RESEARCH ARTICLE

Muslum Toptan[1]
Dursun Cadirci[2]
Senay Kocakoglu[2]

[1]Harran University, Medical Faculty, Opthalmology Department, Sanliurfa, Turkey
[2]Harran University, Medical Faculty, Department of Family Medicine, Sanliurfa, Turkey

Corresponding Author:
Muslum Toptan
mail: muslum.toptan@hotmail.com

Received: 26.07.2021
Acceptance: 18.11.2021
DOI: 10.18521/ktd.974600

Konuralp Medical Journal
e-ISSN1309–3878
konuralptipdergi@duzce.edu.tr
konuralptipdergisi@gmail.com
www.konuralptipdergi.duzce.edu.tr

Clinical Characteristics in Patients Presenting with Red Eye

ABSTRACT

Objective: Red eye, a frequent cause of presentations to ophthalmology clinics, is an important indicator of ocular inflammation. Although the prognosis is generally good and self-limiting, it is possible to distinguish possible serious conditions and prevent important situations such as blindness, with detailed examination and correct treatment approach. The purpose of this study was to evaluate patients with red eye presenting to the eye diseases clinic in terms of clinical and sociodemographic characteristics.

Methods: Diseases causing red eye were classified according to the International Classification of Diseases (ICD 10) coding system. Demographic characteristics such as age and sex and clinical findings were examined. Data were evaluated using number and percentage tests.

Results: A total of 2625 patients, 1775 males (67.61%) and 850 females (32.38%), who presented with red eyes, were evaluated. The mean age of the patients was 36.46±18.24 years. The incidence of viral conjunctivitis, the most frequently observed condition in patients presenting due to red eye, was 15.08% (n=396). The most common cause of red eye resulting in decreased vision and increased intraocular pressure (IOP) was acute angle closure glaucoma (AACG). The most common symptom was stinging-burning (70.36%), and the most frequent finding was follicular hyperplasia (74.17%). Five hundred and seventy-one (21.75%) patients who applied to the clinic with red eye had previously applied to a family physician and 289 patients (11.0%) to an emergency physician.

Conclusions: Although prognosis is usually good in red eye, and the condition is self-limiting, the detection of serious conditions through a detailed history, examination, and therapeutic approach can be enhanced with early and appropriate intervention. In addition to family physicians and emergency physicians, the first to examine patients with red eye, important morbidities such as blindness can also be prevented by increasing the awareness of ophthalmologists and cooperation between these.

Keywords: Red Eye, Glaucoma, Conjunctivitis, Uveitis.

Kırmızı Gözle Başvuran Hastalarda Klinik Özellikler

ÖZET

Amaç: Göz hastalıkları polikliniklerine sık başvuru sebeplerinden biri olan kırmızı göz, oküler inflamasyonun en önemli belirtilerindendir. Çoğunlukla prognozu iyi ve kendi kendini sınırlayıcı olmakla beraber olası ciddi durumların ayırt edilmesi ve körlük gibi önemli durumların önüne geçilmesi, detaylı muayene ve doğru tedavi yaklaşımı ile mümkündür. Bu çalışmada kırmızı göz şikâyeti ile göz hastalıkları polikliniğine başvuran hastaların klinik ve sosyodemografik yönden değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Kırmızı göze sebep olan hastalıkların tanıları, International Classification of Diseases (ICD 10) kod sistemine göre sınıflandırıldı. Hastaların yaş, cinsiyet gibi demografik özellikleri ve klinik bulguları incelendi. Veriler sayı ve yüzdelik testi kullanılarak değerlendirildi.

Bulgular: Çalışmamızda kırmızı göz nedeni ile başvuran 2625 hastanın 1775'i (%67,61) erkek, 850'si (%32,38) kadın'dır. Hastaların yaş ortalaması 36,46±18,24 idi. Yapılan değerlendirmede kırmızı göz nedeniyle başvuranlarda en sık görüldüğü belirlenen viral konjonktivitli hastaların oranı %15,08 (n=396) idi. En sık görme azlığı ve göz içi basınç (GİB) artışı yapan kırmızı göz nedeninin akut açı kapanması glokomu (AAKG) olduğu tespit edilmiştir. En sık semptomun (%70,36) batma-yanma, en sık bulgunun (%74,17) foliküler hiperplazi olduğu görülmüştür. Kırmızı göz nedeni ile polikliniğe başvuran hastalardan 571 (%21,75)'i önceden aile hekimine, 289 (%11,0)'u acil hekimine başvurmuştu.

