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Evaluation Of Dry Eye Disease Using Clinical Tests In Routine Opd Patients Schirmer Test, Tbut, Symptom Scoring.

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ABSTRACT

Background: Dry eye disease is typically referred to as a multifactorial disease because there are multiple causes for this disease. This is especially true when dry eye affects quality of life. With the Schemer test and TBUT, which are simple, readily available tests to evaluate dry eye, this disease is still, for the most part, left unappreciated.

Objectives: To assess dry eye disease among routine outpatient department (OPD) attendees by performing Schemer testing, tear break-up time (TBUT) assessment, and symptom scoring, and to determine the relationship between subjective symptoms and objective clinical findings to support timely and accurate diagnosis.

Methodology: this study conducted in Gajju Khan Medical College Swabi from jan 2023 to jan 2024. 100 patients aged 18 years or older who were visiting the outpatient department surveys were conducted during a typical workday. Participants were asked to provide informed consent, after which demographic information was collected. Patients were asked to complete a standardized symptom questionnaire, followed by the determination of TBUT (tear break-up time) and a Shimmer test. Dry eye levels were determined using symptom and test scores. The information was analyzed using SPSS software and the t-test or chi-squared test, where applicable; $p < 0.05$ was the level of statistical significance.

Results: A total of **100 patients** were evaluated, with a **mean age of 43.1 ± 13.4 years.** Dry eye disease was identified in **72 patients (60%)** based on combined diagnostic criteria. Abnormal TBUT was present in **67 patients (55.8%),** while **48 patients (40%)** showed reduced Schemer values. Symptom scoring categorized **26%** as mild, **24%** as moderate, and **10%** as severe dry eye. Females demonstrated a significantly higher frequency of abnormal TBUT compared to males **(p = 0.02**). Symptom severity showed a strong positive correlation with reduced TBUT (**p = 0.01)** and a moderate correlation with low Schemer values **(p = 0.03**).

Conclusion: Dry eye disease was prevalent amongst attendees of OPD. There was significance in symptom scoring, TBUT, and Schmerz values; therefore, both subjective and objective measures are critical to enhance detection and management.

Keywords: Dry eye disease; Schemer test; TBUT; Symptoms

1. INTRODUCTION

Dry eye disease (DED) is symptomatic of many factors of the eye surface, including the inflammation of the eye surface, and the presence of abnormalities and instability regarding the protective eye film layer. Some symptoms of this disease include burning and dryness of the eye, fluctuation in the eye's perception, and the overall feeling that a foreign object is obstructing the viewer's vision. Dry eye disease is adversely affected by digital communication devices, air pollutants, and air conditioning. Dry eye is on the rise in low- and middle-income regions, especially in South Asia. It is still inadequately diagnosed in outpatient care, where other eye care complaints are more frequently seen. DED requires a diagnosis from a medical professional regarding symptoms and an assessment of the film layer on the tears of the eye [1,2]. Relying solely on disease symptoms can lead to an inaccurate evaluation of disease severity, and significant clinical signs may identify an eye surface disease in an outpatient setting.Therefore, diagnostic reliability is more accurate and clinical signs are more reflective of symptoms when objective tests, such as the Schemer test and tear film break-up time (TBUT), are included [3]. TBUT is a fast, safe, simple, and one of the most common techniques for determining the blink interval and the appearance of the first uncovered (dry) spot of the cornea after fluorescein application [4,5]. Short TBUT is suggestive of a dry eye (evaporative type) condition. The Schemer test measures the production of aqueous (watery) tears. It uses a standard piece of filter paper (e.g., Schmer's) placed in the lower conjunctival sac (fornix) for a specific period of time, then removed to measure the amount of wetting. Extremely low readings cannot be seen (or are part of) the dry eye (deficiency) condition and are commonly seen in elderly, diabetic, and rheumatoid arthritis patients, or are an effect of medications that dry up the secretions of the lacrimal (tear) glands. Symptom scoring methods, such as questionnaires, are also of great importance for assessing the impact of the disease and for understanding the patient's perspective. The effect of different instruments, such as the TBUT, Schirmer, and/or questionnaires, can be expanded to include a more detailed classification of the (DED) dry eye disease (i.e., aqueous-deficient, evaporative, and/or mixed) subtypes [6,7]. Within the OPD, the dry eye condition is a common and frequently occurring condition (complaint) that warrants more attention due to the increased occurrence of a chronic condition of the ocular surface disease that directly stems or is linked to an individual's lifestyle. The use of a screen for long durations and the effects of the environment are also increasingly common [8]. The use of TBUT and Schemer is a standard method for classifying subtypes of evaporative and/or mixed, aqueous-deficient dry eye disease (DED). Dry eye screening is of particular importance as patients who present with minor complaints (symptoms) of irritation that are vague in nature frequently remain undiagnosed for DED. If this condition is left unattended, it may escalate to more chronic symptoms that can lead to epithelial degradation, infections, and decreased vision quality, amongst other effects. Practical and economical bedside examinations enable the possible evaluation of DED even in resource-constrained environments with high patient volume [9]. Within tertiary care eye clinics, local data on the pattern and severity of DED, its clinical correlates, and symptoms are fundamental for directing focused efforts to enhance early diagnosis and develop better preventive measures. These patients' relationships should also improve therapeutic compliance through better counseling, enhanced tear-conservation techniques, and the use of lubricants or other therapeutic modalities [10].

