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Seasonal distribution of ocular conditions treated at the emergency room: a 1-year prospective study

Distribuição sazonal e causas de admissão em pronto atendimento oftalmológico – um estudo prospectivo de 1 ano

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ABSTRACT | Purpose: To determine the clinical characteristics and seasonal distribution of patients admitted to the ocular emergency department of a tertiary ophthalmology care center. **Methods:** The study cohort includes 27,120 patients who were admitted to ocular emergency room between November 2013 and November 2014. The age, sex, reason for admission, diagnosis, and complete ocular examination reports were recorded for each patient. X-ray and ultrasonographic examinations were performed if necessary. **Results:** The mean patient age was 32.83 ± 17.62 years (range, 0-95). The number of males was nearly two times the number of females, with 18,808 (69.4%) males and 8312 (30.6%) females. The diagnoses included viral conjunctivitis (7,859 patients; 29.0%), corneal foreign body (5,286 patients; 19.5%), bacterial conjunctivitis (3,892 patients; 14.4%), corneal abrasions (2,306 patients; 8.5%), and allergic conjunctivitis (1,433 patients; 5.3%) (Table 1). Other frequent diagnoses included subconjunctival hemorrhage, photo keratopathy, chemical eye injury, and penetrating and blunt eye injuries. Allergic conjunctivitis, ocular trauma, and corneal foreign body were more frequent in spring, whereas keratitis and chemical eye injury were more common in winter (chi-square test). The most common reasons for emergency room admission, in order of frequency, were viral conjunctivitis, corneal foreign body, bacterial conjunctivitis, and corneal abrasions. **Conclusion:** This study is the first long-term prospective study to evaluate the seasonal distribution and diagnosis of all adult and pediatric patients admitted to the emergency room for ocular conditions. The frequency of ophthalmological conditions seen in the emergency room may vary according to the season.

Keywords: Conjunctivitis; Eye foreign bodies; Hospital emergency service; Seasons; Eye injuries; Corneal injuries

RESUMO | Objetivo: Determinar as características clínicas e a distribuição sazonal dos pacientes admitidos no departamento de emergências oculares de um centro terciário de cuidados oftalmológicos. **Métodos:** Um total de 27.120 pacientes, admitidos no pronto atendimento ocular entre novembro de 2013 e novembro de 2014, foram incluídos neste estudo prospectivo. Idade, gênero, causa da admissão, diagnóstico e relatórios completos dos exames oculares dos pacientes foram registrados e exames de raios X e de ultrassonografia foram realizados quando necessários. **Resultados:** A idade média do paciente foi de 32,83 ± 17,62 anos (intervalo, 0-95). O número de homens era quase duas vezes maior que o número de mulheres, com 18.808 (69,4%) do sexo masculino e 8.312 (30,6%) do sexo feminino. Os diagnósticos incluíram conjuntivite viral (7.859 pacientes, 29,0%), corpo estranho corneano (5.286 pacientes, 19,5%), conjuntivite bacteriana (3.892 pacientes, 14,4%), abrasões corneanas (2.306 pacientes, 8,5%) e conjuntivite alérgica (1.433 pacientes, 5,3%) (Tabela 1). Outros diagnósticos freqüentes incluíram hemorragia subconjuntival, queratopatia fotográfica, lesões oculares químicas e lesões oculares penetrantes e contundentes. A conjuntivite alérgica, o trauma ocular e o corpo estranho da córnea foram mais frequentes na primavera, enquanto que a queratite e lesões oculares químicas foram mais comuns no inverno (teste qui-quadrado). Os motivos mais comuns para a admissão na sala de emergência, em ordem de frequência, foram conjuntivite viral, corpo estranho da córnea, conjuntivite bacteriana e abrasões da córnea. **Conclusão:** Este é o primeiro estudo prospectivo de longa duração avaliando as causas e a distribuição sazonal de todos os casos de admissão em um pronto atendimento oftalmológico para pacientes em idade adulta ou pediátrica. A frequência das causas de encaminhamento ao pronto atendimento pode variar em função da estação do ano.

