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The profile of patients attending to the general emergency department with ocular complaints within the last year: is it a true ocular emergency?

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Abstract

Purpose Ocular emergencies require immediate intervention to prevent rapid vision loss or functional impairment. The aim of this study was to determine the proportion of true ocular emergencies among patients who presented to the general emergency department with ocular complaints and were referred to the Eye Clinic.

Methods In a retrospective cross-sectional study in a tertiary hospital in Istanbul, patients aged 0–100 years who presented to the general emergency department with ocular complaints between January and December 2022 were included. Inconclusive diagnoses and incomplete records were excluded. Patients were divided into three groups: top eye emergencies (TE), relative eye emergencies (REE), and non-emergency eyes (NEE).

Results Among the 652,224 individuals seeking care, 9,982 (1.5%) were referred to the Eye Emergency Clinic. Of these, 2,788 (27.9%) were female, and 7,194 (72.1%) were male, with ages ranging from 0 to 98 years. TopEye Emergencies (TEE), Relative Eye Emergencies (REE), and Non-Eye Emergencies (NEE) accounted for 13%, 60%, and 27% of the cases, respectively. Common top-eye emergencies (TEE) include chemical injuries, orbital-preseptal cellulitis, and orbital fractures. Relative eye emergencies (REEs) commonly feature corneal foreign bodies, corneal erosion, and conjunctivitis. Nonemulsion eye (NEE) methods involve simple eye redness, trauma without eye involvement, and subconjunctival haemorrhage.

Conclusions Consistent with the literature, 1.5% of patients presenting to the general emergency department had eye complaints. However, 27% of those referred to the ophthalmological clinic did not have an urgent eye condition. This is partly due to the high proportion of patients presenting to the emergency department with ocular complaints and the lack of knowledge of ophthalmological diseases by emergency physicians, leading to unnecessary referrals to the ophthalmology clinic, resulting in a loss of the workforce and reduced time allocated to patients with true ocular emergencies.

Keywords Ocular emergencies, Eye trauma, Corneal injuries, Ophthalmic triage, Corneal foreign body, Eye emergencies

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Introduction

Eye emergencies can result in vision loss or dysfunction without early intervention [1]. Studies have shown that the proportion of patients presenting to general emergency departments with eye complaints ranges from 1 to 6% [2, 3]. A proportion of patients presenting to general emergency departments or directly to eye emergency departments with eye complaints do not actually require emergency care [4]. This proportion varies from 37 to 50.4% across different studies [4, 5]. Some hospitals worldwide have implemented triage systems in their emergency departments, and patients with ocular complaints are initially assessed by general practitioners, trained nurses or ophthalmology residents [6]. Studies using triage and coding systems have shown that it is easier to distinguish true ocular emergencies from non-urgent ocular complaints, allowing more time to be allocated to true ocular emergencies and reducing pre-examination waiting times [7, 8].

In previous studies, the criteria for ocular emergencies were defined as conditions and diseases that threaten vision and lead to functional impairment if not treated early. The main causes are giant cell arteritis, open globe injuries, retinal artery occlusions, acute angle closure glaucoma, retinal detachment, keratitis, uveitis, orbital fractures, endophthalmitis, chemical injuries, burns due to chemical substances or direct caustic conditions such as fire and orbital fractures [9]. Several studies have been conducted worldwide on the prevalence of ocular emergencies, such as in Spain (Galindo-Ferreiro et al., 2021) [5] and China (Chen et al., 2023) [6]. However, there are no similar studies published from Turkey. The aim of this study was to provide valuable data on the prevalence of eye emergencies in patients attending the general emergency department of a tertiary hospital, filling an important gap in the literature.

In addition, we aimed to determine the actual percentage of eye emergencies among the cases examined and explore potential solutions.

Methods

Study setting and participants

The study is a retrospective, cross-sectional, single-centre epidemiological study. Ethical approval was obtained from the Ethics Committee of Başakşehir Cam and Sakura City Hospital for the study (Approval No: 2023.02.84). The study was conducted in accordance with the principles of the Helsinki Declaration. Patients who presented to the general emergency department of a tertiary hospital with eye problems and were referred to the Eye Emergency Department from January 2022 to December 2022 were included in the study. Patients with undetermined diagnoses, incomplete file data, or referrals from other hospitals were excluded. All patients

with eye-related issues who presented to the general emergency department were initially evaluated by an emergency resident without any interventions and then referred to the eye emergency department. In the Eye Emergency Department, the diagnosis was made by ophthalmology resident doctors. Patients with diagnostic challenges were evaluated by ophthalmology specialists. The initial complaint and visual acuity of all patients were noted. After tests for light reflex and eye movements were conducted, a detailed examination of the anterior segment and retina was performed via biomicroscopy. Imaging techniques were used when necessary. In some cases, patients were referred to Neurology, Ear Nose Throat, and other relevant specialty departments. The study included patients aged 0 to 100 years. Patients were categorized into three groups on the basis of their urgency status by a specialist in ophthalmology: top eye emergencies (TEE), relative eye emergencies (REE), and non-emergency eyes (NEE). The classification of TEE, REE and NEE was made considering the classification of the American Academy of Ophthalmology, [10] which can be considered an authority on this subject, and by evaluating the patient using our clinic's daily practice approach.

TEE refers to conditions that could lead to vision loss or disability if individuals do not intervene within hours or even minutes. REE includes conditions that require faster and uncomplicated recovery when diagnosed and treated within days. NEE encompasses patients with no urgent signs requiring immediate attention, patients who should have scheduled elective eye examinations, and those who, after appropriate consultation by a general practitioner, do not need referral to the Eye Emergency Department. The percentages in Tables 1, 2, 3 and 4 were calculated as the ratio of eye emergencies in the relevant row to the total number of eye emergencies.