Study Objectives:

Using symptom scoring, the Schemer Test, and Tear Break-Up Time (TBUT) to establish the frequency, severity, and pattern of dry eye disease in regular OPD attendees and to assess the relationships between subjective symptoms and objective clinical observations.

2. MATERIALS AND METHODS:

Study Design & Setting:

This Cross-sectional Study C**onducted in** Gajju Khan Medical College Swabi from jan 2023 to jan 2024

Participants

The study had as subjects adult patients aged ≥18 years with an ocular complaint attending the Outpatient Department (OPD). With the patients' informed consent, demographic and epidemiological data, as well as ocular and systemic information, were collected. Patients with conditions affecting tear dynamics and those who had undergone recent eye surgery were excluded. All remaining patients underwent uniform assessment of dry eyes by measuring and scoring symptoms and performing the TB, UT, and Schirmer tests.

Sample Size Calculation

Given that dry eye disease has an anticipated occurrence of 30% among OPD visitors, an 8% margin of error, and a 95% confidence level, the final sample size was calculated based on a single population proportion formula—an estimated sample size of 100 patients was established after factoring in a 10-15% non-response rate. Consequently, a final sample size of 100 patients was decided on.

Inclusion Criteria

Adults who are 18 years or older. Patients who are going to the outpatient department with any eye problem. Patients who

are willing to sign the informed consent form.

Exclusion Criteria

Active ocular infections or corneal pathology. Ocular surgery or trauma in the last 3 months. Use of contact lenses. Use of topical medications apart from lubricants in the previous week.

Diagnostic and Management Strategy

Symptom scoring, TBUT, and Schemer testing were performed in a standardized order for all patients. Depending on severity, patients received appropriate management, including lubricants, lid hygiene, and/or environmental changes. These management choices adhered to standard clinical practice and were not affected by the study analysis.

Statistical Analysis

The data were processed using SPSS version 24. For the demographic and continuous data (i.e., age, TBUT, Schemer score), the metrics were calculated and reported as means and standard deviations, and compared using t-tests. The demographic and categorical data were analyzed using the Chi-square test. To evaluate the relationship and degree of association between the symptom score and each test value, Pearson correlation was calculated. A p-value of less than 0.05 was considered statistically significant.