Sonuç: Kırmızı göz varlığında, prognoz çoğunlukla iyi olup, klinik tablo kendi kendini sınırlayabilse de detaylı anamnez, muayene ve tedavi yaklaşımı ile ciddi durumlar fark edilerek erken ve doğru müdahale ile tedavi başarısı arttırılabilir. Kırmızı gözü olan hastaları ilk karşılayan aile hekimleri ve acil hekimlerinin yanı sıra oftalmologların farkındalıklarının ve iş birliğinin arttırılması ile körlük gibi önemli morbiditelerin önüne geçilebilecektir.

Anahtar Kelimeler: Kırmızı Göz, Glokom, Konjonktivit, Üveit.

INTRODUCTION

Red eye, one of the most common reasons for presentations to ophthalmology clinics, is in fact a signal mechanism in the orbit and an important indicator of ocular inflammation. While the clinical manifestation in red eye can be self-limiting, depending on the etiology, visual acuity can also be permanently and adversely affected in some types requiring emergency intervention. Detailed history and detailed examination by an ophthalmologists from time of initial presentation are therefore required in order to determine the etiology (1, 2). Conjunctivitis is the most important reported cause in the development of red eye. Conjunctivitis emerges through both viral and bacterial agents, although viral conjunctivitis is more common viral (1, 3). The clinical manifestation in viral conjunctivitis exhibits a broad spectrum, from mild to progression to evisceration and permanently decreased vision. Among the viral agents, adenoviruses are known to lead to epidemic keratoconjunctivitis. A detailed history taken before contact with the patients in outbreaks is an important protecting the physician against contamination with the infectious agent and the development of red eye (4). In case of bacterial conjunctivitis, onset is sudden, and prognosis may be poorer. Bacterial conjunctivitis is estimated to be seen in 135 out of every 10,000 people annually in the USA (5).

Allergic conjunctivitis, another cause of red eye, is also frequently accompanied by itching and watery eyes. Allergic conjunctivitis affects at least 20% of the population annually. Conjunctival edema and marked chemosis may be seen in severe cases. It is typically reported not to threaten vision and to cause no severe ocular side-effects (6).

Corneal opacities caused by microbial keratitis are the fourth leading cause of blindness globally. The most common findings are acute eye pain and redness. Infectious keratitis generally develops in association with contact lens use in developed countries, while in developing countries it is reported to develop due to trauma and fungal infections among agricultural workers. Vision disorder occurring due to microbial keratitis can generally be prevented by adopting an appropriate approach (7, 8).

In addition to causing red eye, acute angle closure glaucoma (AACG) also results in patients presenting to physicians due to severe ocular pain, reduced vision, and nausea and vomiting. Decreased vision, corneal edema, and mid-dilated pupils are important findings accompanying AACG. Rapid diagnosis and treatment are highly important since the condition can result in permanent damage to the optic nerve and permanent loss of vision. The presence of AACG should always be considered when evaluating patients with migraine-related headache (9).

Episcleritis, one of the causes of red eye, characterized by infection of the sclera and involving only superficial episcleral tissue, is idiopathic in the majority of cases, while 50% of cases of scleritis capable of involving the cornea, episcleral, and uvea are reported to be associated with a systemic disease (10).

Management of red eye relies on collaboration between and sensitivity on the part of family physicians, emergency physicians, and ophthalmologists, the first health professionals to encounter red eye, in terms of differential diagnosis and identification of emergency conditions (11).

The purpose of the present study examining the clinical and demographic characteristics of patients presenting to our eye diseases clinic due to red eye is to describe our own clinical experience and increase awareness of red eye, a condition frequently encountered in the community, among physicians.

MATERIAL AND METHODS

The present study involved 2625 patients presenting to the Harran University Medical Faculty Ophthalmology Clinic, Turkey, with red eye between 1 May 2016 and 25 March 2020. Approval for the study was granted by the Harran University Institutional Assessment Committee and Ethical Committee (No. E.18161 dated 13/05/2020).

Diseases causing red eye were classified according to the International Classification of Diseases (ICD 10) coding system. A data form containing detailed history and examination findings recorded from patients' files was employed during data collection. Recorded data such as age, sex, red eyes, sensations of stinging, burning, or foreign bodies, eyelid edema, conjunctival edema, corneal involvement, photophobia, blurred vision, presence in environments such as swimming pools, the sea, or thermal spas and other public areas, history of contact with patients with conjunctivitis, and whether or not patients had presented to another health institution or physician with the existing symptoms were all noted. Patients included in the study underwent complete ophthalmological examinations including best corrected visual acuity (BCVA) examination, intraocular pressure (IOP) measurement using an i-care tonometer (Tiolat Oy, Helsinki, Finland), and dilated fundus examination or orbital ultrasonography for diagnostic purposes during presentation. Elevated IOP was defined as values exceeding 30 mmHg (12). Cases with conjunctivitis were examined in isolation from other patients against the risk of contagion in hospital as a routine requirement.

