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Cataract Improvement by the Mixture of Cassiae Semen, Wolfberry, and Dendrobium Huoshanense - A Preliminary Study in Animals

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Abstract: Introduction: Cataract is a primary cause of decreasing vision that includes the development of presbyopia. **Methods**: A total the 36 Sprague Dawley (SD) rats aged 7 and 8 weeks were enrolled. The mixed herbal water extracts (MHWE) were designed, including Cassiae semen, wolfberry, and Dendrobium houshanese in one serving. Each serving consisted of a total of 0.04 mg of mixed drugs in 10 mL of drinking water. First, the cataract model was established by a 26 gauge needle puncture, and all the left eyes of 36 SD rats were diagnosed with cataracts. They were randomly categorized into four groups receiving different doses for 2 months. The groups included placebo, low dose group (LDG; one serving daily), middle dose group (MDG; two servings daily), and high dose group (HDG; three servings daily). The changes in cataracts during the whole study were observed. **Results**: The percent of improvement in cataracts was 0%, 33.3%, 50%, and 66.6% in placebo, LDG, MDG, and HDG, respectively, in a dose-dependent manner. **Conclusion**: We boldly suggested that MHWE may enhance the improvement in the lens of the eye. In humans, taking MHWE may possibly benefit cataract formation, especially in the early stage.
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1. Introduction

The prevalence and the absolute number of blind people because of cataracts remain high, and the rates continue to increase worldwide [1]. A cataract is a condition in which the lens of the eye becomes opaque and may cause blurred or distorted vision, glare problems, or blindness (in the advanced stage). Cataracts occur frequently with increasing age. For example, the age-standardized prevalence of blindness in adults older than 50 years remains the highest, with a rate of 6.0%. Besides, poor nutrition, metabolic insults, excessive exposure to sunlight or other sources of radiation, trauma, and certain medications such as cortisone can speed their development. There are no effective medical treatments for cataracts. However, some Chinese herbal drugs have been found to improve cataracts and include bletilla striata, scutellaria baicalensis, commelina communis, poria, longan, folium mori, asparagus cochinchinensis, scutellaria barbata, eucommia ulmoides, prunella vulgaris, schisandra chinensis, white chrysanthemum, artemisia capillaris Thunb, and dendrobium. In the past, we observed that the mixture of traditional Chinese herbs, including cassiae semen, wolfberry, and Dendrobium huoshanense, could improve the human ocular accommodation that clear lens plays an important role. Therefore, we suggest that the same drugs may benefit in preventing cataract progression. Hence, we designed the animal study described below for a deeper evaluation of this hypothesis [2].

2. Methods and Materials

This approved study included 36 consecutive eyes (all left eyes selected from 36 Sprague Dawley (SD) rats aged 7-8 weeks (mean 7.7 weeks) and the mean body weight of 756 mg. The studies were completely performed at the Laboratory of Kaohsiung Armed Forces General Hospital (Taiwan). All 36 SD rats were maintained in standard conditions (a 12-hour light/dark cycle and a temperature of 22.2 ±2 °C) and stand chow (contained > of 25% crude protein, > 4.5% crude fat, < 12% water, and < 9% ash) and sterilized water were available ad libitum from May 2022 and Sep 2022. At first, the cataract model was performed by a 26 gauge needle puncture through the anterior chamber and into the lens cortex. Afterwards, all the rats were diagnosed with cataracts (mild) [3]. We designed the mixed herbal water extracts (MHWE) of cassiae semen, wolfberry, and Dendrobium houshanese in one serving. Each serving would consist of 0.04 mg MHWE in 10 mL of drinking water. All rats were randomly categorized into four groups

and different doses of MHWE were given for 2 months. These four groups were: placebo (plain water 10 CC/day), low dose group (LDG; one serving daily), middle dose group (MDG; 2 serving daily), and high dose group (HDG; 3 serving daily). We observed the changes during the entire study. If cataract was found to improve by the naked eyes, the therapy was considered a ”success” (Figures 1 and 2). The results were analyzed for efficacies using SAS 9.0 (SAS Inst. Cary, NC, USA). We compared the outcomes with placebo by paired t-test. The treatment was considered “significantly different” when the *p*-value < 0.05.