Statistical analyses

The mean, standard deviation, median minimum, maximum, frequency and ratio values were used for descriptive statistics. The distribution of variables was measured via the Kolmogorov–Smirnov test or Shapiro–Wilk test. The Mann–Whitney U test was used to analyse quantitative independent data. The chi-square test was used in the analysis of qualitative independent data, and the Fisher test was used when the chi-square test conditions were not met. The SPSS 27.0 program was used in the analyses.

Results

In 2022, a total of 652,224 individuals sought care at the general emergency department, with 285,355 being adults and 366,869 being children. Among these, approximately 325,000 were males, and 327,224 were females.

Table 1 Patient demographic data and the time of presentation to the eye emergency clinic

		Min–Max		Median	Mean±sd/n-%	
Age		0.0	-	98.0	32.0	33.0 ± 18.8
Age	0-10					1427 14.3%
	11-20					988 9.9%
	21-30					2281 22.9%
	31-40					1957 19.6%
	41-50					1573 15.8%
	51-60					921 9.2%
	61-70					522 5.2%
	71-80					254 2.5%
	81-90					35 0.4%
	91-100					24 0.2%
Sex	Female					2788 27.9%
	Male					7194 72.1%
Month	January					724 7.3%
	February					678 6.8%
	March					708 7.1%
	April					719 7.2%
	May					723 7.2%
	June					776 7.8%
	July					764 7.7%
	August					881 8.8%
	September					954 9.6%
	October					949 9.5%
	November					1050 10.5%
	December					1056 10.6%
Hour	08:00-17:30					5038 50.5%
	17:30-24:00					3683 36.9%
	00:00-08:00					1261 12.6%

Amid all presentations, 9,982 individuals (1.5%) were referred to the Eye Emergency Clinic. Twelve patients who could not be diagnosed, 42 patients for whom nothing was written about the diagnosis and treatment in the registration file, and 35 patients who were diagnosed and treated but did not attend the follow-up examination were not included in the study.

Table 1 shows the demographic characteristics of the patients admitted to the Eye Emergency Clinic and the time of presentation. The age distribution shows that the youngest patient was a newborn (Day 1), and the oldest patient was 98 years old. The mean age was 32 years, and the median age was 33 years. In terms of sex distribution, 72.1% of the patients were male, and 27.9% were female. The patients were distributed throughout the year, with the highest number in November (10.5%) and the lowest number in February (6.8%). According to the time of arrival, 50.5% of the applications were made between 08:00 and 17:30, 36.9% between 17:30 and 24:00, and 12.6% between 00:00 and 08:00. (Fig. 1).

Table 2 shows the numbers and rates of various eye emergencies among patients presenting to the Eye Emergency Clinic. The most common emergencies included keratitis and preseptal cellulitis, whereas some

conditions, such as retinal artery occlusions and giant cell arteritis, were rare.

Table 3 presents the number of patients belonging to the relative eye emergency group and their ratio to all patients presenting to the eye emergency clinic. The three most common conditions were corneal foreign bodies, conjunctivitis and corneal disorders.

Table 4 shows the number of patients in the non-emergency ophthalmological conditions group and their proportion of all patients attending the Eye Emergency Clinic. The most common conditions included subconjunctival haemorrhage and dry eye.

The proportion of male patients was significantly ($p < 0.05$) greater in the >30 years group than in the ≤ 30 years group (Table 5).

Analysis of true eye emergencies by age group shows that the rates of retinal artery occlusion, rhegmatogenous retinal detachment, keratitis, glaucoma crisis, endophthalmitis and chemical injury were significantly greater in individuals older than 30 years. However, no significant difference was found between the two age groups in terms of the incidence of open globe injuries or orbital fractures. (Table 6).

Table 2 The number of patients belonging to the True Eye emergencies group and their percentage to all patients examined in the Eye Emergency Clinic. (n=9,982)

		n	%
Top Eye Emergencies		1304	13
Retinal Artery Occlusions	Central Retinal Artery Occlusion	3	0.0%
	Branch Retinal Artery Occlusion	3	0.0%
Rhegmatogenous retinal detachment	Macula-off	77	0.8%
	Macula-on	47	0.5%
Open Globe Injury	Foreign Body +	29	0.3%
	Foreign Body -	41	0.4%
Keratitis		100	1.0%
Giant Cell Arteritis		0	NA
Glaucoma Crisis	Angle Closure	31	0.3%
	Open angle	68	0.7%
	Congenital glaucoma	3	0.0%
Endophthalmitis		17	0.2%
Chemical Injury	Alkali	71	0.7%
	Acidic	84	0.8%
	Glue	32	0.3%
	Other Chemicals	151	1.5%
Cellulitis	Preseptal Cellulitis	241	2.4%
	Orbital Cellulitis	16	0.2%
	Acute Dacryocystitis	34	0.3%
	Other Cellulitis(such as Subcutaneous Cellulitis and Facial Cellulitis).	24	0.2%
Orbital Fractures	With muscle trap	12	0.1%
	Without muscle trap	220	2.2%

Table 7 shows that there are certain differences between eye emergency cases according to age group. Individuals older than 30 years have significantly higher rates of corneal foreign bodies, conjunctivitis and corneal disorders. The rates of retinal vein occlusion and ocular cranial nerve palsies were also significantly higher in the group older than 30 years. However, no significant difference was observed between age groups in terms of uveitis, optic neuropathy or sudden visual loss.

As shown in Table 8, the rates of subconjunctival haemorrhage, cataracts, diabetic retinopathy, vitreous diseases and refractive error were significantly greater in the group aged >30 years than in the group aged ≤30 years.

Visual acuity was significantly ($p < 0.05$) greater in the >30 years age group than in the ≤30 years age group. (Table 9).

The age of the male patients was significantly ($p < 0.05$) greater than that of the female patients (Table 10).

