RESEARCH PAPER

Effectiveness of Evaluation of Sodium Hyaluronate 0.2% on Visual Acuity and Schirmer's test 1 in patients with Dry Eye Syndrome

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ABSTRACT

Background: Dry eye is multifactorial and affects millions of people. These diseases may lead to complications, if left untreated. Dry eye syndrome when our eye's tear film layer becomes deficient and excessive evaporation may cause damage to the ocular surface, causing pain, burning sensation. This is also caused by surface inflammations of any kind and the hyperosmolarity of the outer and middle layers of the tear film. The loss of the outer layer called lipid layer and poor blinking have an impact on this; on the contrary, the meibomian glands and their functioning remain intact. Severe symptoms and increased blinking may be caused by thin lipid layers, which offer little protection against tear evaporation. Dry eyes can have a direct influence on the patient's quality of life and reduce efficacy in the job and learning process. Typically, vision alternates between blurriness and diplopia. This study evaluated the changes in visual zone and Schirmer's value in patients with dry eye pre and post treatment after using sodium hyaluronate 0.2% medication. **Aim:** The aim of this study is to compare the effectiveness of sodium hyaluronate 0.2% on visual acuity and Schirmer's test in patients with dry eyes by evaluating clinical dataset such as Schirmer's 1 test. **Objective**: To assess baseline visual acuity in patients with dry eye patients to evaluate tear production.

To analyze changes in visual assessment after medication to assess improvement in tear production

Methods: This prospective interventional study is conducted at a tertiary eye centre (Kunal eye hospital) over a duration of six months, from August 1, 2025 to January 31, 2026. Patients with follow up 2 times are included in this study. After detailed history, complete work up (including visual assessment and Schirmer's test 1). We have recorded demographic data of the patient with age, gender, visual acuity (unaided and aided), Schirmer's test 1 results. **Result:** In this study, the patient's management option of dry eye as per data is sodium hyaluronate 0.2%, warm compress and lid massage. In 18 eyes, we have noticed visual acuity improvement, Visual acuity in 62 eyes remained the same whereas we have noticed worsening in 8 eyes. Schirmer's test 1 shows stable results in 16 eyes, improved in 42 eyes and worsening in 30 eyes. In this study (31.8%) patients had Moderate dry eye, (54.5%) patients had severe grade of dry eye, (13.6%) had mild dry eye. **Conclusion:** Our study demonstrates changes in the visual acuity and Schirmer's value of the patients which suggested that there is little difference in Schirmer's value. Dry eyes diagnosis is often ignored as the potential cause of a patient's grievances. However, we only included a few samples to see the trend after excluding subjects. The early diagnosis of dryness and appropriate treatment can reduce the prevalence of dry eyes and could be best for better outcomes.

Keywords: Dry eye syndrome, Visual acuity, Schirmer's test 1, Tear film

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INTRODUCTION

Dry eyes also called as dry eye syndrome, is a multifactorial disease that usually occurs due to deficiency of tears in the tear film layer and huge amount of evaporation of tears. Dry eyes refer to dryness of our

ocular surface, irritation, inflammation and damage of cornea which occurs when tear film layers cannot maintain the balance of tears to protect the anterior segment of eyeball. When our tears don't sufficiently lubricate our eyes, dry eye diseases develop also called as dysfunction tear syndrome (unstable tear film), keratitis sicca (evaporation of excessive tears), keratoconjunctivitis sicca (insufficient amount of production of tears), xerophthalmia (deficiency of vitamin A), xerosis syndrome. [1]. Dry eye is a disease of the tear film layer which occurs due to deficiency of tears or excessive evaporation of tears in the tear film layer, results in symptoms of fluctuating vision, ocular discomfort like burning sensation, pain, redness, instability of tear film with potential damage to the ocular surface of eye mainly cornea and conjunctiva [2].

Dry eye impacts on functional vision, especially reading books or writing work, intermediate work and driving. 70% of patients complain of poor quality of life while 30% complain of poor efficiency at work. Epidemiological studies suggested that dryness affects a major percentage of the population, particularly among adults and in females. However, it is increasingly observed in younger adults because of excessive usage of digital screen time. The growing burden of dryness highlights the need for effective diagnosis and treatment [3].

It may affect our anterior structures of eyes including cornea, conjunctiva, the main lacrimal glands or accessory lacrimal glands or the oil glands. Oil glands refers to meibomian glands that covers the outer margin of the eyelids, where the eyelashes are located. These glands release lipids, which is the outer layer of tear film called lipid layer, preventing evaporation of fluid of tears. It is the major cause of evaporation of dry eye, which is more common than aqueous-deficient dry eye [4].

Dry eye syndrome has become increasingly, in recent decades, largely due to environmental factors, increased usage time of digital screen and lifestyle changes. Prolonged exposure of screen time reduces blink rate, leading to increased ocular surface dryness and increased tear evaporation rate. Additionally, factors such as air-conditioned environments, systemic disease medications, air-pollution, dusty environment and hormonal changes increase the rising changes of dryness. Dry eye is most common in the elderly people, particularly after menopause in females and is the most common disorder [5].

