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Acil Oftalmolojik Konsültasyonların Aciliyet, Oftalmik Patoloji ve Hafta Sonu Etkisi Açısından İrdelenmesi

Examination of Emergency Ophthalmologic Consultations in Terms of Urgency, Ophthalmic Pathology, and the Weekend Effect

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ÖZ

Amaç: Acil serviste oftalmoloji konsültasyonlarının aciliyetini ve oftalmik patolojinin varlığını değerlendirmek. Bu çalışma aynı zamanda hafta sonu fenomeninin, acil oftalmolojik konsültasyon taleplerini etkileyip etkilemediğini belirlemeyi amaçladı.

Materyal ve Metot: Türkiye'de bir üçüncü basamak hastanenin acil servisini Ocak-Aralık 2019 tarihleri arasında ziyaret eden hastalar için acil hekimi tarafından talep edilen oftalmoloji konsültasyonları geriye dönük olarak incelendi. Konsültasyon talepleri olası acil, acil olması muhtemel olmayan ve belirsiz olarak gruplandırıldı.

Bulgular: Çalışmaya uygun toplam 256 hasta dahil edildi. Acil oftalmolojik konsültasyonların ilk üç nedeni künt travma (%29,7), yabancı cisim (%24,2) ve konjonktivit (%13,3) idi. Konsültasyonların %70,3'ü olası acil, % 18,4'ü acil olması muhtemel olmayan ve %11,3'ü belirsiz olarak kategorize edildi. Olası acil kategorideki konsültasyonların çoğunda oftalmik patoloji vardı (p=0.001).

Sonuç: Travmatik yaralanmalar acil serviste oftalmoloji konsültasyonunun en sık nedenidir. Hastaların yaklaşık beşte biri acil olması muhtemel olmayanlardır. Olası acil kategorideki hastalarda erken oftalmoloji değerlendirmesi gereklidir. Hafta sonu etkisi, oftalmoloji konsültasyonlarını etkilememektedir. Göz acil servislerinin kurulması veya bir göz doktorunun bulunması özel uygulama becerisi gerektiren bu hastaların acil tanı ve tedavisinde büyük öneme sahiptir.

Anahtar Kelimeler: Acil servis, hafta sonu, konsültasyon, oftalmoloji

ABSTRACT

Objective: To evaluate the urgency of ophthalmology consultations in the emergency department (ED) and the presence of ophthalmic pathology. This study also aimed to determine whether the weekend phenomenon affected emergency ophthalmologic consultation requests.

Materials and Methods: Ophthalmology consultations requested by the emergency physician for patients who visited the ED of a tertiary care hospital in Turkey from January to December 2019 were retrospectively investigated. Consultation requests were grouped as possible emergent, unlikely to be emergent, and undetermined.

Results: A total of 256 eligible patients were included. The top three reasons for ophthalmologic consultations were blunt trauma (29.7%), foreign body (24.2%), and conjunctivitis (13.3%). 70.3% of the consultations were categorized as a possible emergent, 18.4% as unlikely to be emergent, and 11.3% undetermined. Most of the possible emergent consultations had ophthalmic pathology (p=0.001).

Conclusion: Traumatic injuries are the most common cause of ophthalmology consultation in the ED. Approximately one-fifth of patients are unlikely to be emergent. Early ophthalmology evaluation is required in possible emergent category patients. The weekend effect does not influence ophthalmology consultations. Establishing eye emergency services or having an available ophthalmologist is crucial in the emergency diagnosis and treatment of patients who require special practice skills.

Keywords: Consultation, emergency department, ophthalmology, weekend

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INTRODUCTION

Many patients present directly to the emergency department (ED) for ophthalmic problems, regardless of whether an ophthalmologist is there or not. Early diagnosis and treatment of ophthalmic emergencies are essential to improve systemic and ocular outcomes among these visits.[1]

Eye-related complaints, which constitute 1-6% of ED visits worldwide, are mainly based on benign and self-limiting inflammatory or infectious processes.[2,3] Some conditions needing an urgent ophthalmic evaluation are foreign body injuries, penetrating, and chemical injuries.[4,5] In these situations that may result in organ dysfunction, emergency ophthalmology consultation is required.[6] An efficient continuation of ophthalmology consultations is necessary to prevent vision loss. An 11-year study examining ophthalmic emergencies reported that there is a need for ophthalmic emergency services.[7]

The "weekend effect" defines the clinical outcomes of patients hospitalized over the weekend are worse than those admitted during the week. This phenomenon has been studied in a variety of clinical conditions.[8-11] To our knowledge, there is no study investigating the impact of the weekend effect on ophthalmology consultations.