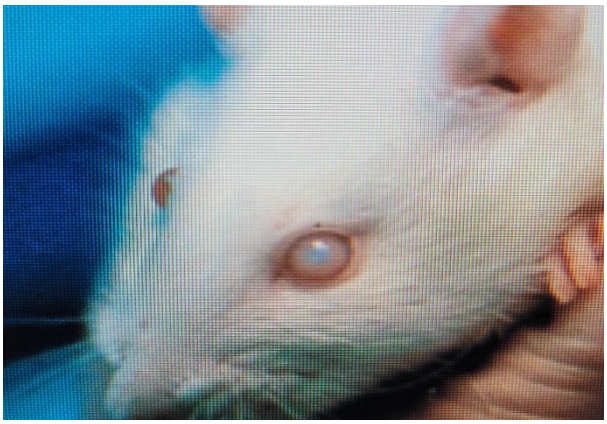
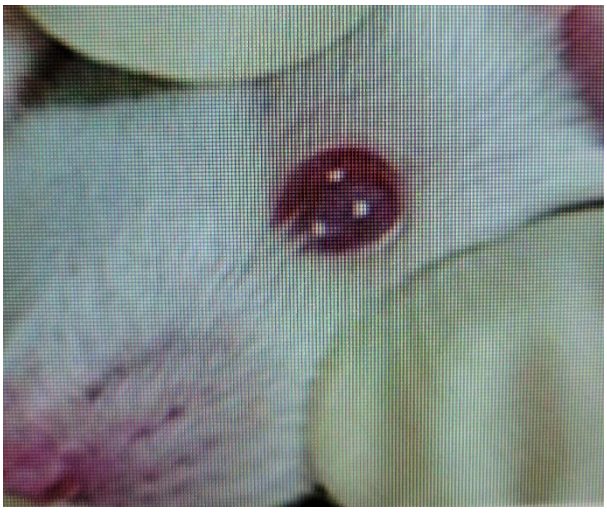


Fig. 1. The cataract (left eyes) of Sprague Dawley rats were diagnosed as cataracts by naked eyes, and the subjects were arranged to receive various doses of water extracts of mixed herbal drugs.



Fiig. 2.This therapy was considered a “success” when the cataract was not found on examination by the naked eyes.

3. **Results**

The percent of improvement of cataracts was 0%, 2/6 (33.3%)
(P<0.05), 3/6 (50%), and 4/6 (66.6 %) in placebo, LDG, MDG, and HDG, respectively. Besides, the improvement was in a dose-dependent manner. All SD rats with MHWE treatment were healthy. We, therefore, suggest that the therapy of mixed herbal drugs for cataracts was relatively effective and safe. This needs to be explored further in the future through human trials.

4. Discussion

A cataract is a term used for the clouding of the lens; if the cloudiness is sufficient to inhibit the transmission of images to the retina, vision is partly or fully obstructed. Mild cloudiness, the most common condition associated with cataracts, does not need surgical intervention for correction but can often be compensated for by using corrective lenses. More severe cloudiness is usually treated by surgery, by removing the original lens and replacing it with an artificial lens. Cataracts that occur most often in the elderly are sometimes referred to as senile cataracts, which affect 25% of those over the age of 65 years; they are especially common in those with diabetes. Some drug therapies also induce cataract formation. Nearly 1.5 million cataract surgeries are performed in the U.S. each year [4].

