

## Efficacy of Autologous Serum Eye Drops in Chemical Eye Injury: An Institutional Based Study

Rajni Gaur<sup>1</sup>, Arun Gaur<sup>2</sup>, Indira Subhadarshini Paul<sup>3</sup>, Rakesh Garg<sup>4</sup>

<sup>1</sup>Professor & Head, Department of Ophthalmology, RVRS Medical College & Attached group of Mahatma Gandhi Hospital, Bhilwara, Rajasthan, India.

<sup>2</sup>Professor & Head, Department of Medicine, RVRS Medical College & Attached group of Mahatma Gandhi Hospital, Bhilwara, Rajasthan, India.

<sup>3</sup>Associate Professor, Department of Medicine, RVRS Medical College & Attached group of Mahatma Gandhi Hospital, Bhilwara, Rajasthan, India.

<sup>4</sup>Assistant Professor, Department of Dentistry, RVRS Medical College & Attached group of Mahatma Gandhi Hospital, Bhilwara, Rajasthan, India.

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### Abstract

**Background:** Ocular chemical injuries are true ophthalmic emergencies that require immediate and intensive intervention to minimize severe complications and profound visual loss. The use of autologous serum (AS) to treat ocular chemical injuries began in 1970s. Hence; the present study was undertaken for assessing the efficacy of autologous serum eye drops in chemical eye injury. **Materials & Methods:** A total of 50 patients with presence of chemical eye injury were enrolled. Written consent was obtained from all the patients after explaining in detail the entire research protocol. Fluorescing staining scores (FI +++, FI ++, FI +, FI +/-, FI  $\emptyset$ ) were performed at baseline and weekly during the treatment. The patients applied the serum eye drops once every two hours for 30 and more days (50% diluted of autologous serum). All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. **Results:** A total of 58 eyes of 50 patients were analyzed. Complete epithelialization of corneal defects lasted until 6 weeks. While analyzing statistically, significant results were obtained. **Conclusion:** From the above results, the authors conclude that autologous serum eye drops found to be effective in chemical eye injury and significantly reduced the healing period.

**Keywords:** Autologous Serum Eye Drops, Healing, Symptoms.

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### Introduction

The ocular surface is a morphofunctional unit that owes its action to the perfect cooperation of all its structures (i.e., conjunctival and corneal epithelium, lacrimal apparatus, and eyelids). In particular, tears are important in maintaining the stability of the ocular surface because of its lubricant, mechanical, epitheliotropic, and antimicrobial functions. Ocular chemical injuries are true ophthalmic emergencies that require immediate and intensive intervention to minimize severe complications and profound visual loss. Such injuries, which are most prevalent among young males aged 20- 40, can result in chronic complications and life-long disability. The severity of chemical injury is determined by several factors, including the chemical and physical characteristics of the offending agent (particularly the pH), the specific reactivity with tissues (pK), concentration, volume, temperature, and impact force. Natural tears consist of complex mixtures of water, hydrocarbons, proteins, salts, and lipids that artificial tears cannot precisely substitute. Moreover, many used artificial tear solutions have chemical additives (preservatives) to avoid contamination, which stimulates toxicity and allergic reactions[1-3].

The use of autologous serum (AS) to treat ocular chemical injuries began in 1970s. To date, it has been used for the treatment of different diseases of the ocular surface, such as persistent epithelial defects, neurotropic keratopathy, superior limbic keratoconjunctivitis, and chemical injuries. Human serum has strong likeness to natural tears and contains many important components[4-6]. Hence; the present study was undertaken for assessing the efficacy of autologous serum eye drops in chemical eye injury.

#### Materials & Methods

The present study was undertaken for assessing the efficacy of autologous serum eye drops in chemical eye injury. A total of 50 patients with presence of chemical eye injury were enrolled. A Among these 50 patients, a total of 58 eyes were analyzed. Written consent was obtained from all the patients after explaining in detail the entire research protocol. Complete demographic and clinical details of all the patients were obtained. Patients were examined before treatment and on weekly basis during the treatment. Clinical examination was done with fluorescing staining pattern of the cornea. Fluorescing staining scores (FI +++, FI ++, FI +, FI +/-, FI  $\emptyset$ ) were performed at baseline and weekly during the treatment. The patients applied the serum eye drops once every two hours for 30 and more days (50% diluted of autologous serum). All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

\*Correspondence

**Dr. Rakesh Garg**

Assistant Professor, Department of Dentistry, RVRS Medical College & Attached group of Mahatma Gandhi Hospital, Bhilwara, Rajasthan, India.

