# Clinical Efficacy of Mannitol in the Treatment of Ophthalmic Diseases

**Qiuyu Wang, Haihua Zheng**

Yueqing People's Hospital, Wenzhou, 325600 Zhejiang, China

Wenzhou Medical University, Wenzhou, 325000 Zhejiang, China

eyezhh@126.com

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**Abstract:** Objective: To analyze the therapeutic effect of mannitol on ophthalmic diseases. Method: 87 patients with ophthalmic diseases hospitalized from January 2020 to January 2022 were selected. 44 cases in group A were treated with mannitol and 43 cases in group B were treated with routine treatment. Results: The total effective rate of group A was significantly higher than that of group B ($P < 0.05$). There was no difference in intraocular pressure before treatment ($P > 0.05$). After 2 weeks of treatment, the intraocular pressure in group A was lower than that in group B ($P < 0.05$). The adverse reaction rate of group A was lower than that of group B, and the quality of life score of patients after 2 weeks of treatment was higher than that of group B ($P < 0.05$). Conclusion: Mannitol treatment for patients with ophthalmic diseases can restore intraocular pressure, reduce adverse drug reactions, and improve the quality of life.

## 1. Introduction

There are various types of ophthalmic diseases, such as dry eye, color blindness, retinal diseases and conjunctivitis. The typical symptom of ophthalmic diseases is decreased vision, which will reduce the basic quality of life[1]. Drug therapy is the basic therapy for patients with this kind of disease. Acetazolamide tablets are commonly used for this disease, which can alleviate the symptoms of ophthalmic diseases and shorten the course of disease. However, its overall efficacy is general, and it needs to be combined with other drugs. Mannitol used in this kind of disease can reduce intraocular pressure, and the curative effect is better. Based on this, 87 patients with ophthalmic diseases were selected to analyze the therapeutic efficacy of mannitol.

## 2. Data and Method

### 2.1 General Data

87 patients with ophthalmic diseases hospitalized from January 2020 to January 2022 were selected. There were 44 cases in group A, 26 males and 18 females aging between 18 and 59 years old. The average age was ($45.21 \pm 0.48$) years. The course of disease ranged from 2 months to 3 years, with a mean of ($1.02 \pm 0.48$) years. There were 43 cases in group B, 27 males and 17 females aging between 19 and 60 years old. The average age was ($45.85 \pm 0.51$) years. The course of disease ranged from 3 months to 2 years, with a mean of ($1.05 \pm 0.44$) years. There was no difference in data after hypothesis test ($P > 0.05$).

### 2.2 Method

Group B received routine treatment, examined the condition of eye diseases, debridement and disinfection for the injured. If the anterior chamber bleeding needed to be bandaged after hemostasis, glucose intravenous drip treatment was given. The patient was instructed to take acetazolamide tablets (H20083760, Hangzhou Aoyipollen Pharmaceutical Co., Ltd.) orally, with a dose of 0.25g each time and twice a day. Group A combined with mannitol (H20103169, Chengdu Qingshan Likang Pharmaceutical Co., Ltd.), combined with age, the dose was 1 to 2g / mg for

children and 0.25 to 2.00g/mg for adults, and drip for 30 to 45min. Elderly patients can prolong the infusion time to prevent renal injury. The specific course of treatment was drawn up for two weeks according to the curative effect of the patients in both groups.

### 2.3 Observation Indicators

Intraocular pressure was measured by tonometer before and after treatment, and the normal value was 10 to 21 mmHg. Intraocular pressure was judged in combination with symptoms and diagnostic indicators during the measurement period. Adverse reactions such as nausea and vomiting, acute pulmonary edema, skin allergy and dyspnea were observed. The comprehensive quality of life assessment questionnaire was used to evaluate the quality of life before and after treatment, including social function items, material life items, physical health items and mental health items. Each item was 100 points, and the quality of life was positively correlated with the score.

### 2.4 Efficacy Evaluation Criteria

Basically cured: symptoms disappeared, no adverse reactions, normal intraocular pressure; Significant effect: symptoms improved significantly, slight adverse reactions, and intraocular pressure decreased significantly; Initial curative effect: symptoms improved, obvious adverse reactions and slight decrease of intraocular pressure; Ineffective: no change in symptoms and intraocular pressure, serious adverse reactions.

### 2.5 Statistical Analysis

Data processing was completed by SPSS21.0, measurement data was compared and tested by t value, and the counting data was compared and tested by $x^2$ value. It was assumed that the meaningful standard of verification is that the P value is less than 0.05

## 3. Results

### 3.1 Comparison of Total Effective Rate between the Two Groups

The total effective rate of group A was significantly higher than that of group B ($P < 0.05$).

Table 1 Comparison of Total Effective Rate between the Two Groups [n /%]

| Group | Cases | Basically cured | Significant effect | Initial curative effect | Ineffective | Total effective |
|---|---|---|---|---|---|---|
| A group | 44 | 24(54.55) | 12(27.27) | 6(13.64) | 2(4.55) | 95.45(42/44) |
| B group | 44 | 20(45.45) | 7(15.91) | 7(15.91) | 10(22.73) | 77.27(34/44) |
| $x^2$ | - | - | - | - | - | 6.175 |
| P | - | - | - | - | - | 0.013 |

### 3.2 Changes of Intraocular Pressure in the Two Groups

The intraocular pressure of the two groups had no change before treatment ($P > 0.05$). After 2 weeks of treatment, the intraocular pressure in group A was lower than that in group B ($P < 0.05$).