As shown in Table 11, the rates of rhegmatogenous retinal detachment and microbial keratitis were significantly lower in males than in females, whereas the rate of orbital fracture was greater in females.

As shown in Table 12, the rates of corneal foreign bodies and corneal disorders were significantly greater in

Table 3 The number of patients belonging to the relative Eye Emergency group and their percentage to all patients examined in the Eye Emergency Clinic. (n=9,982)

		N	%
Relative Eye Emergencies		6002	60
Corneal Foreign Body		2556	25.6%
Conjunctivitis	Conjunctivitis	1200	12.0%
	Episcleritis (like a conjocitive)	4	0.0%
	Other	23	0.2%
Uveitis	Anterior Uveitis	105	1.1%
	Anterior Uveitis and Posterior uveitis	35	0.4%
	Posterior uveitis and scleritis	3	0.0%
Optic Neuropathy	Ischaemic Optic Neuropathy	16	0.2%
	Optic Neuritis, Papillitis	61	0.6%
	Papilledema	18	0.2%
Retinal Vein Occlusions	Other	6	0.1%
	Central Retinal Vein Occlusion	4	0.0%
	Branch Retinal Vein Occlusion	23	0.2%
Nerve Paralysis	Oculomotor Nerve	12	0.1%
	Trochlear Nerve	2	0.0%
	Abducens Nerve	9	0.1%
	Other	6	0.1%
Corneal Disorders	Corneal Erosion	1650	16.5%
	Corneal Melting	23	0.2%
	Corneal Ulcer	4	0.0%
	Graft Failure and Bullouskeratopathy	6	0.1%
Eyelid injury (in the absence of ocular complications)	Full thickness	64	0.6%
	Partial thickness	143	1.4%
Sudden Vision Loss	Organic (such as retinal detachment or optic neuropathy)	5	0.1%
	AmarosizFugax	8	0.1%
	Unexplained	22	0.2%

male patients than in female patients, whereas the rate of sudden loss of observation was significantly lower in female patients.

As shown in Table 13, the rates of subconjunctival haemorrhage, cataracts, diabetic retinopathy, vitreous diseases and refractive error were significantly lower in male patients than in female patients.

Visual acuity did not differ significantly ($p > 0.05$) between male and female patients (Table 14).

The cause of arrival, management and outcome of cases are detailed below by diagnosis. (Table 15)

Corneal foreign body

Patients complained of foreign bodies in the cornea. All patients were discharged with medical treatment. Good visual outcomes (mean visual acuity: 0.86) were observed.

Conjunctivitis

Patients complained of eye redness and discharge. All patients were discharged with medical treatment. Minimal visual impact (mean visual acuity: 0.64).

Table 4 The number of patients belonging to the nonemergency eye disease group and their percentages compared with those of all patients examined at the Eye Emergency Clinic. (n=9,982)

		n	%
Non-emergency Eye		2760	27
Subconjunctival Haemorrhage		404	4.0%
Cataract	Cataract	7	0.1%
	Congenital Cataract	94	0.9%
Diabetic Retinopathy	Nonproliferative diabetic retinopathy	77	0.8%
	Vitreous Haemorrhage	43	0.4%
	Tractional Retinal Detachment	14	0.1%
Hypertensive Retinopathy	Other	41	0.4%
		0	N/A
Vitreous Diseases	Floater	59	0.6%
	Idiopathic Vitreous Haemorrhage	35	0.4%
	Other	12	0.1%
Others	Dry eye	1015	10.2%
	Pterygium, Pinguecula	3	0.0%
	Sightseeing??	11	0.1%
	Blepharitis, Chalazion	23	0.2%
	Trauma(Normal)	527	5.3%
	Trauma/Hyphema Haemorrhage)	34	0.3%
	Burn	38	0.4%
	Conjunctival injury	14	0.1%
	Senile Macular Degeneration	22	0.2%
	Retinopathy of Prematurity	4	0.0%
	Strabismus	8	0.1%
	Other	162	1.6%
	Refraction Errors	113	1.1%

Uveitis

Patients complained of eye pain and blurred vision. Patients were referred for medical treatment. Moderate visual impairment (mean visual acuity: 0.52).

Subconjunctival haemorrhage

Patients complained of a red spot in the eye. All patients were discharged with medical treatment. Almost normal vision (mean visual acuity: 0.98) was observed.

Optic neuropathy

Patients complained of sudden vision loss. Medical treatment and follow-up were performed. Significant visual impact (mean visual acuity: 0.55).

Retinal artery occlusion

Patients complained of sudden, severe vision loss. Medical treatment, hyperbaric oxygen, and retinal follow-up were performed. Severe visual impairment (range: LP to 0.1).

Retinal vein occlusion

Patients complained of blurred or distorted vision. Medical treatment and retinal follow-up were performed. Variable vision outcomes (range: HM to 0.5).

Retinal detachment

Patients complained of flashes of light and floaters. Vitreoretinal surgery and retinal follow-up was conducted. Vision ranged from LP to 0.7.

Nerve paralysis

Patients complained of double vision and eye movement problems. Follow-up and consultation were given. Moderate visual impairment (mean visual acuity: 0.55).

Keratitis

Patients complained of eye pain, redness, and blurred vision. Medical treatment, hospitalization, and referral to the cornea department were performed. Severe visual impairment (range: HM to 1.0).

Open globe injury

Patients complained of severe eye trauma and vision loss. Hospitalization, emergency surgery, and follow-up were performed. Severe visual impairment (range: LP to 0.3).

Glaucoma crisis

Patients complained of severe eye pain and blurred vision. Medical treatment and referral to the glaucoma department were performed. Variable vision outcomes (range: HM to 0.8).

Endophthalmitis

Patients complained of eye pain, redness, and vision loss. Medical and surgical treatment were performed. Severe visual impairment (range: LP to 0.3).