Cataract surgery is part of ancient medical arts; it was one of the earliest surgical procedures, even in the Oriental regions, traced back over 2,000 years. It is likely that the reliance on surgery possibly limited the efforts to develop non-surgical treatment methods; likewise, it is likely that non-surgical methods that had been tried were relatively unsatisfactory, making surgery seem an appropriate alternative. Currently, therapy for cataracts with Chinese herbs is being well discussed. For example, Pueraria lobata has been used to treat diabetes and cataracts in China, and it may increase the mRNA expression of Nrf2 and HO-1, thus inhibiting oxidative stress. The present findings suggest that puerarin had hypoglycemic effects and that it prevented cataract development and progression in diabetic rats by reducing oxidative stress through the Nrf2/HO-1 signaling pathway [5]. In this study, we prepared three Chinese herbs, including cassiae semen, wolfberry, and Dendrobium huoshanense, simultaneously. In our earlier study, we also reported that a mixture of these drugs should benefit from the accommodation. However, a well-controlled cataract is good for accommodative gain. From further inference, we suggest that a similar prescription of mixed herbs would control and even improve lens clouding.

Cassiae semen is a well-known traditional

medicine that has been used for improving eyesight. Of late, cassia seeds have been used in ancient China to treat headaches, obesity, periocular pain, constipation, hypertension, hyperlipidemia, Alzheimer's disease, ischemic stroke, bronchospasm, and some ocular diseases. For example, lowering the intraocular pressure (IOP) and handling night vision [6,7]. A total of 55 chemical compounds in cassiae semen were identified, including flavonoids, emodin, chrysophanol, physcion, obtusin, rhein, aurantio-obtusin, chryso-obtusin, and anthraquinones, which showed the pharmacological functions, including anticoagulant, antiangiogenic, antimicrobial, and antioxidant abilities. For example, physcion is a polyphenol, which has antioxidative and anti-inflammatory properties. Aloe-emodin can regulate the apoptosis of retinal ganglion cells and prevents glaucoma. Furthermore, obtusin and aurontioobtusin may enhance vasodilation and diuresis. Chrysophanol and physcion were suggested to decrease IOP in our earlier study [6]. Many antioxidants from cassiae semen have been reported that may be preventing the free radical attack [8]. Therefore, we suggest that the water extract of cassiae seeds may benefit by ameliorating cataract formation.

Wolfberry (L. barbarum or goji berries) has been used as an antiaging agent to maintain good health for a long time. Goji can also improve the "Kidney Yang Deficiency Syndrome" and balance the "yin" and "yang" in the body. Recently, various extracts of wolfberry, including carotenoids, phenolics, flavonoids, betaine, taurine, vitamins, β-sitosterol, polysaccharides, and scopoletin, were found [9]. Therefore, Goji exhibits cytoprotective, antifatigue, neuroprotective, anti-inflammatory, antiapoptotic, anticoagulant, cardioprotective, antiproliferative, antimicrobial, and even antioxidant effects. Wolfberry can also improve arterial compliance, skeletal muscle power, renal function, and hemopoiesis; it can also ameliorate anemia, asthma, metabolic syndrome, diabetes mellitus, various types of cancers, and Parkinson's disease. In ophthalmology, wolfberries are known to benefit presbyopia-induced dry eye, blurred vision, ocular fatigue, age-related macular degeneration, diabetic retinopathy, UV light-induced retinal degeneration, retinitis pigmentosa, and glaucoma [10]. Recently, it was reported that diabetes-induced-cataract is associated with suppression of sirtuin 1 (SIRT1) and B-cell lymphoma 2 (Bcl-2) and activation of other cell death-related genes. LBP prevented diabetic cataracts by upregulating *Sirt1* and *Bcl-2* and suppressing cell-death-related genes [11]. Therefore, we suggested that wolfberry intake may decrease cataract formation.

