for acupuncture treatment of eye diseases. Sibai, an acupoint on the stomach meridian of foot-Yangming, is a starting point of the flow of qi in the meridian of foot-Yangming. The combination of these local acupoints promotes the circulation of qi and blood around the eyes and relieves eye fatigue. For distal acupoints, Hegu and Zusanli were selected for their distant treatment effects. Hegu is the source point of the large intestine meridian of hand-Yangming, and Zusanli is the He-sea point and lower He-sea point of

the stomach meridian of foot-Yangming, and is the entrance of the qi of meridian of foot-Yangming. Zusanli combined with Hegu and Neiguan can treat eye diseases, replenish the qi and blood of the viscera, regulate the transportation and transformation of spleen and stomach, and carry the qi and blood of the viscera upward to the eyes to improve vision.

The formula for TCM external application included: *vinegar-processed frankincense* and *vinegar-processed myrrh* that can activate blood circulation, resolve blood stasis, and improve the stagnation of qi and blood around the eyes; *Flos chrysanthemi* and *Herba taraxaci* that clear liver heat, improve vision, and alleviate eye fatigue caused by excessive liver fire and inflammation due to long-term eye use; *Herba lycopi* and *Radix angelicae sinensis* that assist in promoting blood circulation, draining water retention, and preventing blood stasis from transforming into heat; *Herba menthae* and *Borneolum syntheticum* that can remove wind and clear heat, and enhance the permeability of the medicine. The medicine applied to the acupoints around the eyes (such as Zanzhu, Sibai, and Taiyang) regulates the flow of qi and blood in the eyes through the bladder meridian of foot-Taiyang and the liver meridian, improves blood supply to the eyes and enhances the nutritional metabolism of eye tissues. Grinding these TCM ingredients into powder and mixing them into a paste for external application around the eyes can fully exert the therapeutic effects.

The TCM had blood-activating and stasis-eliminating effects with heat-clearing and detoxifying properties, and can enhance transdermal absorption, improve the regulatory function of the eye muscles and delay abnormal remodeling of scleral collagen fibers. *Flos chrysanthemi*, *Semen cassiae*, and *Flos buddlejae* can effectively clear the liver, improve vision, alleviate symptoms such as eye fatigue and dryness, and improve the visual function of the eyes. *Radix salviae*

multiorrhizae and *Rhizoma chuanxiong*, which are blood-activating and stasis-eliminating TCM, can promote blood circulation around the eyes, improve blood supply, and enhance the nutritional metabolism of eye tissues. These TCM can be ground into powder and then mixed into a paste for external application around the eyes to fully exert the therapeutic effects.

TCM external application mainly functions through transdermal absorption. The medicine acts directly on the acupoints around the eyes. On one hand, it enhances the stimulating effect of acupuncture, further promoting the flow of meridian qi and blood. On the other hand, drug ingredients can alleviate visual fatigue, reduce the accumulation of inflammatory factors in ocular tissues, and inhibit scleral remodeling. Although further verification is needed in animal experiments regarding the inhibitory effect of TCM external application on scleral remodeling, existing studies have shown its positive role in improving eye symptoms and protecting eye tissues.

However, this study also has some limitations. Firstly, the sample size of this study is small, and more studies need to be conducted by expanding the sample size in the future. In addition, the treatment cycle can also be extended to observe the efficacy of these treatment methods, and regular follow-ups can be conducted to understand the improvement of the patients and whether there is a recurrence.

5 Conclusion

Acupuncture therapy combined with TCM external application can effectively improve the corrected visual acuity of children with amblyopia. This discovery not only provides an effective plan for the clinical treatment of amblyopia, but also confirms the advantages of TCM in treating this disease.

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Exploration and Verification Publishing

Conflicts of Interest

The author declares no conflicts of interest.

Author Contributions

L.J.: Project design, Project administration, Writing - original draft; L.J.: Project design, Visualization; L.J.: Methodology; L.J.: Conceptualization, Funding acquisition, Writing - review & editing.

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of our hospital and informed consent forms were signed with the parents of the patients., and this study was conducted in accordance with the Declaration of Helsinki.

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Availability of Data and Materials

Data supporting this study are included within the article.

Supplementary Materials

Not applicable.

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