Chemical injury

Patients complained of eye pain and vision problems following chemical exposure. Mostly medical treatment was performed. Moderate visual impairment (mean visual acuity: 0.46).

Cellulitis

Patients complained of swollen, red, and painful eyelids. Mostly medical treatment was performed. Moderate visual impairment (mean visual acuity: 0.70).

Corneal disorders

Patients complained of eye pain and vision problems. Mostly medical treatment was performed. Moderate visual impairment (mean visual acuity: 0.68).

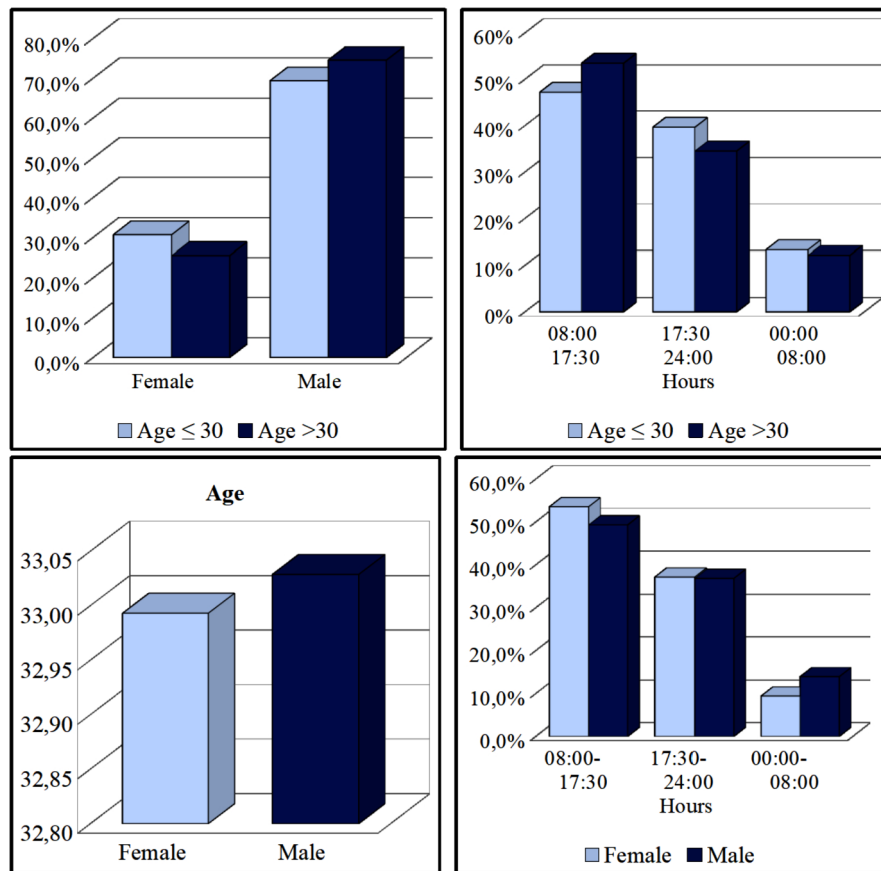


Fig. 1 Bar graphs illustrating the age distribution, sex distribution, arrival month, and arrival time of patients presenting with eye complaints to the emergency department

Table 5 Comparison of patients aged ≤ 30 years and >30 years in terms of sex and time of arrival

		Age ≤ 30		Age >30		p	
		n	%	n	%		
Sex	Female	1440	30.7%	1348	25.5%	0.000	χ ²
	Male	3256	69.3%	3938	74.5%		
Hours	08:00 a.m-17:30 p.m	2214	47.1%	2824	53.4%	0.000	χ ²
	17:30 p.m -24:00 p.m	1860	39.6%	1823	34.5%		
	00:00 a.m -08:00 p.m	622	13.2%	639	12.1%		

^m Mann-whitney u test /^{χ²} Ki-kare test

Cataract

Patients complained of blurred vision. All patients were referred to the cataract department. Moderate visual impairment (mean visual acuity: 0.46).

Diabetic retinopathy

Patients complained of vision changes and floaters. The patient was referred to the retinal department. Variable vision outcomes (range: HM to 1.0).

Orbital fractures

Patients complained of facial trauma and vision problems. Follow-up or consultation. Significant visual impact (mean visual acuity: 0.22).

Eyelid incision (in the absence of ocular complications)

Patients complained of eyelid cuts. This was followed or primarily repaired. Moderate visual impairment (mean visual acuity: 0.57).

Table 6 Comparison of true eye emergencies in the age ≤ 30 years and age >30 years groups

	Age ≤ 30		Age >30		p		
	n	%	n	%			
	???	???	???	???			
Retinal Artery Occlusions							
Central Retinal Artery Occlusion	0	0.00%	3	0.06%	0.021	χ ²	
Branch Retinal Artery Occlusion	0	0.00%	3	0.06%			
Rhegmatogenous retinal detachment	Macula-off	22	0.47%	55	1.04%	0.000	χ ²
	Macula -on	7	0.15%	40	0.76%		
Open Globe Injury	Foreign Body +	12	0.26%	17	0.32%	0.640	χ ²
	Foreign Body -	17	0.36%	24	0.45%		
Keratitis		26	0.55%	74	1.40%	0.000	χ ²
Glaucoma Crisis	Angle Closure	0	0.00%	31	0.59%	0.000	χ ²
	Open angle	13	0.28%	55	1.04%		
	Congenital glaucoma	3	0.06%	0	0.00%		
Endophthalmitis		3	0.06%	14	0.26%	0.015	χ ²
Chemical Injury	Alkali	61	1.30%	10	0.19%	0.001	χ ²
	Acidic	57	1.21%	27	0.51%		
	Glue	11	0.23%	21	0.40%		
	Other Chemicals	60	1.28%	91	1.72%		
Cellulitis	Preseptal Cellulitis	165	3.51%	76	1.44%	0.000	χ ²
	Orbital Cellulitis	8	0.17%	8	0.15%		
	Dacryocystitis	12	0.26%	22	0.42%		
	Other Cellulitis	8	0.17%	16	0.30%		
Orbital Fractures	With muscle trap	7	0.15%	5	0.09%	0.377	χ ²
	Without muscle trap	95	2.02%	125	2.36%		

χ² Ki-kare test**Vitreous diseases**

Patients complained of floaters and vision changes. Follow-up was conducted. Variable vision outcomes (range: LP to 1.0).