Dendrobium is a traditional Chinese herb of the Orchidaceae family. Its stem has been traditionally used to treat diseases such as throat inflammation and chronic superficial gastritis, strengthen the body, and prolong life. Besides, the extract from Dendrobium comprises alkaloids, stilbenoids, anthracene, fluorine, polysaccharides, flavone, phenanthrene, and gigantol; these have several pharmacological functions, including enhancing immune activities, controlling blood sugar, inhibiting tumor growth, and protecting the liver from oxidative stress[12]. Dendrobium is also used for some ophthalmic diseases, such as dry eye and diabetic and ischemic retinopathy. Accumulating evidence indicates that all improvements in ocular conditions are due to the anti-inflammatory and antioxidant abilities of the plant. Dendrobium also shows hypoglycemic and anticataract activities by inhibiting nitric oxide, aldose reductase, protein glycation, and advanced glycation end products. Dendrobium has been widely famous since ancient times for its medicinal value in treating cataracts[13,14].

5. Conclusion

Optimal outcomes largely depend on the successful performance of cataract surgery. However, most patients prefer traditional treatment at first. In this study, we concluded that MHWE may enhance the improvement of the lens. In humans, taking MHWE possibly benefits cataract formation, especially in the early stage.

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References

[1]. Lee CM, Afshari NA. The global state of cataract blindness. Curr Opin Ophthalmol 2017; 28:98.

[2]. Horng CT, Ma JW, Shieh PC. Improvement of presbyopia using a mixture of traditional Chinese herbal medicines, including cassiae semen, wolfberry, and dendrobium huoshanense. Evid Based Complementary Altern Med. 2021; 2021: 9902211.

[3]. Caxinha M, Velte E, Santos M, et al. Automatic cataract classification based on ultrasound technique using machine learning: A comparative study. Phys Procedia. 2015(7); 1221-4.

[4]. Asbell PA, Dualan I, Mindel J, et al. Age-related cataract. Lancet 2005; 365365 (9459):599-609.

[5]. Zhang D, Li M. Puerarin prevents cataract development and progression in diabetic rats through Nrf2/HO-1 signaling. Mol Med Rep 2019;

20(2): 1017-24.
[6]. Horng CT, Tsai ML, Chien ST, et al. The activity of lowering intraocular pressure of cassia seed extract in a DBA/2J mouse glaucoma model. J Ocul Pharmacol Ther 2013; 29(1): 48-54.
[7]. Lin FL, Lin CH, Ho JD, et al. The natural retinoprotectant chrysophanol attenuated photoreceptor cell apoptosis in an N-methyl-N-nitrosourea-induced mouse model of retinal degeneration. Sci Rep 2017; 7: 41086.
[8]. Dong X, Fu J, Yin X, et al. Cassiae semen: a review of its photochemistry and pharmacology (Review). Mol Med Sci 2017; 16(3): 2331–46.
[9]. Liu Y, Guo S, Zhang F, et al. Comparison of functional components and antioxidant activity of Lycium barbarum L. fruits from different regions in China. Molecules 2019; 24(12):2228.
[10]. Grover AK, Samson SE. Antioxidants and vision health: facts and fiction. Mol Cell Biochem 2014; 388(1-2) :173–83.
[11]. Yao Q, Zhou Y, Yang Y, et al. Activation of Sirtuin1 by lyceum barbarum polysaccharides in protection against diabetic cataract. J Ethnopharmacol 2020; 261: 113126.
[12]. Zha XQ, Li XL. Wang JF, et al. The core structure of a Dendrobium huoshanense polysaccharide required for the inhibition of human lens epithelial cell apoptosis. Carbohydr Polym 2017;155: 252–60.
[13]. Ng TB, Liu J, Wong JH, et. Al. Review of research on Dendrobium, a prized folk medicine. Appl Microbiol Biotechnol 2012; 93: 1795-1803
[14]. Fang H, Hu X, Wan M, et al. Anti-osmotic and antioxidant activities of gigantol from Dendrobium aurantiacum var. denneanum against cataractogenesis in galactosemic rats. J Ethnopharmacol 2015; 172: 238-46.

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