ORIGINAL ARTICLE

Evaluation of Red Eye Cases in Primary Eye Care: Patterns, Causes, and Outcomes

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ABSTRACT

Background: Red eye is a frequent presentation in primary eye care, with causes ranging from mild, self-limiting conditions to potentially serious ocular emergencies. Despite its high prevalence, limited data exists on the patterns, causes, and outcomes of red eye cases seen in primary care settings, particularly in resource-limited environments.

Objective: To evaluate the clinical patterns, underlying causes, and short-term outcomes of patients presenting with red eye to a primary eye care facility, aiming to improve early diagnosis and management at the primary level.

Methods: A descriptive observational study was conducted at the department of Ophthalmology, Bolan Medical College / Helpers Eye Hospital Quetta, over six months (from January 2020 to June 2020). A total of 612 patients with red eye were included. Comprehensive clinical assessments were performed, and diagnoses were categorized into major groups such as infective conjunctivitis, allergic conjunctivitis, episcleritis, keratitis, anterior uveitis, and acute angle-closure glaucoma. Management was provided based on standardized protocols. Follow-up within 7–10 days assessed outcomes as complete resolution, partial improvement, or no improvement. Data were analyzed using descriptive statistics and Chi-square tests.

Results: Of the 612 patients, 52.6% were male and 47.4% female, with a mean age of 28.4 ± 13.6 years. The most common diagnosis was infective conjunctivitis (43.8%), followed by allergic conjunctivitis (20.3%) and nonspecific conjunctivitis (10.5%). Serious conditions like keratitis (6.2%), anterior uveitis (4.2%), and acute angle-closure glaucoma (2.9%) were less frequent but clinically significant. At follow-up, 67.6% of patients showed complete resolution, 23.2% had partial improvement, and 9.2% showed no improvement and required referral.

Conclusion: Red eye is a common and varied presentation in primary care, most often due to infective or allergic conjunctivitis. While most cases can be effectively managed at the primary level, a subset requires specialist care. This highlights the importance of accurate clinical assessment, structured triage, and efficient referral systems to ensure timely and appropriate treatment.

Keywords: Red eye, conjunctivitis, primary eye care, keratitis, uveitis, ocular emergencies, diagnosis patterns.

INTRODUCTION

Red eye is a prevalent ocular manifestation observed in both general and specialized clinical environments, frequently indicating a diverse array of underlying pathologies. Red eye is one of the most common complaints in primary eye care. It can be anything from a harmless, self-limiting condition to an emergency that could threaten vision. Because it happens so often and can show up in different ways, it needs careful evaluation, accurate diagnosis, and prompt treatment to avoid complications and protect vision[1].

Red eye is commonly linked to conditions like conjunctivitis, dry eye, episcleritis, and allergic reactions in primary care and outpatient ophthalmology environments. Nonetheless, more severe conditions such as uveitis, keratitis, and acute angle-closure glaucoma, albeit less prevalent, necessitate immediate intervention and referral. Clinicians must be proficient in differentiating among these etiologies based on clinical presentation, concomitant symptoms, and examination results, as misdiagnosis may result in delayed treatment and suboptimal outcomes[2,3].

The reasons for red eye can be very different based on the patient's age, where they live, how clean they are, and the time of year. For example, allergic conjunctivitis usually gets worse at certain times of the year, while infectious types may spread because of poor sanitation or close contact. A study showed that viral conjunctivitis alone is responsible for almost half of red eye cases in some primary care clinics, even though bacterial and allergic causes are also common[4]

Additionally, the assessment of red eye must take into account laterality, discharge characteristics, pain, photophobia, and alterations in vision to facilitate accurate classification. Inadequate or empirical treatment without a definitive diagnosis may not only fail to resolve the condition but also contribute to antimicrobial resistance, chronicity, or ocular surface damage[5]. This emphasizes the necessity of organized clinical assessment protocols and suitable follow-up procedures in primary eye care establishments.

Even though red eye is very common, it is still not well-studied, especially in primary-level eye care clinics where most people go for help first. The majority of current literature concentrates on hospital-based or tertiary care populations, which may exhibit a bias towards more severe cases[6]. Conversely, the epidemiology and management outcomes of red eye in primary care are inadequately documented, especially in resource-constrained environments where access to ophthalmologists may be limited[7].

For general practitioners, optometrists, and primary eye care workers to make accurate diagnoses, send patients to the right specialists, and manage red eye effectively, they need to know the patterns, causes, and effects of red eye in a primary care setting. It also helps you avoid common mistakes, see how things change with the seasons, and find areas where you could use more training or new rules.

Objective: The goal of this study is to look at the clinical patterns, underlying causes, and outcomes of red eye cases that come to a primary eye care facility. The goal is to improve the accuracy of diagnoses and management strategies at the first point of contact.