This study aimed to investigate the urgency of ophthalmologic consultations, the presence of ophthalmic pathology, and determine whether the weekend effect influenced ophthalmology consultation requests.

MATERIALS AND METHODS

Study Design and Setting: Ophthalmology consultations requested by the emergency physician for patients who visited the academic ED of a tertiary care hospital in Turkey between January 1, 2019- December 31, 2019, were retrospectively investigated. The study was initiated after the approval of the Düzce University Non-Invasive Health Research Ethics Committee (approval no: 2020/34; dated March 16, 2020). Patient data were collected over the hospital's electronic database and emergency service records.

The demographic data of the patients, the time they visited the ED, the response time to consultation, the reason for the consultation, the urgency category, the presence of ophthalmological pathology reported by the ophthalmologist, discharge/hospitalization status, and existing ophthalmological disease history were recorded in the study forms.

Participants and Measurements: All patients who were 18 years of age and above and who were consulted to ophthalmology in the emergency department for any reason were recruited (n=286). Patients who were consulted to ophthalmology but left the ED without a physical examination by an ophthalmologist (n=30) were excluded from the study. A total of 256 eligible patients were included in the study.

The reasons for the ophthalmology consultations requested by the emergency physician were noted. Channa et al.'s[12] study was used in determining the urgency categories of the consultations. Accordingly, the urgency of the consultations was divided into three categories as follows: Possible emergent, unlikely to be emergent (non-emergency), and undetermined. Based on this categorization, corneal abrasion, foreign body, laceration, orbital tissue contusion, eyelid abscess, orbital cellulitis, eyelid or periocular abrasion, penetrating injuries, chemical burns, flame burns, vitreal hemorrhage, homonymous hemianopsia, fractures due to eye trauma, or superficial wounds, were placed in the *possible emergent* category. Conjunctivitis, conjunctival hemorrhage, blepharitis were defined in the sort of *unlikely to be emergent*. *Undetermined:* redness, eye pain, swollen eyes, unspecified visual impairment, diplopia, anisocoria, and uveitis. On the other hand, it was also recorded whether an ophthalmic pathology was detected as a result of the ophthalmologist's evaluation.

Statistical Analysis: Normality assumption for continuous variables was checked with the Shapiro-Wilk test. The Mann-Whitney U test was used to analyze the differences between the two groups. Kruskal Wallis was used in the comparison of three or more groups. The relationship between categorical variables was examined using the Pearson chi-square test and Fisher's exact test. Descriptive statistics of categorical variables were presented as numbers and percentages. Descriptive statistics of numerical variables were presented as mean ± standard deviation for normally distributed variables or median, interquartile range (IQR) for non-normally distributed variables. IBM SPSS Statistics for Windows, Version 23 (IBM Corp, Armonk, NY) program was used for all analyzes. The significance level was accepted as $p<0.05$.

RESULTS

The average age of 256 patients in the study was 44.9±16.9 (min-max:18-87) years and 72.7% (n=186) were male. Consultation was requested mostly due to blunt trauma (n=76, 29.7%), followed

by foreign body (n=62, 24.2%), and conjunctivitis (n=34, 13.3%). All reasons for consultation are presented in Table 1.

While 181 (70.7%) patients were consulted to ophthalmology during the week, 129 (50.4%) patients were consulted during working hours. When ED ophthalmology consultations are categorized; 70.3% (n=180) were evaluated as possible emergent, 18.4% (n=47) as unlikely to be emergent, and 11.3% (n=29) as undetermined. Figure 1 compares ophthalmology consultations according to urgency during the weekday/weekend and working hours/out of hours. It was determined that there was a significant difference in comparing the patients who came on weekdays or weekends according to urgency categories, and the patients in the non-emergency category caused this difference. The frequency of consultations classified as non-emergency at the weekend (n=7, 9.3%) was significantly lower than during the weekday (n=40, 22.1%) (p=0.032). Non-emergency

Table 1. Reasons for emergency ophthalmologic consultation.