Statistical analyses were performed on IBM SPSS 15.0 software (SPSS Inc., Chicago, IL, USA). Normally distributed numerical variables were expressed as mean +/- standard deviation (SD), and

non-normally distributed numerical variables as median (min-max), while categorical variables were expressed as frequencies (percentages).

RESULTS

Males represented 1775 (67.61%) of the patients in this study, and females 850 (32.38%). The ages of the 2625 participants ranged between 0 and 95 years (36.46±18.24). In terms of age distributions, 19.1% (n=500) of patients were aged 0-20 years, 49.2% (n =1291) 21-40 years, 17.8% (n=467) 41-60 years, and 13.9% (n=366) over 61 years.

The most common cause of red eye was viral conjunctivitis as 15.08% (n=396), followed by bacterial conjunctivitis at 13.56% (n=356), allergic conjunctivitis at 12.87% (n=338), keratitis at 10.78% (n=283), corneal / conjunctival foreign body at 9.98% (n=262), episcleritis at 8.0% (n=210), scleritis at 1.75% (n=46), uveitis at 8.57% (n=225), acute angle closure glaucoma (AACG) at 7.08% (n=186), subconjunctival hemorrhage at 6.28% (n=165), and dry eye at 6.01% (n=158) (Table 1).

Table 1. Patients' demographic and clinical characteristics

	Age	Sex (F/M) (n)	Number of patients n/%
Viral conjunctivitis	35.46±11.49	90/302	396 (15.08%)
Bacterial conjunctivitis	33.15±13.14	54/302	356 (13.56%)
Allergic conjunctivitis	17.83±6.94	136/202	338 (12.87%)
Keratitis	32.78±12.52	81/202	283 (10.78%)
Corneal / conjunctival foreign body	29.89±10.08	64/198	262 (9.98%)
Episcleritis	31.26±9.05	29/181	210 (8.0%)
Scleritis	30.22±5.63	15/31	46 (1.75%)
Uveitis	26.33±9.52	125/100	225 (8.57%)
AACG	63.43±11.69	103/83	186 (7.08%)
Subconjunctival hemorrhage	66.41±11.15	75/90	165 (6.28%)
Dry eye	63.83±10.96	78/80	158 (6.01%)

AACG: acute angle closure glaucoma.

The most frequently reported symptoms were a sensation of stinging or burning at 70.36% (n=1847), photosensitivity at 55.77% (1464), itching at 55.16% (n=1448), drying at 53.83% (n=1413), pain in the eye at 26.97% (n=708), and decreased vision at 21.91% (n=575) (Figure 1).

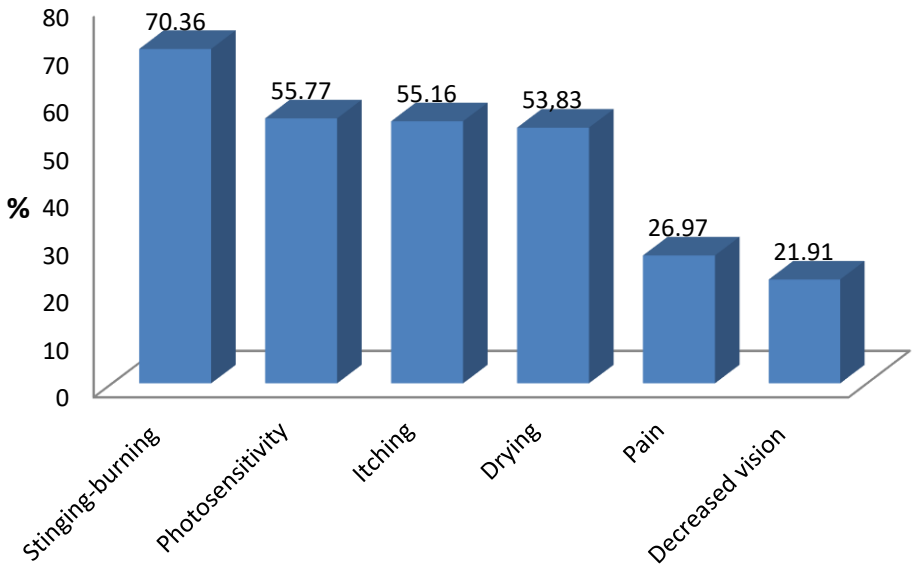

Figure 1. Symptoms of patients presenting due to red eye

The most common finding was follicular hyperplasia at 74.17% (n=1947), followed by conjunctival hyperemia at 69.14% (n=1815), discharge at 53.83% (n=1413), loss of corneal transparency at 34.17% (n=897), chemosis at 33.79% (n=887), and increased IOP at 8.46% (n=222). Fundus findings (+ 2, + 3 cells in the vitreous 13 patients; macular edema 8 patients; perivascular encasement 5 patients; 4 patients with active focus of chorioretinitis) were present in 0.76% (n=20) of patients (Figure 2).