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Descritores: Conjuntivite; Corpos estranhos no olho; Serviço hospitalar de emergência; Estações do ano; Traumatismos oculares; Lesões da córnea

INTRODUCTION

Environmental factors affect patients who suffer from dermatological, musculoskeletal, and respiratory disorders. The question thus arises whether the conditions of patients seeking emergency services for ocular issues differ between seasons[1]. Studies report more admissions to general emergency rooms[1] and ocular emergency rooms[2] on hot, dry, sunny days. However, these studies did not evaluate the demographic and clinical characteristics of the patients. The clinical presentations of patients with ocular trauma in emergency rooms are reported in several studies[3-8]. One study from Egypt evaluates all patients hospitalized for an ocular emergency over a 5-year period but does not include the outpatient cases[9]. Several studies report a relationship between the seasons and specific eye diseases, including herpes simplex keratitis, infectious keratitis, and central retinal vein occlusion (CRVO) have been reported[10-12]. However, to the best of our knowledge, no such study includes all of the cases admitted to the ocular emergency room over a 1-year period to evaluate associations between diagnosis and seasonal factors.

This study aims to investigate the relationship between diagnosis and seasons and to determine the clinical presentations of all patients admitted to the ocular emergency room in a specialized tertiary care center in Ankara. One of the strengths of this study is that it includes all of the patients, not only traumatic cases, examined in ocular emergency room.

METHODS

All patients (27,120) admitted to our ocular emergency room between November 2013 and November 2014 were included in this prospective study. Permission to conduct this study was given by the Institutional Ethics Committee of the Ankara Numune Training and Research Hospital, and informed consent was given by all patients or, in the case of pediatric patients, their parents.

The patient demographic data and the admission date were recorded for seasonal analysis. Ocular examinations, including best-corrected visual acuity, anterior and posterior segment examinations, and intraocular pressure (IOP) measurements by pneumotonometer, were performed. X-rays and ultrasound examinations were performed if necessary. The diagnosis (e.g., viral, bacterial, allergic conjunctivitis, corneal foreign body, corneal abrasion, subconjunctival hemorrhage, photo keratopathy, chemical eye injury, and penetrating or blunt eye injury) and treatment performed were evaluated.

The demographic characteristics of the patients and the relationship between the diagnosis and the seasons were investigated by statistical analyses (SPSS version 16). Descriptive statistical results are reported as numbers and percentages. The chi-square test was performed to identify significant associations between the month, season, and frequency of the most common ocular conditions.

RESULTS

The mean age of the 8,312 female (30.6%) and 18,808 male (69.4%) patients was 32.83 ± 17.62 years (range, 0-95). The diagnoses for these patients included viral conjunctivitis (7,859 patients; 29.0%), corneal foreign body (5,286 patients; 19.5%), bacterial conjunctivitis (3,892 patients; 14.4%), corneal abrasions (2,306 patients; 8.5%), and allergic conjunctivitis (1,433 patients; 5.3%) (Table 1). Other frequent diagnoses included subconjunctival hemorrhage, photo keratopathy, chemical eye injury, and penetrating and blunt eye injuries.

Over the year, the greatest number of patients was admitted in the spring (35%), especially in April (13.8%). The quietest season was fall (16.5%), with October having the lowest number of admissions (2.6%). The number of patients admitted to the emergency department by season and month is summarized in table 1. Allergic conjunctivitis (32.6%), corneal foreign body (17.7%),