E-mail: [dr.rkgarg82@gmail.com](mailto:dr.rkgarg82@gmail.com)

**Results**

Mean age of the patients was 28.4 years. 60 percent of the patients were males while the remaining 40 percent were females. A total of

58 eyes of 50 patients were analyzed. Complete epithelialization of corneal defects lasted until 6 weeks. While analyzing statistically, significant results were obtained.

**Table 1: Demographic data**

Variable	Number
Mean age (years)	28.4
Males (%)	60
Females (%)	40

**Table 2: The size of defect and the length of healing**

Signs	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	p- value
FI +++	53	42	25	0	0	0	0	0.00*
FI ++	4	2	8	3	2	0	0	
FI +	1	6	7	4	3	0	0	
FI +/-	0	5	7	24	3	1	0	
FI ø	0	3	5	9	24	4	2	
Total patients	58	58	52	40	32	5	2	

\*: Significant

**Discussion**

It is well known that alkaline substances, due to their lipophilicity, penetrate the eye more readily and therefore threaten both ocular surface tissues as well as intraocular structures such as the trabecular meshwork, ciliary body, and lens. In contrast, acidic substances cause protein coagulation in the epithelium, a process that limits further penetration into the eye. Nonetheless, acids may severely damage the ocular surface. Human serum contains many soluble factors that promote healing in various tissues including the cornea. Autologous serum has been shown to be effective in promoting wound healing in patients with persistent epithelial defects due to a variety of etiologies, including chemical injury. Umbilical cord serum has likewise been shown to be very effective in accelerating epithelial healing in acute chemical injuries in both animal models and human studies; however, difficulty associated with acquiring such serum is an important barrier to treatment[6-9]. Hence; the present study was undertaken for assessing the efficacy of autologous serum eye drops in chemical eye injury. Mean age of the patients was 28.4 years. 60 percent of the patients were males while the remaining 40 percent were females. A total of 58 eyes of 50 patients were analyzed. Complete epithelialization of corneal defects lasted until 6 weeks. While analyzing statistically, significant results were obtained. Semeraro F et al evaluated the efficacy of 50% autologous serum eye drops in ocular surface diseases not improved by conventional therapy. They analyzed two groups: (1) acute eye pathologies (e.g., chemical burns) and (2) chronic eye pathologies (e.g., recurrent corneal erosion, neurotropic keratitis, and kerato conjunctivitis sicca). The patients were treated for surface instability after conventional therapy. The patients received therapy 5 times a day until stabilization of the framework; they then reduced therapy to 3 times a day for at least 3 months. They analyzed the best corrected visual acuity, epithelial defects, inflammation, corneal opacity, and corneal neovascularization. They also analyzed symptoms such as tearing, burning, sense of foreign body or sand, photophobia, blurred vision, and difficulty opening the eyelids. They enrolled 15 eyes in group 1 and 11 eyes in group 2. The average therapy period was  $16 \pm 5.86$  weeks in group 1 and  $30.54 \pm 20.33$  weeks in group 2. The epithelial defects all resolved. Signs and symptoms improved in both groups. In group 2, the defect recurred after the suspension of therapy in 2(18%) patients; in group 1, no defects recurred. Autologous serum eye drops effectively stabilize and improve signs and symptoms in eyes previously treated with conventional therapy[10]. Franchini M et al evaluated the use of serum eye drops in ocular surface disorders, we performed a systematic search of the literature. In this systematic review, we included 19 randomised controlled trials (RCTs) investigating the use of serum eye drops in 729 patients compared to controls. For the quantitative synthesis, we

included only 10 RCTs conducted in patients with dry eye syndrome comparing autologous serum to artificial tears. At 2–6 weeks, no clear between-group differences in Schirmer test (MD 1.05; 95% CI: -0.17–2.26) and in fluorescein staining (MD -0.61; 95% CI: -1.50–0.28) were found (very low-quality evidence, down-graded for inconsistency, serious risk of biases, and serious imprecision). Slightly higher increase in tear film break-up time (TBUT) scores in autologous serum compared to control (MD 2.68; 95% CI: 1.33–4.03), and greater decrease in ocular surface disease index (OSDI) in autologous serum compared to control (MD -11.17; 95% CI: -16.58 – -5.77) were found (low quality evidence, down-graded for serious risk of bias, and for inconsistency). For the Schirmer test, fluorescein staining and TBUT, data were also available at additional follow-up timing (2–12 months): no clear between-group differences were found, and the quality of the evidence was graded as low/very-low. In patients with dry eye syndrome, it is unclear whether or not the use of autologous serum compared to artificial tears increases Schirmer test and fluorescein staining scores at short-term and medium-/long-term follow up[11].

**Conclusion**

From the above results, the authors conclude that autologous serum eye drops found to be effective in chemical eye injury and significantly reduced the healing period.

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