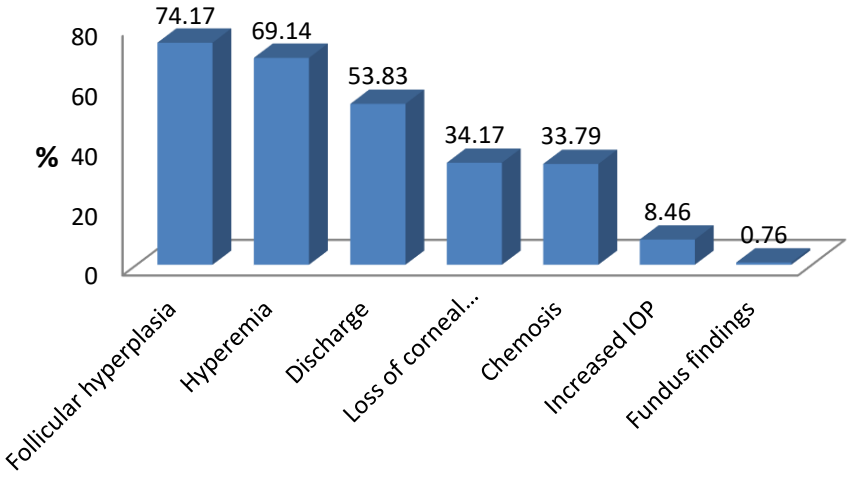

Figure 2. Findings of patients presenting with red eye.

Flare and cells in the anterior chamber were observed in patients with uveitis, and corneal edema and mid-dilated pupils in patients with AACG. Seen in 186 patients, AACG was the most common cause of decreased visual acuity, which was also seen in cases of uveitis, corneal foreign body, keratitis, scleritis, bacterial conjunctivitis and dry eye (Table 2).

The condition in which IOP most frequently exceeded 30 mmHg was AACG, followed by episcleritis/scleritis, keratitis, uveitis, and allergic conjunctivitis. (Table 3).

Table 2. Visual acuity values of red eye patients

	P+P+ / HM +	1/200- 19/200	20/200-20/50	≤20/40
Viral conjunctivitis				396
Bacterial conjunctivitis		9	10	337
Allergic conjunctivitis				338
Keratitis		30	48	205
Corneal / conjunctival foreign body		42	46	174
Episcleritis				210
Scleritis		3	5	38
Uveitis		69	88	68
AACG	48	128	6	2
Subconjunctival hemorrhage				165
Dry eye		2	10	146

HM: Hand movement, P: Projection of rays, AACG: acute angle closure glaucoma.

Table 3. Average ıntraocular pressure values

	Average IOP (mmHg)	Number of patients with IOP above 30 mmHg
Viral conjunctivitis	15	0
Bacterial conjunctivitis	16	0
Allergic conjunctivitis	18	4
Keratitis	19	11
Corneal / conjunctival foreign body	17	0
Episcleritis	19	5
Scleritis	20	7
Uveitis	22	9
AACG	44	186
Subconjunctival hemorrhage	16	0
Dry eye	17	0

AACG: acute angle closure glaucoma, IOP: intraocular pressure

Five hundred seventy-one (21.75%) patients presenting to our clinic with red eye had previously presented to a family physician, and 289 (11.0%) to an emergency physician. Conjunctivitis was the most common etiological cause in presentations to family physicians, and foreign bodies in the cornea or conjunctiva in case of presentations to emergency physicians.

DISCUSSION

Red eye, one of the most common reasons for presentations to eye clinics, exhibits a wide course, from mild manifestations to blindness. The present study considered red eye in the community and our own region.

Analysis of the demographic and clinic characteristics of patients presenting to our clinic with red eye identified viral conjunctivitis as the

most common etiological cause. Other frequently observed causes were, in descending order, allergic conjunctivitis, bacterial conjunctivitis, keratitis, foreign bodies in the cornea and conjunctiva, episklerit, scleritis, uveitis, AACG, subconjunctival hemorrhage, and dry eye. Sanchez et al. investigated approximately 3000 patients presenting with ocular emergencies, and reported that approximately half of presentations were due to inflammatory conditions involving the cornea, conjunctiva, and eyelids. Distribution by age and sex in that study was also compatible with the findings of the present study, with male patients representing the majority of presentations, and presentations being more common in the 21-50 age range (35.4%). Presentations in the present study were most frequent in the 21-40 age range (13).

In their retrospective study of 20,822 emergency ocular presentations, Galindo-Ferreiro et al. cited acute conjunctivitis as the most frequent cause of red eye, in agreement with the present study. Presentations were more frequent among male patients than females in the present study, and were most common in the 21-40 age range, while Galindo et al. reported that the proportion of female patients presenting was close to that of men, and that presentations were more frequent in the 45-65 age range (14).