Sudden vision loss

Patients complained of sudden vision loss. Consultation and follow-up occurred. Variable vision outcomes (range: 0.3 to 1.0).

Refraction errors

Patients complained of blurred vision. The patient was referred to the eye clinic. Moderate visual impairment (mean visual acuity: 0.43).

Discussion

This study aimed to evaluate the profile of patients attending eye emergency clinics, with an emphasis on differentiating between true ocular emergencies (TEEs) and nonemergency eye conditions (NEEs). Our findings highlight several significant aspects that warrant detailed discussion.

A very small proportion of patients presented to the emergency department with eye complaints, which included central retinal artery and central retinal artery branch occlusions, [11]giant cell arteritis, open globe injuries, [11–13]Cavernous sinus thrombosis, acute

angle-closure glaucoma, 13 endophthalmitis, orbital cellulitis, 13 alkali chemical eye injuries, [11–13]retinal detachment without macular involvement, [11–13]and various types of keratitis, constitute conditions associated with urgent eye conditions [14, 15]. The rates reported in the literature are similar to those reported in this study [2, 3]. In our study, 13% of the cases were classified as true ocular emergencies. In comparison, previous studies reported that approximately 12% and 14% of cases, respectively, were true ocular emergencies. However, patients were not classified according to the order of urgency, as was done in our study. When looking at the subcategories, true ocular emergencies were very rare compared with all ocular emergencies in the study. The rate of true ocular emergencies among all patients examined in the emergency department was 0.2%. To help differentiate nonurgent eye complaints from genuine complaints, it is important to establish robust protocols for triage and coding systems, as well as the implementation of adequate training platforms. These measures can improve patient care by providing health care workers with the knowledge and skills necessary for accurate diagnosis and treatment [6–8].

The annual incidence of retinal detachment is reported to be between 6.3 and 17.9 cases per 100,000 [16]. In this study, this rate was 19 cases per 100,000. Studies have indicated that retinal detachment without macular

Table 7 Comparison of relative eye emergencies in the age ≤ 30 years and age>30 years groups

	Age ≤ 30		Age>30		p		
	n	%	n	%			
Relative Eye Emergencies							
Corneal Foreign Body	1040	22.1%	1516	28.7%	0.000	x ²	
Conjunctivitis	Conjunctivitis	764	16.3%	436	8.2%	0.000	x ²
	Episcleritis	0	0.00%	4	0.08%		
	Other	17	0.36%	6	0.11%		
Uveitis	Anterior Uveitis	32	0.68%	73	1.38%	0.373	x ²
	Anterior Uveitis and Posterior uveitis	27	0.57%	8	0.15%		
	Posterior uveitis and scleritis	3	0.06%	0	0.00%		
Optic Neuropathy	Ischaemic Optic Neuropathy	0	0.00%	16	0.30%	0.366	x ²
	Optic Neuritis, Papillitis	31	0.66%	30	0.57%		
	Papilledema	12	0.26%	6	0.11%		
	Other	0	0.00%	6	0.11%		
Retinal Vein Occlusions							
Central Retinal Vein Occlusion	0	0.00%	4	0.08%	0.000	x ²	
Branch Retinal Vein Occlusion	0	0.00%	23	0.44%			
Nerve Paralysis	Oculomotor Nerve	3	0.06%	9	0.17%	0.001	x ²
	Trochlear Nerve	0	0.00%	2	0.04%		
	Abducens Nerve	0	0.00%	9	0.17%		
Corneal Disorders	Corneal Erosion	907	19.3%	743	14.1%	0.000	x ²
	Corneal Melting	0	0.00%	23	0.44%		
	Corneal Ulcer	0	0.00%	4	0.08%		
	Graft Failure and Bullouskeratopathy	3	0.06%	3	0.06%		
Eyelid Incision	Full	31	0.66%	33	0.62%	0.001	x ²
	Partial	89	1.90%	54	1.02%		
Sudden Vision Loss	Organic	0	0.00%	5	0.09%	0.152	x ²
	AmarosizFugax	5	0.11%	3	0.06%		
	Unexplained	11	0.23%	11	0.21%		

x² Ki-kare test

Table 8 Comparison of nonemergency eye patients between the age ≤ 30 years and age>30 years groups

	Age ≤ 30		Age>30		p		
	n	%	n	%			
Non-emergency Eye							
Subconjunctival Haemorrhage(no sequelae)	167	3.6%	237	4.5%	0.019	x ²	
Cataract	Cataract	7	0.15%	0	0.00%	0.000	x ²
	Congenital Cataract	12	0.26%	82	1.55%		
Diabetic Retinopathy							
Haemorrhage	5	0.11%	72	1.36%	0.000	x ²	
Vitreous Haemorrhage	3	0.06%	40	0.76%			
Tractional Retinal Detachment	0	0.00%	14	0.26%			
Other	0	0.00%	41	0.78%			
Vitreous Diseases	Floater	22	0.47%	37	0.70%	0.000	x ²
	Idiopathic Vitreous Haemorrhage	7	0.15%	28	0.53%		
	Other	0	0.00%	12	0.23%		
Refraction Errors	36	0.77%	77	1.46%	0.001	x ²	

x² Ki-kare test

Table 9 Comparison of visual acuity between the age ≤ 30 years and age> 30 years groups