Reasons	**n (%)**
Blunt trauma	76 (29.7%)
Foreign body	62 (24.2%)
Conjunctivitis	34 (13.3%)
Burn	21 (8.2%)
Penetrating trauma	14 (5.5%)
Blurred vision	12 (4.7%)
Conjunctival hemorrhage	10 (3.9%)
Eye pain	7 (2.7%)
Periorbital cellulite	5 (2%)
Red-eye	4 (1.6%)
Diplopia	2 (0.8%)
Eye swelling	1 (0.4%)
Homonymous Hemianopsia	1 (0.4%)
Hordeleum	1 (0.4%)
Postoperative Complication	1 (0.4%)
Contact lens keratitis	1 (0.4%)
Blepharitis	1 (0.4%)
Peripheral facial paralysis	1 (0.4%)
Uveitis	1 (0.4%)
Vitreous hemorrhage	1 (0.4%)
Total	**256 (100%)**

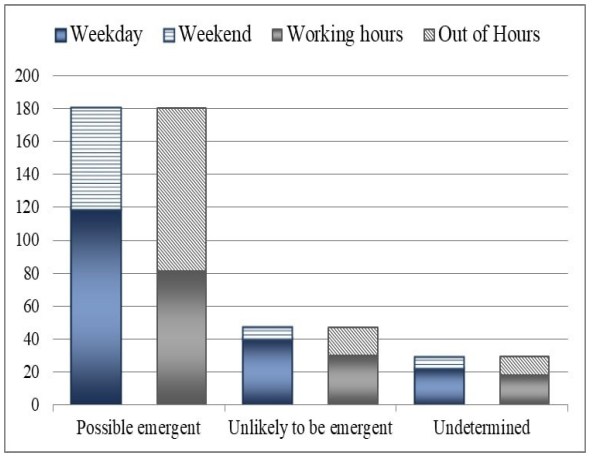

Figure 1. Comparison of ophthalmology consultations according to urgency categories in terms of the weekend

Table 2. Comparison of the presence of ophthalmic pathology in terms of the weekend effect, urgency category, and hospitalization.

		Ophthalmic Pathology, n(%)		
	Total	**No**	**Yes**	**p**
Week				
Weekdays	181 (70.7%)	31 (17.1%)	150 (82.9%)	0.768
Weekend	75 (29.3%)	14 (18.7%)	61 (81.3%)	
Shift				
Working hours	129 (50.4%)	24 (18.6%)	105 (81.4%)	0.664
Out of hours	127 (49.6%)	21 (16.5%)	106 (83.5%)	
Urgency Categories				
Possible emergent	180 (70.3%)	22 (12.2%)	158 (87.8%)	**0.001**
Unlikely to be emergent	47 (18.4%)	12 (25.5%)	35 (74.5%)	
Undetermined	29 (11.3%)	11 (37.9%)	18 (62.1%)	
Final Status				
Discharged	232 (90.6%)	43 (%18.5)	189 (%81.5)	0.270
Hospitalized	24 (9.4%)	2 (%8.3)	22 (%91.7)	
Total	256 (100%)	45 (17.6%)	211 (82.4%)	

consultations were significantly less out of working hours than during working hours (p=0.029).
There were pathological findings in 82.4% (n=211) of emergency department ophthalmology consultations. When examined in terms of pathological findings, a significant difference was found between the urgency categories of the patients (p=0.001). With the follow-up analysis method, fewer pathological findings than expected were found first in patients with undetermined urgency and then in patients categorized as non-emergency (Table 2).

Table 3. Comparison of the weekend effect, urgency categories, and hospitalization in terms of ophthalmic disease history.