Similarly to the present study, Sridhar et al. described viral conjunctivitis (8.7%) as the most common cause of presentation, followed by dry eye (6.6%) and corneal injury (6.6%). The most frequent other causes of presentation in the present study, in descending order, were bacterial conjunctivitis, allergic conjunctivitis, keratitis, and corneal and conjunctival foreign bodies (15). In their study of approximately 1000 patients, Fitch et al. reported that no definite diagnosis was possible in 24% of cases, similar to our rates, they found viral etiology in 36% of the patients and a higher rate (40%) of bacterial etiology (16).

Yis et al. performed a retrospective investigation of 3199 emergency department presentations due to red eye. Male presentations in that study were similarly to those in the present research, but in contrast to our study, pediatric presentations were more frequent (30.6%). Also consistent with the present study, those authors also described conjunctivitis as the most frequent cause of presentation. In contrast to our study, however, the next most common causes of presentation were foreign bodies in the eye, conjunctival hemorrhage, and hyphema. In the present study, episcleritis was diagnosed in 8% of patients presenting due to red eye, and scleritis in 1.75%, while no patients were diagnosed with these conditions in Yis et al.'s study (17).

Marinos et al. reported that 68% of patients with viral conjunctivitis received antibiotherapy, and that 78% presented to their clinic within one week (18). In the present study, 21.75% of patients, particularly those with conjunctivitis, had presented to family physicians, subsequently presenting to our eye diseases clinic due to referral because of persistence of symptoms or of their own individual volition.

Consistent with the previous literature, the majority of patients developing keratitis in the present study were aged 21-40 years and were men (7, 8). In a study of 857 patients with red eye disease, Ahmad et al. also reported more diagnoses of keratitis among men. These findings may be attributable to the ability to work actively outdoors and a greater likelihood of experiencing ocular trauma in this age group, and to use of contact lenses (19). It is particularly important for individuals using contact lenses to be informed of the need for greater care over use and hygiene rules, and for agricultural workers to be told to use protective equipment to protect their eyes in order to prevent keratitis. Presentation were more frequent between the ages of 40 and 60 in that study. However, in the present study, the distribution was more frequent between 21 and 40. Microbial keratitis was diagnosed in 3.7% of patients presenting due to red eye in that study, considerably lower than the comparable figure in the present study (10.78%) (19). Tena et al. described contact lens use as the most common risk factor (33.2%) for the development of keratitis. Other causes in that study, in descending order of frequency, were blepharitis (19.7%), trauma (13.2%), and immunosuppression (6.8%) (7). Upadhyay et al. reported that the incidence and etiology of microbial keratitis varied depending on the geographical region, and that the annual incidence of microbial keratitis in the USA was 11.0-27.6:100,000, compared to 799:100,000 in Nepal, a developing country (20, 21). In the present study, performed in a region with a high presence of agricultural workers in epidemiological terms, the incidence of trauma-related infectious keratitis (10.7%) was considerably higher than those figures. In another study, the most frequent cause of microbial keratitis, at 43.75%, was trauma due to accidents, significantly higher than the equivalent figure in the present study (19).

Farahni et al. reported that visual acuity in keratitis is always affected in line with the position of the lesion and the degree of intraocular infection, and that IOP elevation should always be considered, particularly in the presence of trabeculitis-related HSV infection (22). Similarly in the present study, visual acuity was adversely affected in 27.56% of patients diagnosed with keratitis, and increased IOP was seen in 11 patients. In a study of 268 pediatric eye trauma patients, Puodžiuvienė et al. reported a lower proportion of individuals with decreased visual acuity among patients with keratitis (18.4%) than in the present study (23). Furlanetto et al. reported pre-treatment visual acuity lower than 20/400 in 53.85% of

patients (24). In the present study, a decrease in vision levels was observed in 78 (27.5%) patients with keratitis, while no decrease was observed in patients with viral conjunctivitis, allergic conjunctivitis, episcleritis, or subconjunctival hemorrhage.

Similarly to the present study, Şahinoğlu et al. found that spontaneous subconjunctival hemorrhages or those developing with Valsalva had histories of systemic disease, while traumatic subconjunctival hemorrhages were more widespread in young men engaged in heavy work and activities (25). A male/female ratio of 0.8 has been reported in the incidence of non-traumatic subconjunctival hemorrhage, rising with age (26). Kaimbo et al. reported that subconjunctival hemorrhage was diagnosed in 0.8% of 6843 patient for whom ocular consultations were requested, with a higher rate being determined in women compared to men (59%/41%), and a mean age of 31. Those authors reported traumatic subconjunctival hemorrhage in 52% of patients and spontaneous subconjunctival hemorrhage in 48%, the most frequently associated condition being hypertension (27). Hu et al. reported that subconjunctival hemorrhage developed in one out of 167 individuals in the East Asian population that it was more common in women than in men, that the most frequent agent was hypertension, and that the incidence was low in childhood, but rose to 136 in 10,000 individuals in the 60-69 age group (28). The mean age of our patients was similar to that in Kaimbo et al., but considerably lower than that in Hu et al. Subconjunctival hemorrhage was also not a cause of decreased visual acuity in any patient (27, 28).