	Age ≤ 30		Age>30		p	
	Mean.±sd	Median	Mean.±sd	Median		
Visual acuity	0.72 ±	0.28	0.74 ±	0.26	0.000	^m

^m Mann-whitney u test

Table 10 Comparison of age and time of arrival according to sex

	Female		Male		P
	Mean±sd	Median	Mean±sd	Median	
Age	32.99	29.00	33.03	33.00	0.004 ^m
Age	±	±	±	±	0.000 ^{x²}
Age ≤ 30	1440		3256	17.03	
Age > 30	1348		3938	45.3%	
Hours	1492		3546	54.7%	0.000 ^{x²}
08:00-17:30	1035		2648	49.3%	0.770 ^{x²}
17:30-24:00	261		1000	36.8%	0.000 ^{x²}
00:00-08:00				13.9%	

^mMann-whitney u test/^{x²}Ki-kare test

involvement is considered an urgent condition, whereas retinal detachment with macular involvement is relatively urgent [17]. The reason for the slightly higher retinal detachment rate in this study than in other studies may be that the hospital is a tertiary care hospital and allows more trauma patients to be admitted.

Giant cell arteritis can cause optic neuropathy leading to blindness and occurs in approximately 15–25 cases per 100,000 people [18]. No cases of giant cell arteritis were encountered in our study over the course of a year. The disease can sometimes have a subclinical course, leading to either an undiagnosed state or patients not presenting to the emergency department with primary eye complaints.

Central retinal artery and branch occlusions are among the most urgent conditions in ophthalmology practice. The incidence is reported to be 1 in 100,000, and among ophthalmology referrals, it is found to be 1 in 10,000 [19]. In our study, central retinal artery occlusion was diagnosed in 3 patients, and central retinal artery branch occlusion was diagnosed in 3 patients. A higher incidence rate than that reported in the literature was observed; this could be attributed to the development of new diagnostic methods, such as optical coherence tomography angiography (OCTA), fluorescein angiography (FA), and enhanced depth imaging optical coherence tomography (EDI-OCT).

Open globe injury is the most common cause of unilateral visual blindness worldwide; [20] its incidence ranges from 2 to 6 cases per 100,000 annually [21]. In this study, the incidence was 10.7 cases per 100,000. Among patients with ophthalmic complaints, the rate was 0.7%. Owing to its poor prognosis, open globe injury is the most common cause of unilateral visual loss worldwide, as observed in our study.

Microbial keratitis is an urgent condition that results in blindness if not treated early; it has varying frequencies in different regions worldwide, with an incidence ranging from 6.6 to 40.3 cases per 100,000 [14, 22]. In this study, the rate was 15.3 cases per 100,000. As one moves towards rural areas in Turkey, this rate might be even higher. Among true ophthalmic emergencies, acute angle-closure glaucoma is frequently encountered. In Europe, the incidence of acute angle-closure glaucoma ranges from 3.9 to 4.1 cases per 100,000 people. [22, 23] In this study, the incidence was 4.7 cases per 100,000. In addition to acute angle-closure glaucoma, open-angle glaucoma and congenital glaucoma have also presented to our emergency department. Endophthalmitis has varying incidences depending on the causative agent but is a common reason for emergency eye visits [24]. In the literature, the reported incidence of endophthalmitis ranges from 0.1 to 4 cases per 100,000 people [25]. In this study, the incidence was 2.6 cases per 100,000. Chemical

Table 11 Comparison of top eye emergencies according to sex

	Female		Male		p		
	n	%	n	%			
Top Eye Emergencies							
Retinal Artery Occlusions							
Central Retinal Artery Occlusion	1	0.04%	2	0.03%	1.000	χ^2	
Branch Retinal Artery Occlusion	0	0.00%	3	0.04%			
Rheg. Retinal detachment	Macula-off	31	1.11%	46	0.64%	0.002	χ^2
	Macula -on	19	0.68%	28	0.39%		
Open Globe Injury	Foreign Body +	5	0.18%	24	0.33%	0.379	χ^2
	Foreign Body -	13	0.47%	28	0.39%		
Keratitis		40	1.4%	60	0.8%	0.007	χ^2
Glaucoma Crisis	Açık Kapanması	13	0.47%	18	0.25%	0.914	χ^2
	Açık Açılı	12	0.43%	56	0.78%		
	KonjenitalGlokom	3	0.11%	0	0.00%		
Endophthalmitis		9	0.32%	8	0.11%	0.021	χ^2
Chemical Injury	Alkali	29	1.04%	42	0.58%	0.000	χ^2
	Acidic	27	0.97%	57	0.79%		
	Glue	18	0.65%	14	0.19%		
	Other Chemicals	56	2.01%	95	1.32%		
Cellulitis	Preseptal Cellulitis	129	4.63%	112	1.56%	0.000	χ^2
	Orbital Cellulitis	8	0.29%	8	0.11%		
	Dacryocystitis	30	1.08%	4	0.06%		
	Other Cellulitis	12	0.43%	12	0.17%		
Orbital Fractures	With muscle trap	4	0.14%	8	0.11%	0.000	χ^2
	Without muscle trap	32	1.15%	188	2.61%		

 χ^2 Ki-kare test

substance exposure to the eye, especially alkali chemical exposure, is one of the most critical eye emergencies [26]. A total of 10–12% of patients present to the emergency department with eye complaints [27]. In this study, chemical injuries accounted for 3.3% of all injuries. This value was lower than that reported in the literature. The lower incidence in our study could be due to differences in regional industrial exposures or safety practices.