MATERIALS AND METHODS

This descriptive, observational study took place at the department of Ophthalmology, Bolan Medical College / Helpers Eye Hospital Quetta, over six months (from January 2020 to June 2022). The study sought to assess the clinical patterns, underlying etiologies, and short-term outcomes of patients presenting with red eye as their principal complaint. The institutional review board gave its ethical approval, and all adult patients or their guardians (in the case of minors) gave their informed consent.

The study included all patients, regardless of age or gender, who presented to the outpatient clinic with red eye. Red eye was characterized by observable conjunctival or scleral hyperemia, with or without accompanying symptoms including pain, discharge, foreign body sensation, photophobia, tearing, or visual disturbance.

We didn't include patients who had a history of eye trauma, recent eye surgery (within the last three months), or known chronic eye diseases (like glaucoma or dry eye that was still being treated) so that we could focus on acute or subacute cases that were new to primary care.

An ophthalmic medical officer or optometrist trained in primary eye care did a thorough clinical assessment on each patient. If needed, a consultant was there to help. The evaluation encompassed comprehensive history acquisition (onset, duration, associated symptoms, prior treatment), visual acuity assessment, external eye examination, slit-lamp biomicroscopy, fluorescein staining as necessary, and intraocular pressure measurement utilizing a non-contact tonometer or Schiotz tonometer. When there was a suspicion of posterior segment involvement or a decrease in visual acuity, a direct ophthalmoscope was used to look at the fundus.

Based on clinical findings, red eye cases were classified into one of the following primary diagnostic categories: infective conjunctivitis (viral or bacterial), allergic conjunctivitis, nonspecific conjunctivitis, episcleritis, keratitis, anterior uveitis, acute angle-closure glaucoma, or other conditions (including dry eye or redness due to exposure). The diagnostic criteria were predicated on established clinical characteristics and examination results. Cases with overlapping symptoms were classified according to the most significant or principal diagnosis.

Management was delivered in accordance with the clinical diagnosis, utilizing standardized treatment protocols available at the facility. Patients needing specialized tests or more advanced care, like those with corneal ulcers, severe uveitis, or suspected glaucoma, were sent to a third-level eye hospital. Follow-up visits were set up as needed to keep an eye on how well the treatment was working and how well the symptoms were going away. Short-term outcomes were documented as complete resolution, partial improvement, or no improvement, determined by symptoms and clinical examination at follow-up, generally conducted within 7 to 10 days.

All data collected, including demographic information, presenting symptoms, diagnosis, treatment administered, and follow-up outcomes, were inputted into a structured pro forma and subsequently analyzed with statistical software. We used descriptive statistics like frequencies and percentages to summarize categorical data. For continuous variables like age, we calculated the mean and standard deviation. The Chi-square test was used to look at the links between diagnosis and demographic variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

During the six-month study period, 612 patients showed up with red eye. Out of these, 322 (52.6%) were men and 290 (47.4%) were women. The ratio of men to women was about 1.1:1. Patients' ages ranged from 4 to 70 years, with an average age of 28.4 ± 13.6 years. The most cases were seen in people between the ages of 21 and 30. Table 1 displays the demographic distribution of the patients.

The most common diagnosis was infective conjunctivitis, which was found in 268 cases (43.8%). Allergic conjunctivitis was the second most common diagnosis, with 124 cases (20.3%), and nonspecific conjunctivitis was the third most common diagnosis, with 64 cases (10.5%). Episcleritis, keratitis, anterior uveitis, and acute angle-closure glaucoma were some of the other less common causes. Table 2 shows how the different causes of red eye are spread out among the people in the study.

When broken down by age group, infective conjunctivitis was found in all age groups, but it was most common in adults aged 21 to 30. Allergic conjunctivitis was more prevalent in younger individuals, especially those under 20 years of age. Adults over 30 were more likely to have more serious conditions like keratitis and uveitis. The age groups in Table 3 show how many people have red eyes.

Follow-up was used to see how well the treatment worked, and most patients showed that their symptoms had gotten better or gone away. At the first follow-up, 414 patients (67.6%) had completely healed, and 142 patients (23.2%) had partially healed. A small number of patients, 56 (9.2%), said they hadn't gotten better or worse, so they needed to be sent to a higher level of care. Table 4 shows how treatment worked based on the first diagnosis.