A study of patients with scleritis reported decreased vision in 37% of participants, anterior uveitis in 42%, peripheral ulcerative keratitis in 14%, glaucoma in 13%, and cataract in 17%, while the rate of glaucoma in anterior scleritis ranged between 9% and 22% (29). Thong et al. investigated the epidemiology of episcleritis and scleritis in Australia and reported an incidence of episcleritis of four in 100,000 and of scleritis of 1.03 in 100,000. Both scleritis and episcleritis were more common in women than in men, and patients with scleritis were older. The authors reported that different ethnic origins, environmental factors, and sex may affect the variations in these figures (30). The rates of episcleritis and scleritis among all the patients in the present study were higher than in previous publications, rates of both were higher in women than in men, with both men and women more frequently being in their 30s. No decrease in visual acuity occurred in any patient with episcleritis in the present study, but decreases were observed in 8 patients with scleritis. Increased IOP was also detected in five patients with episcleritis and seven with scleritis. Diaz et al. reported that episcleritis is rare in childhood, the number of adult patients also exceeding that of children in the present study (10).

In a recent systematic review, Miserocchi et al. reported a global incidence of uveitis of 17-52/100,000 (31). Previous research shows that uveitis is one of the five most common causes of blindness in the developed world, representing 10% of all cases in the USA. Some studies have reported equal gender distribution or slight female predominance among patients with uveitis, that decreased visual acuity is a common symptom, and that an increase in IOP may also be seen, consistent with the findings of the present study (32, 33).

Hart et al. reported an estimated incidence in Australia of 21.54/100,000, that the disease affected young Australians of working age (80.8%), and that it exhibits no general gender preference. Those authors reported a distribution of cases of diffuse uveitis of anterior uveitis in 75%, intermediate in 6%, posterior in 15%, and panuveitis in 4% (34). In the present study, uveitis was present in 8.5% of patients with red eye, the incidence being similar between the genders, although slightly higher in women (56%). Consistent with Hart et al., our findings also showed a higher incidence of patients with anterior-type uveitis. In a study examining the epidemiology of uveitis in the Philippines, Abaño et al. reported a mean age at presentation of 38 ± 18.4 years, that anterior uveitis was more common, consistent with the present study, and that 54% case of cases were idiopathic while specific diagnoses were determined in 46%. In addition, they found that children (13%) and the elderly (15%) were less affected (35). In our study, uveitis was seen less in the elderly and children.

Studies have generally reported severe ocular pain, redness, and decreased vision in AACG. Similarly in the present study, the basic symptoms were reduced vision and pain (9). Park et al. investigated approximately 11,000 patients with AACG (73% female), and reported that the incidence increased sharply with age, peaking at the ages of 75-79, and being 2.5-fold more common in women than men (36). Studies have also reported ethnic variation in AACG. These studies have also shown that the incidence of AACG increases significantly with age, peaking in the 75-79 age group (37, 38). AACG was also more common at advanced age and in women in the present study.

Although dry eye is generally regarded as a simple entity, it is also a condition that can cause pain in the eye and blurred vision under severe conditions. The discomfort it causes directly impacts on accurate diagnosis, treatment, and quality of life through its adverse impacts on activities such as reading, watching television, and social activities such as driving, and can result in delayed diagnosis (39). Similarly in the present study, decreased visual acuity was observed in 12 patients presenting with dry eye and diagnosed with dry eye. Tan et al. reported that the prevalence of

dry eye increased with age, affecting 18% of women and 11% of men in the USA, and between 5% and 34% of the adult population. Studies have also shown that symptomatic dry eye disease is significantly associated with contact lens use (40). The prevalence of dry eye among patients with red eye in the present study was 6%, being equally distributed among men and women, the most frequent symptoms, in agreement with previous research, being stinging, burning, and photosensitivity. The most frequent finding was follicular hyperplasia. Ahmad et al. similarly reported a prevalence of dry eye of 6.75% (19).