		Ophthalmic Disease History, n(%)		
	Total	**No**	**Yes**	**p**
Week				
Weekdays	181 (70.7%)	150 (82.9%)	31 (17.1%)	0.629
Weekend	75 (29.3%)	64 (85.3%)	11 (14.7%)	
Shift				
Working hours	129 (50.4%)	102 (79.1%)	27 (20.9%)	**0.049**
Out of hours	127 (49.6%)	112 (88.2%)	15 (11.8%)	
Urgency Categories				
Possible emergent	180 (70.3%)	165 (91.7%)	15 (8.3%)	**<0.001**
Unlikely to be emergent	47 (18.4%)	34 (72.3%)	13 (27.7%)	
Undetermined	29 (11.3%)	15 (51.7%)	14 (48.3%)	
Final Status				
Discharged	232 (90.6%)	193 (83.2%)	39 (16.8%)	0.775
Hospitalized	24 (9.4%)	21 (87.5%)	3 (12.5%)	
Total	256 (100%)	214 (83.6%)	42 (16.4%)	

16.4% of the patients had an ophthalmic history. Patients with an ophthalmic disease background were significantly less frequent out of working hours (p=0.049). According to the urgency categories of the consultations, a significant difference was found in terms of ophthalmic disease history (p<0.001). With the follow-up analysis method, it was found that the patients in the uncertain first and then the non-emergency category caused a difference, and the patients in these two groups had a significantly higher frequency of ophthalmic disease history than those in the possible emergency category (Table 3).
The median response time to consultation requests was 50 (IQR, 66.75) minutes in the study. While the median response time during working hours was 61 (86.5) minutes, 42 (55) minutes were out of working

Table 4. Comparison of the weekend effect, urgency categories, and hospitalizations in terms of response time to consultation.

		Response Time to Consultation (minute)	
	n	**Median (IQR)**	**p**
Week			
Weekdays	181	50 (66)	0.772
Weekend	75	50 (65)	
Shift			
Working hours	129	61 (86.5)	**0.012**
Out of hours	127	42 (55)	
Urgency categories			
Possible emergent	180	50 (64.75)	0.077
Unlikely to be emergent	47	38 (65)	
Undetermined	29	73 (70)	
Final Status			
Discharged	232	48 (61)	**<0.001**
Hospitalized	24	116.5 (178)	
Total	256	50 (66.75)	

IQR: Interquartile range.

hours. Response time to the consultation was significantly longer during working hours than out of hours (p=0.012). Response time to the consultation was significantly longer in hospitalized patients than in those discharged (p<0.001) (Table 4).

DISCUSSION AND CONCLUSION

In this retrospective study we conducted in an academic ED, we concluded that 70% of ED ophthalmology consultations were in the possible emergency category, only 17.6% of patients had no ophthalmic pathology after ophthalmologist evaluation, and the weekend phenomenon had no effect on the request of the emergency physician for ophthalmology consultation. Also, a significantly higher rate of ophthalmic pathology was found in patients with possible emergent who emergency physicians consulted.

Emergency medicine specialists frequently encounter ophthalmological complaints related to eye and surrounding tissues such as trauma, infection, and postoperative complications. Various important structures such as eyelids, tear drainage systems, muscles, optic nerves, and the globe form orbital soft tissues. Although protected by the bony orbit, these structures are prone to traumatic injuries such as compartment syndrome, laceration, and damage to the lacrimal drainage system. Therefore, a comprehensive examination should be performed by an ophthalmologist in case of any orbital trauma.[13] In the study of Kang et al.,[14] the most common ocular complaints were superficial ocular trauma, conjunctivitis, and burns. In other studies on eye-related disorders in the emergency department, it was reported that both the male gender were more dominant, and the main complaints were trauma and infective conditions.[2,7] The top three reasons for the consultation request were as follows; blunt trauma (29.7%), foreign body (24.2%), and conjunctivitis (13.3%). Increasing the training of the emergency physician in eye-related complaints that require special care and evaluation and gaining skills in this field can prevent many unnecessary consultations.