Table 1: Demographic distribution of patients presenting with red eye (n = 612)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
1–10	48	7.8
11–20	98	16.0
21–30	182	29.7
31–40	126	20.6
41–50	84	13.7
>50	74	12.1
Gender		
Male	322	52.6
Female	290	47.4

Table 2: Causes of red eye in patients (n = 612)

Diagnosis	Frequency (n)	Percentage (%)
Infective conjunctivitis	268	43.8
Allergic conjunctivitis	124	20.3
Nonspecific conjunctivitis	64	10.5
Episcleritis	42	6.9
Keratitis	38	6.2
Anterior uveitis	26	4.2
Acute angle-closure glaucoma	18	2.9
Others (e.g., dry eye, exposure)	32	5.2

Table 3: Distribution of red eye causes by age group

Diagnosis	1–20 yrs	21–40 yrs	>40 yrs
Infective conjunctivitis	78	122	68
Allergic conjunctivitis	52	48	24
Nonspecific conjunctivitis	26	28	10
Episcleritis	6	22	14
Keratitis	4	16	18
Anterior uveitis	2	10	14
Acute angle-closure glaucoma	0	4	14
Others	10	14	8

Table 4: Treatment outcomes by diagnosis

Diagnosis	Complete Resolution	Partial Improvement	No Improvement
Infective conjunctivitis	208	44	16
Allergic conjunctivitis	76	34	14
Nonspecific conjunctivitis	48	12	4
Episcleritis	30	8	4
Keratitis	18	12	8
Anterior uveitis	10	10	6
Acute angle-closure glaucoma	4	8	6
Others	20	14	6

DISCUSSION

This study sought to assess the patterns, underlying causes, and outcomes of red eye cases presented at a primary eye care facility over a six-month duration. Red eye was a common complaint among individuals of various ages, with a marginally higher incidence in males. Most of the cases were in people between the ages of 21 and 30, which is probably because they are more likely to be exposed to things that irritate their skin at work, wear contact lenses, and be affected by environmental factors[9].

Infective conjunctivitis became the predominant diagnosis, representing 43.8% of cases. This is in line with what other clinical studies have found: conjunctivitis, especially viral and bacterial forms, is always the most common cause of red eye in primary and general ophthalmology settings[10,11]. People often say that it is common because it spreads easily, people don't wash their hands

often enough, and it spreads more easily in crowded places like schools and workplaces[12].

The second most common diagnosis was allergic conjunctivitis (20.3%), especially in kids and teens under 20. This pattern is probably caused by seasonal changes and being around allergens like dust, pollen, and pet dander. Similar trends have been documented in prior studies, indicating that allergic conjunctivitis was significantly more prevalent among younger individuals with atopic predispositions[13,14]. The comparatively elevated incidence in the present study indicates an increasing necessity to inform patients about allergen avoidance and long-term management strategies.

Nonspecific conjunctivitis made up 10.5% of the cases. It usually showed up with mild redness and irritation, but there were no clear signs of an infection or allergy. Although not a principal classification, this diagnosis is frequently employed in primary care when the precise etiology remains undetermined during the initial consultation. In numerous studies, such cases were observed to resolve spontaneously or through conservative treatment, underscoring the significance of symptom-based management in low-risk presentations[15].

Keratitis, anterior uveitis, episcleritis, and acute angle-closure glaucoma constituted a minor yet clinically significant subset of red eye cases. These conditions were more common in people over 30 years old, and they needed to be diagnosed quickly to avoid problems. Similar studies have highlighted that although these cases are infrequent, they pose a greater risk for vision loss if not promptly identified and referred[16,17]. Keratitis was frequently linked to contact lens usage or minor trauma, aligning with established risk factors identified in previous studies[18].

The results of this study's treatment were mostly good. At follow-up, 67.6% of patients said they had completely healed, and 23.2% said they had partially improved. This shows how well early diagnosis and the right treatment work at the primary care level. Nonetheless, 9.2% of patients necessitated referral due to persistent or exacerbating symptoms, underscoring the necessity for explicit referral protocols and readily available specialist care. Similar studies have demonstrated analogous resolution rates when standardized management protocols were adhered to at the initial point of contact [19,20].

One of the strengths of this study is that it shows how common and serious red eye conditions are in a primary eye care setting, where most people go for help first. It backs up the growing agreement that primary eye care providers who are well-trained can accurately diagnose and treat most cases of red eye, which will lighten the load on tertiary hospitals. It also stresses how important it is to teach patients, especially when they have infective or allergic conjunctivitis, which can be kept from coming back or spreading with simple steps.

Limitations: This study has a number of limitations. The study was conducted in a single primary care facility, which may limit the generalizability of the findings to broader populations. We didn't look at how seasonal changes might have changed the pattern of allergic or viral conjunctivitis. Moreover, the study predominantly depended on clinical diagnosis lacking laboratory validation, particularly in infectious cases, potentially leading to a certain level of misclassification. Even with these problems, the study gives useful baseline information about red eye presentations in primary care and shows how important it is to triage and manage them well.

CONCLUSION

In conclusion, this study emphasizes that red eye is a frequent and varied manifestation in primary eye care, with infective conjunctivitis as the predominant etiology, succeeded by allergic and nonspecific conjunctivitis. Most cases were handled well at the primary care level, and most patients had good results. But a large number of them needed to be sent to a specialist for conditions that could threaten their vision, such as keratitis, uveitis, and acute angle-closure glaucoma. These results show how important it is to do accurate clinical assessments, act quickly, and have clear referral pathways to make sure patients get the best care and avoid vision-related problems.

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