Frings et al. reported that the duration, laterality (unilateral) of symptoms in red eye, and the severity of pain were the main factors for a family physician to refer to an ophthalmologist (39). Narayana et al. reported that findings of anisocoria and pupillary constriction indicate severe ocular disease in red eye patients (41). In the present study, 21.75% of patients had previously presented to a family physician and 11% to an emergency physician. The most common etiological reason for presentations to family physicians was conjunctivitis, while the most common reason for presentations to emergency physicians was foreign bodies in the cornea or conjunctiva. The limitations of our study are that it is not prospective, it is conducted in the city we are in.

CONCLUSION

In conclusion, red eye is a condition widely seen in the community and a frequent cause of presentations to family physicians, emergency departments, and ophthalmology clinics. In order to prevent the development of red eye, it is important for patients and physicians to be informed of the importance of negative domestic conditions capable of causing ocular traumas being corrected, of glasses and headgear being worn, particularly when working out of doors, for protection against foreign body, and of hygiene in contact lens use. Physicians should be aware of clinical conditions accompanying red eye, such as hemorrhage, watery eyes, decreased vision and pain in order to prevent permanent damage, and patients should be referred to ophthalmologists without loss of time when necessary. Increasing cooperation between family physicians and relevant branches of medicine and raising awareness is also important in terms of both preventive medicine and early diagnosis and treatment of existing diseases.

REFERENCES

1. Leibowitz HM. The red eye. New England Journal of Medicine. 2000;343(5):345-51.
2. Roscoe MC, Landis TC. How to diagnose the acute red eye with confidence. Journal of the American Academy of PAs. 2006;19(3):24-30.
3. Parsons G. The red eye. Papua and New Guinea medical journal. 1992;35(1):67-70.
4. Gilani CJ, Yang A, Yonkers M, Boysen-Osborn M. Differentiating urgent and emergent causes of acute red eye for the emergency physician. Western Journal of Emergency Medicine. 2017;18(3):509.
5. Smith AF, Waycaster C. Estimate of the direct and indirect annual cost of bacterial conjunctivitis in the United States. BMC ophthalmology. 2009;9(1):13.
6. Shaker M, Salcone E. An update on ocular allergy. Current Opinion in Allergy and Clinical Immunology. 2016;16(5):505-10.
7. Tena D, Rodríguez N, Toribio L, González-Praetorius A. Infectious keratitis: microbiological review of 297 cases. Japanese Journal of Infectious Diseases. 2019;72(2):121-3.
8. Ung L, Bispo PJ, Shanbhag SS, Gilmore MS, Chodosh J. The persistent dilemma of microbial keratitis: Global burden, diagnosis, and antimicrobial resistance. Survey of ophthalmology. 2019;64(3):255-71.
9. Kaur S, Larsen H, Nattis A. Primary Care Approach to Eye Conditions. Osteopathic Family Physician. 2019;11(2).
10. Diaz JD, Sobol EK, Gritz DC. Treatment and management of scleral disorders. Survey of ophthalmology. 2016;61(6):702-17.
11. Schaller U, Klauss V. From conjunctivitis to glaucoma. When is a red eye an alarm signal? MMW Fortschritte der Medizin. 2002;144(11):30-3.
12. Kiziloglu M, Kiziloglu TG, Akkaya ZY, Burcu A, Ornek FJTJoO. Prognostic factors in blunt eye trauma/Kunt goz travmalarinda prognostik faktorler. 2013;43(1):32-9.
13. Sánchez TH, Galindo FA, Iglesias CD, Galindo AJ, Fernández MM. Epidemiologic study of ocular emergencies in a general hospital. Archivos de la Sociedad Espanola de Oftalmologia. 2004;79(9):425.
14. Galindo-Ferreiro A, Sanchez-Tocino H, Varela-Conde Y, Diez-Montero C, Belani-Raju M, García-Sanz R, et al. Ocular emergencies presenting to an emergency department in Central Spain from 2013 to 2018. European Journal of Ophthalmology. 2019:1120672119896420.
15. Sridhar J, Isom RF, Schiffman JC, Ajuria L, Huang LC, Gologorsky D, et al. Utilization of Ophthalmology-Specific Emergency Department Services. Semin Ophthalmol. 2018;33(2):185-90.
16. Fitch CP, Rapoza PA, Owens S, Murillo-Lopez F, Johnson RA, Quinn TC, et al. Epidemiology and diagnosis of acute conjunctivitis at an inner-city hospital. Ophthalmology. 1989;96(8):1215-20.
17. Yis NŞ, Çelik K, Kükner AŞ, Sarman ZŞ, Selim S. Acil Serviste Kırmızı Göz. Eur J Health Sci. 2016;2(2):40-4.