The incidence of orbital cellulitis ranges from 1.6 to 6 per 100,000 in those under 18 years of age and from 0.6 to 2.4 per 100,000 in adults [28, 29]. In this study, the incidence of orbital cellulitis was 2.45 per 100,000, constituting 0.2% of those presenting with eye complaints. Cases of preseptal cellulitis, dacryocystitis, and cellulitis due to other causes were also included in the true eye emergencies category because of the potential progression to orbital cellulitis. Overall, the incidence of eye and periocular cellulitis was 48.3 per 100,000, constituting 3.1% of all eye emergencies.

Orbital wall fractures also require a multidisciplinary approach and referral to the Eye Emergency Clinic. In a study conducted in Korea, the incidence was 46.9 per 100,000, and 26.8% of these patients underwent surgery [30]. In a study conducted in America, the incidence ranged from 7.7 to 11 per 100,000 people [31]. A study with 500 patients reported muscle entrapment in 3 patients [32]. In our study, the incidence of orbital

fractures was 35.5 per 100,000, constituting 2.3% of all ocular emergencies. The percentage of patients with muscle entrapment among all orbital fractures was 5.4%. Overall, the incidence of true eye emergencies in the present study was generally in line with the literature.

A corneal foreign body is one of the most common reasons for seeking emergency care for the eye. It is often seen among industrial workers dealing with materials, construction workers, and motorcycle riders who do not wear protective eyewear. In some studies, it has been identified as the most frequent cause of emergency visits. In a study focusing on patients with ocular trauma presenting to the emergency department, corneal foreign bodies accounted for 58.2%, followed by corneal erosion at 24.9% and blunt eye trauma at 12.6% [33]. In this study, similar to this research, the proportion of patients presenting with ocular trauma among all ophthalmic emergencies was 56.8%. Among patients with ocular trauma, 45.1% had corneal foreign bodies, 29.1% had corneal erosion, and 9.9% had blunt eye trauma, ranking second and third, respectively. In this study, patients with corneal foreign bodies and corneal erosion were classified into the relative emergency group. Some patients present to the emergency department immediately, and some present a few days after the trauma, suggesting the urgency of the situation. In another study, among patients presenting to the emergency department with eye complaints,

Table 12 Comparison of relative eye emergency levels according to sex

		Female		Male		p	
		n	%	n	%		
Relative Eye Emergencies							
Corneal Foreign Body		102	3.7%	2454	34.1%	0.000	X ²
Conjunctivitis	Conjunctivitis	487	17.5%	713	9.9%	0.000	X ²
	Episcleritis	4	0.14%	0	0.00%		
	Other	10	0.36%	13	0.18%		
Uveitis	Anterior Uveitis	40	1.43%	65	0.90%	0.008	X ²
	Anterior Uveitis and Posterior uveitis	11	0.39%	24	0.33%		
	Posterior uveitis and scleritis	3	0.11%	0	0.00%		
Optic Neuropathy	Ischaemic Optic Neuropathy	5	0.18%	11	0.15%	0.000	X ²
	Optic Neuritis, Papillitis	41	1.47%	20	0.28%		
	Papilledema	7	0.25%	11	0.15%		
	Other	0	0.00%	6	0.08%		
Retinal Vein Occlusions							
Central Retinal Vein Occlusion		0	0.00%	4	0.06%	0.000	X ²
Branch Retinal Vein Occlusion		16	0.57%	7	0.10%		
Nerve Paralysis	Oculomotor Nerve	5	0.18%	7	0.10%	0.844	X ²
	Trochlear Nerve	0	0.00%	2	0.03%		
	Abducens Nerve	1	0.04%	8	0.11%		
Corneal Disorders	Corneal Erosion	383	13.7%	1267	17.6%	0.000	X ²
	Corneal Melting	3	0.11%	20	0.28%		
	Corneal Ulcer	1	0.04%	3	0.04%		
	Graft Failure and Bullouskeratopathy	3	0.11%	3	0.04%		
Eyelid injury	Full thickness	16	0.57%	48	0.67%	0.151	X ²
	Partial thickness	30	1.08%	113	1.57%		
Sudden Vision Loss	Organic (such as retinal detachment or optic neuropathy)	1	0.04%	4	0.06%	0.049	X ²
	AmarosizFugax	7	0.25%	1	0.01%		
	Unexplained	7	0.25%	15	0.21%		

X² Ki-kare test

Table 13 Comparison of nonemergency eyes according to sex

		Female		Male		p	
		n	%	n	%		
Non-emergency Eye							
Subconjunctival Haemorrhage		210	7.5%	194	2.7%	0.000	X ²
Cataract	Cataract	7	0.25%	0	0.00%	0.000	X ²
	Congenital Cataract	50	1.79%	44	0.61%		
Diabetic Retinopathy							
Haemorrhage		36	1.29%	41	0.57%	0.001	X ²
Vitreous Haemorrhage		18	0.65%	25	0.35%		
Tractional Retinal Detachment		7	0.25%	7	0.10%		
Other		8	0.29%	33	0.46%		
Vitreous Diseases	Floaters	36	1.29%	23	0.32%	0.000	X ²
	Idiopathic Vitreous Haemorrhage	8	0.29%	27	0.38%		
	Other	8	0.29%	4	0.06%		
Refraction Errors		41	1.47%	72	1.00%	0.047	X ²

X² Ki-kare test

Table 14 Comparison of visual acuity according to sex

	Female		Male		p	
	Mean±sd	Median	Mean±sd	Median		
Visual acuity	0.72 ± 0.29	0.80	0.74 ± 0.26	0.80	0.079	^m