Dry eye conditions are divided into two main categories. Aqueous tear-deficient dry eye (ATDDE) is a common form of dry eye in which fails of lacrimal glands to produce sufficient amount of tears and eye become dry, redness e.g., autoimmune diseases and Sjogren's syndrome is most common type which is caused by rheumatoid arthritis and Non-Sjogren's syndrome which is age related neurotropic, medication induced forms of lacrimal hyposecretion and Evaporative dry eye (EDE) is also a common form of dry eye caused by tears evaporates too quickly because of meibomian gland dysfunction that impairs protective outer layer called lipid overlying the tear film, slower blink rate, ocular surface disorder leads to ocular inflammation, burning sensation, fluctuating vision etc. [6].

Sodium Hyaluronate: Sodium hyaluronate is a natural moisture salt of sodium hyaluronate acid found in various tissues of the body, especially in eyes, skin and joints. It has muco-adhesive properties, viscoelastic, biocompatibility, and water retention capacity, making it highly effective in ocular lubrication. Sodium hyaluronate mainly works as it helps to stabilize tear film, promote epithelial healing and protect ocular surface cells. It is available in various concentrations, such as 0.1% to 0.3%. The importance of 0.2% concentration is considered optimal due to its balance between viscosity, longer retention time, better lubrication, improved patient ocular surface, enhanced therapeutic treatment and comfort. In moderate dry eye to severe dry eye causes, a preferred choice of sodium hyaluronate 0.2% having a primary goal is to maintain the stability of tear film, reduction in ocular symptoms, and help to protect the cornea. The first primary treatment for most patients with dry eye syndrome includes lubricating drops, also known as artificial tears. The symptoms of dry eyes are dryness, burning sensation, itching, foreign body sensation, pain, redness, glare , gritty feelings in the eyes, stingy discharge and blurred vision [7].

MATERIAL AND METHODS

This prospective interventional study is conducted at Kunal eye hospital over a duration of six months, from August 1, 2025 to January 31, 2026. Before the start of this study, the complete protocol was reviewed and approved. This study strictly adhered to the ethical principles. During this study, a total of 100 patients who visits the outpatient department with symptoms suggestive of dry eye disease such as dryness, redness, blurring of vision, and inflammation were initially screened. After careful evaluation, 44 patients who satisfied the inclusive criteria and did not match the exclusive criteria were selected for final enrollment. To minimize selection bias and ensure a more representative sample, patients were recruited using a consecutive sampling method as they presented.

Study Population: Patients who were diagnosed based on clinical findings with dry eye disease on the basis of

complaints such as ocular dryness, inflammation, redness, irritation, burning sensation, and fluctuating vision were evaluated for eligibility of this study. The study included both male and female participants.

Inclusion Criteria: Age between 10-70 years patients with dry eye symptoms and those who visited at least 2 times follow-up were included for analysis in this study.

Exclusion Criteria: The old cases, chemical injury cases, patients with history of ocular surgery, history of co-morbidity, contact lens users, pregnant women were excluded from the study.

This study is followed by an objective test :

After proper history taking and following examinations were done, Visual acuity (aided, unaided) was taken with the help of using snellen chart, tumbling E-optotypes for illiterate patients.

A slit lamp biomicroscopic examination was done to assess anterior structures of the eye.

Schirmer's test 1 was done to check the strip wetting level (in mm) in 5 minutes.

Grading of Schirmer's test 1 result:

10-15 mm is considered Mild. 5-10 mm is considered Moderate.

0-5 mm is considered Severe >15 mm is considered Normal.

STATISTICAL ANALYSIS

All statistical analysis in this study is carried out with the Microsoft Excel software. The

collected data scores and vision were systematically entered and verified prior to analysis to ensure accuracy and consistency. Descriptive statistics were first applied to finalize the primary characteristics of the population of study, including mean values of Schirmer's scores and standard deviations for continuous variables such as visual acuity and Schirmer's test 1 scores.

To evaluate the effectiveness of intervention over time, a period of six months of study. The same subjects were assessed before and after treatment, the paired Student's-t-test is used to compare before and after treatment values of the visual acuity and Schirmer's test 1. This test was considered appropriate for measuring the significance of changes within the same individual and accounts for intra-subject variability.

For analytical purposes and to obtain a more representative assessment of tear function and visual function, the mean values of Schirmer's Test 1 and visual acuity from both eyes were also calculated and included in the statistical evaluation to avoid inter-eye variability. Statistical tests were two-tailed, and a p-value is less than 0.05 is considered indicative of statistical significance. The results were presented in tabular and graphical formats wherever appropriate to enhance clarity and interpretation.