18. Marinos E, Cabrera-Aguas M, Watson SL. Viral conjunctivitis: a retrospective study in an Australian hospital. Contact Lens and Anterior Eye. 2019;42(6):679-84.
19. Ahmad F, Amin MS. The predisposing factors for mocrobial keratitis in patients with red eye reporting to the military hospital rawalpindi. Pakistan Armed Forces Medical Journal. 2019;69(5):1134-38.
20. Upadhyay M, Karmacharya P, Koirala S, Shah D, Shakya S, Shrestha J, et al. The Bhaktapur eye study: ocular trauma and antibiotic prophylaxis for the prevention of corneal ulceration in Nepal. British Journal of Ophthalmology. 2001;85(4):388-92.
21. Jeng BH, Gritz DC, Kumar AB, Holsclaw DS, Porco TC, Smith SD, et al. Epidemiology of ulcerative keratitis in Northern California. Archives of Ophthalmology. 2010;128(8):1022-8.
22. Farahani M, Patel R, Dwarakanathan S. Infectious corneal ulcers. Disease-a-month: DM. 2017;63(2):33-7.
23. Puodžiuvienė E, Jokūbauskienė G, Vieversytė M, Asselineau K. A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. BMC ophthalmology. 2018;18(1):10.
24. Furlanetto RL, Andreo EG, Finotti LG, Arcieri ES, Ferreira MA, Rocha FJ. Epidemiology and etiologic diagnosis of infectious keratitis in Uberlandia, Brazil. European Journal of Ophthalmology. 2010;20(3):498-503.
25. Sahinoglu-Keskek N, Cevher S, Ergin A. Analysis of subconjunctival hemorrhage. Pak J Med Sci. 2013;29(1):132.
26. Mimura T, Usui T, Yamagami S, Funatsu H, Noma H, Honda N, et al. Recent causes of subconjunctival hemorrhage. Ophthalmologica. 2010;224(3):133-7.
27. Kaimbo W, Kaimbo D. Epidemiology of traumatic and spontaneous subconjunctival haemorrhages in Congo. Bull Soc belge Ophthalmol. 2009;311:31-6.
28. Hu D-N, Mou C-H, Chao S-C, Lin C-Y, Nien C-W, Kuan P-T, et al. Incidence of non-traumatic subconjunctival hemorrhage in a nationwide study in taiwan from 2000 to 2011. PloS one. 2015;10(7):e0132762.
29. de la Maza MS, Jabbur NS, Foster CS. Severity of scleritis and episcleritis. Ophthalmology. 1994;101(2):389-96.
30. Thong LP, Rogers SL, Hart CT, Hall AJ, Lim LL. Epidemiology of episcleritis and scleritis in urban Australia. Clin Exp Ophthalmol. 2020;48(6):757-66.
31. Miserocchi E, Fogliato G, Modorati G, Bandello F. Review on the worldwide epidemiology of uveitis. European journal of ophthalmology. 2013;23(5):705-17.
32. Gritz DC, Wong IG. Incidence and prevalence of uveitis in Northern California: the Northern California epidemiology of uveitis study. Ophthalmology. 2004;111(3):491-500.
33. Bodaghi B, Cassoux N, Wechsler B, Hannouche D, Fardeau C, Papo T, et al. Chronic severe uveitis: etiology and visual outcome in 927 patients from a single center. Medicine. 2001;80(4):263-70.
34. Hart CT, Zhu EY, Crock C, Rogers SL, Lim LL. Epidemiology of uveitis in urban Australia. Clinical & experimental ophthalmology. 2019;47(6):733-40.
35. Abaño JM, Galvante PR, Siopongco P, Dans K, Lopez J. Review of epidemiology of uveitis in Asia: pattern of uveitis in a tertiary hospital in the Philippines. Ocular immunology and inflammation. 2017;25(sup1):S75-S80.
36. Park SJ, Park KH, Kim TW, Park BJ. Nationwide Incidence of Acute Angle Closure Glaucoma in Korea from 2011 to 2015. J Korean Med Sci. 2019;34(48):e306.
37. Seah SK, Foster PJ, Chew PT, Jap A, Oen F, Fam HB, et al. Incidence of acute primary angle-closure glaucoma in Singapore: an island-wide survey. Archives of ophthalmology. 1997;115(11):1436-40.
38. Wong TY, Foster PJ, Seah SK, Chew PT. Rates of hospital admissions for primary angle closure glaucoma among Chinese, Malays, and Indians in Singapore. British journal of ophthalmology. 2000;84(9):990-2.
39. Frings A, Geerling G, Schargus M. Red eye: A guide for non-specialists. Deutsches Ärzteblatt International. 2017;114(17):302.
40. Tan LL, Morgan P, Cai ZQ, Straughan RA. Prevalence of and risk factors for symptomatic dry eye disease in S ingapore. Clinical and Experimental Optometry. 2015;98(1):45-53.
41. Narayana S, McGee S. Bedside diagnosis of the 'red eye': a systematic review. The American Journal of Medicine. 2015;128(11):1220-4.