Table 2 Changes of Intraocular Pressure in the Two Groups[$\bar{x}$±s/Kpa]

| Group | Cases | Before treatment | After treatment |
|---|---|---|---|
| A group | 44 | 2.98±0.62 | 1.81±0.15 |
| B group | 44 | 2.97±0.60 | 2.21±0.19 |
| t | - | 0.077 | 10.961 |
| P | - | 0.939 | 0.000 |

### 3.3 Comparison of Adverse Reaction Rates between the Two Groups

The adverse reaction rate of group A was significantly lower than that of group B ($P < 0.05$).

Table 3 Comparison of Adverse Reaction Rates between the Two Groups[n/%]

| Group | Cases | Nausea and | Acute pulmonary | Skin sensibility | Dyspnea | Incidence |
|---|---|---|---|---|---|---|

| | | vomiting | edema | | | |
|---|---|---|---|---|---|---|
| A group | 44 | 2(4.55) | 0 | 1(2.27) | 0 | 6.82(3/44) |
| B group | 44 | 4(9.09) | 1(2.27) | 3(6.82) | 2(4.55) | 22.73(10/44) |
| $x^2$ | - | - | - | - | - | 4.423 |
| P | - | - | - | - | - | 0.036 |

### 3.4 Comparison of Quality of Life Scores between the Two Groups

There was no difference in the scores of quality of life between the two groups before treatment (P > 0.05). After 2 weeks of treatment, the quality of life score of group A was higher than that of group B (P < 0.05).

Table 4 Comparison of Quality of Life Scores between the Two Groups[$\bar{x}$±s/Point]

| Group | Cases | social function items | | material life items | | physical health items | | mental health items | |
|---|---|---|---|---|---|---|---|---|---|
| | | Before treatment | After treatment | Before treatment | After treatment | Before treatment | After treatment | Before treatment | After treatment |
| A group | 44 | 75.26±4.84 | 91.26±4.22 | 76.94±3.26 | 90.48±4.68 | 74.29±3.12 | 89.75±4.15 | 75.49±3.65 | 87.94±4.19 |
| B group | 44 | 75.21±4.98 | 87.26±4.18 | 76.94±3.22 | 85.15±4.76 | 74.30±3.16 | 85.02±4.11 | 75.50±3.66 | 82.19±4.15 |
| t | - | 0.048 | 4.467 | 0.000 | 5.296 | 0.015 | 5.372 | 0.013 | 6.468 |
| P | - | 0.962 | 0.000 | 1.000 | 0.000 | 0.988 | 0.000 | 0.990 | 0.000 |

## 4. Discussion

Ophthalmic diseases involve the eyeball and other eye tissues, and there are a large number of patients. The etiology is long-term radiation of electronic products and unreasonable drug use. There are many disease types, such as glaucoma and myopia, which will seriously affect the visual acuity level [2]. Mannitol is a diuretic with high application rate. It belongs to reducing six-carbon sugar and is a commonly used hypertonic drug. It has good permeability to venous tissue, can balance the liquid and blood and inhibit nervous system diseases [3]. It is mainly used in ophthalmic diseases. It has ideal curative effect on glaucoma, intractable and acute ocular hypertension diseases. It can adjust intracranial pressure and intraocular pressure and improve blood and aqueous humor osmotic pressure [4]. Intravenous infusion of drugs can accelerate tissue dehydration, reduce pressure, change vitreous pressure and alleviate ocular angle edema. The drug is not easy to penetrate the blood aqueous humor physiological barrier and has a more significant antihypertensive effect [5]. The onset time of mannitol is about 15min, and the efficacy will begin to decline after intravenous drip for 2h, until the efficacy basically disappears after 6h. The therapeutic effect of intravenous drip is significantly better than oral administration. After intravenous drip, the efficacy is absorbed quickly, which can regulate intracranial pressure in a short time, and regulate the symptoms of ophthalmic diseases faster. However, it should be noted that if mannitol is injected rapidly, it may accelerate the dehydration speed, significantly increase the intracranial pressure, and then lead to dizziness and headache. The drug will also affect cardiac function, resulting in transient increase of blood volume, accelerate the load of circulatory system, and cause pulmonary edema or chest pain [6]. Therefore, during the medication period, it is necessary to reasonably select the dose in combination with the patient's weight, age and other factors, scientifically adjust the intravenous drip rate, strictly monitor the changes of signs and medication response, and deal with any abnormalities immediately. In addition, during medication, psychological counseling should be strengthened to inform patients that headache and other reactions after medication are normal phenomena, which can be targeted to solve abnormal reactions and take predictive intervention measures to avoid adverse reactions as far as possible [7]. If the patient is complicated with allergic reaction or renal tubular necrosis, it is forbidden to use the drug, and it is also forbidden to use the drug for severe dehydration.

The results showed that the total effective rate of group A patients increased significantly. After 2 weeks of treatment, the intraocular pressure of group A patients decreased significantly, the adverse

reaction rate of group A patients decreased significantly, and the quality of life score of group A patients decreased significantly, which was different from that of group B ($P < 0.05$). It shows that mannitol can enhance the curative effect, reduce the intraocular pressure of patients, reduce drug-related adverse reactions and optimize the quality of life of patients.

In conclusion, mannitol can be widely used in the treatment of ophthalmic diseases, but during the treatment, it is necessary to master the drug contraindications, clarify the medication matters and give targeted intervention to ensure the drug efficacy.

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