^m Mann-whitney u test

Table 15 Follow-up and prognosis of eye emergencies

Eye Emergencies	Vision	Condition
Corneal Foreign Body	0,86(mean)	All discharged with medical treatment
Conjunctivitis	0,64(mean)	All discharged with medical treatment
Uveitis	0,52(mean)	Referred with medical treatment
Subconjunctival Haemorrhage	0,98(mean)	All discharged with medical treatment
Optic Neuropathy	0,55(mean)	Medical treatment and follow-up
Retinal Artery Occlusions	LP- 0,1(range)	All received medical treatment, hyperbaric oxygen and retinal follow-up
Retinal Vein Occlusions	HM-0,5(range)	All received medical treatment, and retinal follow-up
Retinal detachment	LP- 0,7(range)	Vitreoretinal surgery and retinal follow-up
Nerve Paralysis	0,55(mean)	Follow-up and consultation
Keratitis	HM- 1,0(range)	Medical treatment, hospitalization and referral to the cornea department
Open Globe Injury	LP- 0,3(range)	Hospitalization and emergency surgery, follow-up afterwards
Glaucoma Crisis	HM- 0,8(range)	Medical treatment and referred to the glaucoma department.
Endophthalmitis	LP - 0,3(range)	Medical and Surgical treatment
Chemical Injury	0,46(mean)	Most Medical treatment
Cellulitis	0,70(mean)	Most Medical treatment
Corneal Disorders	0,68(mean)	Most Medical treatment
Cataract	0,46(mean)	All referred to cataract department
Diabetic Retinopathy	HM- 1,0(range)	Referred to Retinal department
Orbital Fractures	0,22(mean)	Followed or consulted.
Eyelid Injury	0,57(mean)	Followed or primary repaired.
Eyelid Injury cision(in the absence of ocular complications)	0,57(mean)	Followed or primary repaired.
Vitreous Diseases	LP -tam(range)	Followed-up
Others	HM- 1,0(range)	Medical treatment or followed-up
Sudden Vision Loss	0,3-1,0(range)	Consultation and follow-up
Refraction Errors	0,43(mean)	Refereed to the eye clinic

HM: hand movements, LP: light perception

The "0" values indicate no light perception, which is the lowest level of visual acuity, whereas "1" represents normal visual acuity

the highest rate was 40.9% for ocular trauma, 29% for ocular infections, and approximately 45% for conditions they did not consider urgent [34]. In this study, ocular infections were identified in 18.4% of patients with ocular complaints, of which 12.2% were cases of conjunctivitis, which aligns with findings from the same cohort.

The primary objective of this study was to assess the prevalence of urgent eye pathologies among patients visiting the general emergency department. Compared with the literature, our cohort's percentage of ocular infections was lower. This prompts an exploration of the potential reasons behind this variation, and raises questions about health care-seeking behaviour, access to services, and possibly differing diagnostic practices between regions or urban versus rural settings. For example, could a higher utilization of general practitioners for minor conditions such as conjunctivitis contribute to this discrepancy?

A study conducted in the UK reported that 37% of patients presenting with eye complaints did not require urgent care [35]. Similarly, another study reported that 50.4% of patients who presented to the emergency department with eye complaints did not have an urgent condition [36]. The findings contribute to this understanding, indicating that 27.3% of patients presenting with eye complaints in the emergency department do not have urgent conditions. Among these patients, the largest subset (10.2%) comprised patients reporting eye irritation and foreign body sensation, often attributed to dry eyes [37].

Analysing the comparatively lower proportion of urgent cases in our cohort can offer valuable insights into service provision and potentially guide improvements. Understanding why cohort figures differ from those in the literature may reveal opportunities for optimizing pathways to care, enhancing service accessibility, and refining diagnostic protocols within the health care system.

The proportion of patients who presented to the emergency department for refractive errors was 1.1%. These groups consisted of individuals who were unable to find an appointment at any clinic for dry eye issues and eyeglass prescriptions. In our study, the proportion of patients who presented with no sequelae or subconjunctival haemorrhage (SCH) was 4%. A similar study with a comparable patient count reported an incidence of SCH of 2.9% [38]. In our study, owing to its predominantly benign course, SCH was included in the nonurgent eye conditions group. However, it should be carefully evaluated, as sometimes it can be a precursor symptom of an underlying condition.

A study in the United States found that emergency physicians often feel uncomfortable examining patients with eye complaints [39]. There is a similar situation in Turkey. Another study showed that there was a high level of agreement when patients whose initial examination in the emergency department was performed by emergency medicine residents trained in ophthalmology triage were re-evaluated by ophthalmologists [40]. This finding indicates that, both globally and in Turkey, when evaluating patients with eye complaints in the emergency

department, doctors, who are the first point of contact with patients, should receive additional training in the field of ophthalmology in addition to basic medical education.

Limitations

In this study, diseases were not categorized via any scoring system. Additionally, detailed distinctions between paediatric and adult conditions were not made. These can be considered limitations of our study.

Conclusion

In conclusion, timely intervention is crucial in preventing visual and functional impairment resulting from top eye emergencies (TEEs). This study found that 13% of eye emergencies were classified as TEEs, 60% as relative eye emergencies (REEs), and 27% as nonemergency eye (NEE) conditions. Although the prevalence of TEEs is not excessively high, a significant proportion of patients presenting to the emergency department with eye concerns are referred for eye consultation by doctors with limited expertise in ophthalmology. This burdens the Eye Clinic, leading to extended waiting times and compromising examination thoroughness. To address this issue, it is imperative to enhance the training of general emergency department staff, particularly in tertiary hospitals, in recognizing and managing eye emergencies. This will streamline patient care pathways, optimize resource allocation, and ensure timely intervention for TEE patients, minimizing adverse outcomes.

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Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Yaşar Dağ, Seyfi Aydın, and Ebrar Kumantas. The first draft of the manuscript was written by Yaşar Dağ and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data availability

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Consent for publication

Not Applicable.

Competing interests

The authors declare no competing interests.

Ethical approval and consent to participate

Ethical approval for this study was obtained from the Basaksehir Cam and Sakura City Hospital Ethics Committee. All participants provided informed consent to participate in the study.

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