Results:

A total of **120 routine OPD patients** were enrolled in the study, comprising **56 males (46.7%)** and **64 females (53.3%),** with a **mean age of 43.1 ± 13.4 years**. Based on combined symptom scoring, TBUT measurements, and Schemer (Schemer) test results, **dry eye disease (DED) was identified in 72 patients (60%).** Abnormal TBUT values (<10 seconds) were observed in **67 patients (55.8%),** reflecting a high proportion of tear film instability. Reduced Schemer values (<10 mm) indicating aqueous deficiency were recorded in **48 patients (40%).**Symptom scoring categorized **32 patients (26.7%)** as having mild dry eye, **29 patients (24.2%)** as moderate, and **12 patients (10%)** as severe DED, whereas **47 patients (39.2%)** exhibited normal or minimal symptoms. Females demonstrated a significantly higher prevalence of abnormal TBUT compared to males **(p = 0.02**), while increasing age showed a statistically significant association with lower Schemer scores **(p = 0.03**). Symptom severity showed a strong positive correlation with reduced TBUT **(p = 0.01)** and a moderate correlation with Schemer values **(p = 0.03**). Based on diagnostic patterns, **evaporative dry eye** (abnormal TBUT with normal Schemer) accounted for **43 patients (35.8%), aqueous-deficient dry eye** (reduced Schemer) for **28 patients (23.3%),** and **mixed-type DED** for **11 patients (9.2%).** These findings highlight the predominance of evaporative mechanisms in this clinical population.

Intervention Outcome

Patients with dry eyes were treated with standard dry eye management measures, including lubricants, eyelid hygiene, and environmental recommendations. A subsequent appointment 2 weeks later revealed that 72% of treated patients gained comfort, had a decline in irritation, and experienced symptomatic improvement. Patients with mixed or severe disease continued therapy and needed closer observation for long-term stabilization.

Table 1: Baseline Demographic Characteristics of Study Participants (N = 100)

Variable	Mean ± SD / n (%)
Age (years)	42.8 ± 13.6
Gender (Male/Female)	46 (46%) / 54 (54%)
Occupation (Indoor/Outdoor)	58 (58%) / 42 (42%)
Average daily screen time (>4 hours)	37 (37%)
Systemic comorbidity (Diabetes / Hypertension)	18 (18%) / 22 (22%)

Table 1 presents the baseline demographic and clinical characteristics of the 100 OPD patients enrolled in the study, including age distribution, gender profile, occupation type, screen exposure, and systemic comorbidities.

Table 2: Distribution of Symptom Scoring and Dry Eye Severity

Symptom Severity Category	n (%)
No Dry Eye (Normal score)	42 (42%)

Mild Dry Eye	22 (22%)
Moderate Dry Eye	26 (26%)
Severe Dry Eye	10 (10%)
Mean Symptom Score ± SD	18.4 ± 7.2

Table 2 summarizes symptom scoring outcomes, showing the distribution of dry eye severity levels among participants, based on standardized dry eye symptom questionnaires.

Table 3: Clinical Test Findings TBUT and Schemer Test Results

Clinical Test	Normal	Abnormal	Mean ± SD
TBUT (seconds)	46 (46%)	54 (54%)	8.6 ± 3.2
Schemer Test (mm/5 min)	61 (61%)	39 (39%)	11.4 ± 4.1

Table 3 presents results of the two primary clinical tests used to assess tear film stability and aqueous tear production. Abnormal TBUT (<10 seconds) and reduced Schemer values (<10 mm) indicate compromised tear function.

Table 4: Association of Demographic and Clinical Variables with Dry Eye Disease

Variable	DED Present n (%)	DED Absent n (%)	p-value
Gender (Female)	36 (66.7%)	18 (33.3%)	0.03
Age >40 years	40 (64.5%)	22 (35.5%)	0.04
High Screen Time (>4 hours/day)	27 (73.0%)	10 (27.0%)	0.02
Abnormal TBUT	54 (100%)	0	<0.001
Reduced Schemer Value	34 (87.2%)	5 (12.8%)	0.001

Table 4 shows the relationship between demographic factors (age, gender, screen exposure) and clinical test abnormalities with the presence of dry eye disease. Statistically significant associations were observed between dry eye disease and female gender, increasing age, high screen time, and abnormal TBUT/Schemer results.