Mean formula: to calculate the average value of visual acuity and schirmer's test 1

$$\bar{X} = \Sigma X / N$$

where , $\bar{X}$: Mean (average)

ΣX : Total of all patient values

N : Number of patients

Paired-t test formula : t compared pre-treatment values and post-treatment values

$$t = \bar{d} / (Sd / \sqrt{n})$$

where, t : t-value

$\bar{d}$: difference of mean between pre and post values

Sd : Standard deviation

n : No. of patients

RESULT

In this study, the total number of patients was 44 with 88 eyes included. 22 (50%) were males and 22 (50%) were females. The age of the youngest patient is 11 years, and the age of the oldest patient is 66 years old. The mean age of the patient is (40.78) with a standard deviation of 13.8. In 18 eyes (21%) noticed visual acuity improvement, Visual acuity in 62 eyes (70%) remained the same whereas we noticed worsening in visual acuity in 8 eyes (9%). Most of the patients had normal vision and least had a reduction in vision

Schirmer's test 1 is stable in 16 eyes (18%), improved in 42 eyes (47%), and worsening in 30 eyes (34%). Major patients had severe dry eye (54.5%), followed by moderate dry eye (31.8%) and mild dry eye (13.6%).

Post treatment visual acuity improved in 20.45% cases, remains same in 70.45% and worsening in 9.09% The visual acuity and Schirmer's value were significant (P=0.042, P=0.05)

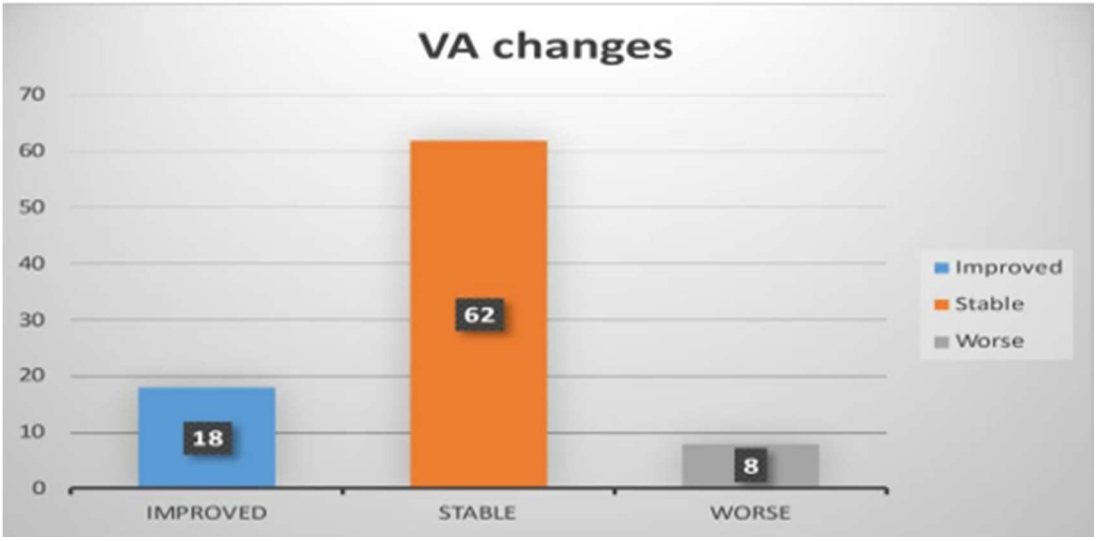

Fig 1 : Graph showing Visual acuity changes

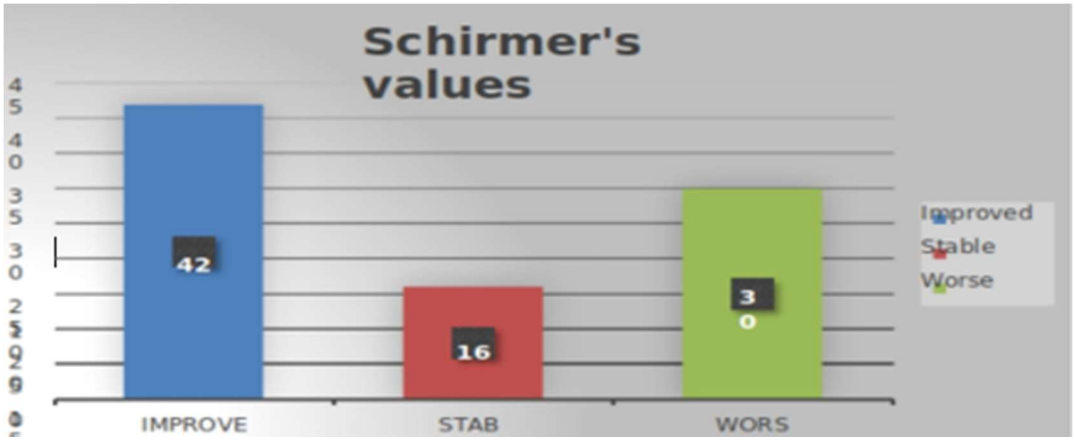

Fig 2 : Graph showing schirmer's test 1 values

CONCLUSION

The present study is conducted to evaluate the effectiveness of sodium hyaluronate 0.2% on visual acuity and schirmer's test 1 in patients with dry eye syndrome. A total number of 44 patients with dry eye were included in the study and assessed pre and post treatment.

After assessing the Demographic profile of patients, it was found that the Dry eye is very common nowadays and varies with multiple reasons. However, we only included a few samples to see the trend after excluding Subjects. It was demonstrated that in most of the cases Visual acuity remained constant. Improvement noticed in Schirmer's value. There was also significant correlation with pre and post medication.

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