If we put aside eye-related complaints frequently referred for traumatic reasons, not every eye-related emergency visit is always urgent. Channa et al.[12] reported that nearly half of the patients presented for non-urgent reasons. Kang et al.[14] stated that 1/5 of the patients visited ED for non-urgent reasons. In our study, the vast majority of the patients (70.3%) were consulted in the possible emergency category, while 18.4% of the requests were in the non-emergency class. Although patients are not expected to anticipate their urgency, it is evident that visits increase the ED crowd. ED abuse in non-urgent cases is now an undeniable fact. Using the algorithm for ophthalmologic emergencies can reduce ED visits in half for outpatients.[15] Today, when telemedicine applications are increasing, establishing national communication units where patients can receive pre-hospital support, just like pre-hospital emergency medical services, may reduce such visits, or this problem can be overcome by popularizing eye emergency services.

It was previously reported that 6.64% of the patients who applied to the same ED in a month were consulted, and 3.1% of these were ophthalmology consultations.[16] In our study, a pathology was detected by an ophthalmologist in 82.4% of the patients. In addition, fewer pathologies were observed in patients categorized as non-emergency or undetermined than patients classified as a possible emergent. Kang et al.[14] stated that 74.7% of the patients were consulted in the possible emergency category, and pathology requiring ophthalmological follow-up was observed in half of the consulted patients, and 10.3% of them required emergency intervention and were hospitalized in the ophthalmology ward. Channa et al.[12] reported that 41.2% of the patients were in the possible emergency category. Many patients were evaluated in the possible emergency category during their first examination in the ED. The high rate of pathology observed in these patients due to ophthalmology consultation shows that emergency physicians can adequately eliminate inappropriate consultations on ophthalmology.

It is frequently reported that patients presenting on weekends and out of working hours can progress worse.[8,9,11,17,18] Although it is not fully explained why patients progress worse on weekends, it has been suggested that situations such as the absence of routine procedures, lack of in-hospital organization, and unpredictability of the types of emergency visits may have contributed.[17-19] Channa et al.[12] reported that 1/3 of the patients visited the ED at the weekend. Kang et al.[14] said that patients mostly presented with eye-related complaints in the evening hours, and those with non-emergency complaints were more common after midnight. Our study observed that the patients consulted in the possible emergency category were significantly more on weekdays and working hours. It was concluded that the weekend effect did not affect the request of the emergency physician for ophthalmology consultations. It may be because there is always an available ophthalmolo-

gist in our hospital. We stated a similar result in our previous study, where we investigated the influence of weekend effect on MRI tests ordered by emergency physicians.[20] The availability of the MRI device eliminated the negative impact of the weekend phenomenon. The fact that favorable situations on weekdays can also be reached on weekends may reduce the negative effects of the weekend phenomenon and bury the weekend phenomenon in history.

Prolonged response times to consultation may prolong patients' stay in the ED and indirectly increase mortality and morbidity.[21,22] In a study where there was no difference between response time to ophthalmology consultation and patient urgency, response time to the consultation was found to be 13±19 minutes.[23] When we examined the consultation response times in our study, while the median response time was 61 minutes during working hours, it was 42 minutes out of working hours. In the hospitalized patients, it was determined that the response time to the consultation was later. The length of response times to consultation can be attributed to hierarchical counseling behavior in tertiary hospitals, waiting for the completion of medical consultations other than ophthalmology in the ED for patients who are planned to be hospitalized.

The first limitation of the study was that it was a retrospective and single center. Secondly, patients who visited the ED with eye-related complaints but were not consulted for ophthalmology were excluded from the scope of the study. Finally, patients who left the hospital before the consultation process could not be evaluated.

Emergency ophthalmology consultation is mainly carried out for traumatic injuries. While approximately one-fifth of ophthalmology consultations are not urgent, the vast majority of patients categorized as a possible emergency have ophthalmic pathology. It was concluded that the preliminary evaluation in the ED was influential in determining the ophthalmological severity of the patient. In addition, the weekend phenomenon does not affect emergency ophthalmologic consultation. There is a need to establish eye emergency services or have an ophthalmologist available at any time, and for the emergency physicians need to gain skills in ophthalmology.

Ethics Committee Approval: Our study was approved by the Düzce University Non-Invasive Health Research Ethics Committee (Date: 16.03.2020, decision no: 2020/34).

Conflict of Interest: No conflict of interest was declared by the authors.

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