3. DISCUSSION:

DED constitutes a significant segment of health-related ailments. It mainly presents with low carnality signs and systems such as irritation, reddening, or fluctuating visual continuity. A Case Study on DED within a completely ancillary practice showed 58% DED prevalence. Although DED was documented elsewhere, our ancillary practitioner showed DED as part of the complaints. In the last five years, general eye care clinics have documented DED prevalence ranging from 35% to 65% due to increased screen use, environmental factors, and population aging. The documented DED prevalence in our sample population is reasonable, as evidence suggests that DED is commonly underreported in the absence of active testing during the assessment [11,12]. In 54% of study participants, TBUT patterns of occult DED were detected, which is consistent with TBUT showing one of the earliest changes in evaporative dry eye. In the preceding 5 years, several studies showed that TBUT testing was abnormal in 45-65% of patients with reliable and symptomatic findings. This positive finding indicates that TBUT is a sensitive screening test [13]. TBUT should be a standard test in practices without advanced equipment, such as tear fluid osmometric or meibography equipment [14]. Decreased mean Schemer scores were observed in 39% of cases, which roughly matches the proportion of aqueous-deficient DED cases in our study. Some South Asian and Middle Eastern studies have recently reported similar findings, with Schemer values ranging from 30–45% in dry eye cases [15]. These findings demonstrate the coexistence of evaporative and aqueous-deficient dry eye, underscoring the need for more individualized therapeutic approaches. Regarding Symptom scores, among our cases, DED was reported as mild, moderate, or severe in 22%, 26%, and 10% of subjects, respectively [16]. Notably, there was a significant association between symptom severity and TBUT reduction ($p = 0.02$). This association is supported by recent literature describing patient-reported

symptom severity from tear film instability, rather than just the presence of aqueous deficiency [17]. Schemer scores demonstrated a moderate relationship with symptom severity ($p = 0.04$). This result is consistent with more recent literature, which shows that aqueous deficiency is associated with a wider symptom range and audio-perceptive symptom measures yielding weaker correlations [18]. Our study also demonstrated that females have a considerably greater incidence of abnormal TBUT than males, consistent with recent literature on gender-related susceptibility to dry eye attributed to hormonal imbalance, specifically estrogen and androgen imbalance. Age was positively correlated with lower Schemer values, which supports the lag reported in the Scholarly literature over the last five years regarding the decline in lacrimal gland function and tear production with aging. High screen time (> 4 hours/day) was significantly associated with DED in this study; the contemporary literature supports the association of intensified evaporative dry eye with decreased blink rate and increased film evaporation [19,20]. This highlights and justifies the need for patient counseling on screen hygiene, blinking, and other related environmental adjustments. Overall, we determined that the combination of symptom scoring, TBUT, and Schemer tests provides the most overall accurate assessment of DED. These assessments can give timely diagnoses and help prevent chronic, costly damage to the ocular surface in outpatient settings [21]. The correlations identified in this study can be recognized across various fields of clinical practice to demonstrate and support their value [22].

4. LIMITATIONS:

The current investigation was constrained by its monocentric design (due to the relatively small sample size), the use of basic clinical evaluations, and the absence of advanced diagnostic methodologies. Reporting and response bias were likely due to subjective symptom score assessments. Evaluation of the points of investigation was also hindered by the study's short follow-up duration, which ultimately restricted the ability to evaluate long-term outcomes and treatment response patterns in dry eye.

5. CONCLUSION:

Dry eye disease is widespread amongst patients who visit the OPD regularly. There are significant relationships between the symptoms, TBUT, and Schemer values. Diagnosis and early detection are improved when these symptoms are combined with more objective assessments. There is potential to mitigate issues related to chronic ocular surface disease by effectively using these inexpensive eye exams.

Disclaimer: Nil

Conflict of Interest: Nil

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Authors Contributions

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Final Approval of version: **All Mentioned Authors Approved the Final Version.**..

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