Table 1. Demographic characteristics and diagnoses of patient cohort

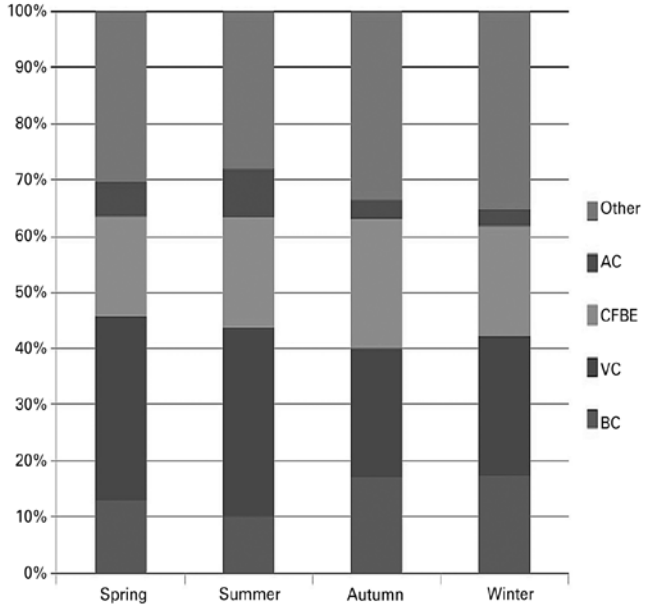
	n (%)
Age (years)	
Mean ± SD (range)	32.83 ± 17.62 (0-95)
Sex	
Female	8,312 (30.6%)
Male	18,808 (69.4%)
Diagnosis	
Viral conjunctivitis	7,859 (29.0%)
Corneal foreign body	5,286 (19.5%)
Bacterial conjunctivitis	3,892 (14.4%)
Corneal abrasions	2,306 (8.5%)
Allergic conjunctivitis	1,433 (5.3%)

and bacterial conjunctivitis (13.0%) were the most common conditions seen in the spring (Figure 1). Keratitis, chemical eye injury, and acute angle-closure glaucoma were more common in winter (chi-square test). Almost half of the cases of acute angle-closure glaucoma (42.7%) were observed in winter, especially in December (18%).

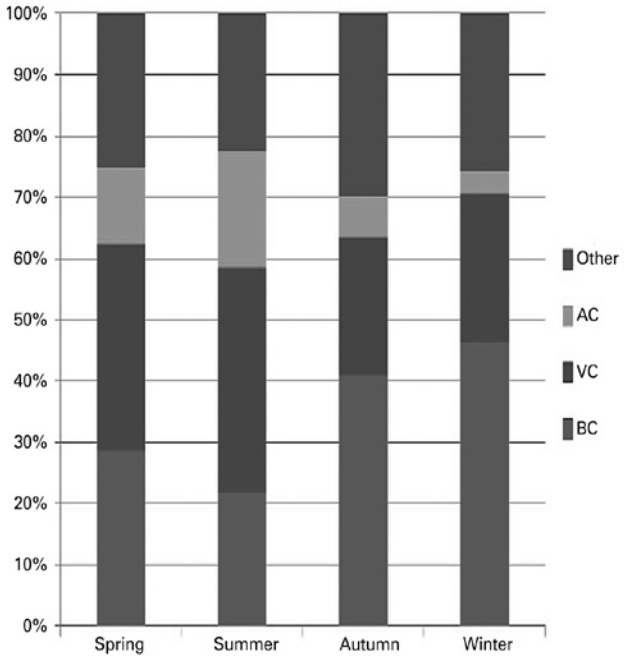
The patient cohort included 5,141 patients ≤16 years of age (girls, 2,413 [46.9%]; boys, 2,728 [53.1%]) Among these children, bacterial conjunctivitis (33.7%), viral conjunctivitis (30.2%), and allergic conjunctivitis (10.7%) were the most frequent diagnoses, with 642 children (12.5%) admitted for ocular injuries. The number of children admitted to the emergency room by season and month is summarized in figure 2 and table 2.

DISCUSSION

Consistent with the literature, we found that the number of males admitted to the emergency room for ocular conditions was nearly two times that of females[3,9]. The rate of admission for ocular conditions was highest in the spring (35%) and lowest in autumn (16.5%). Allergic conjunctivitis, bacterial conjunctivitis, and corneal foreign body cases were found to be more common in the spring. This seasonal peak can be explained by the increase in outdoor activities in the spring. We observed approximately half of the acute glaucoma crisis cases in winter, with the peak in December. This observation can be explained by the dimmer winter light, which may lead to angle closure in response to pupil dilation. Young et al.[2] evaluated pa-



AC= allergic conjunctivitis, CFBE= corneal foreign body excision, VC= viral conjunctivitis, BC= bacterial conjunctivitis.
Figure 1. Seasonal distribution of the most common diagnoses in the total patient cohort.



AC= allergic conjunctivitis, VC= viral conjunctivitis, BC= bacterial conjunctivitis.
Figure 2. Seasonal distribution of the most common pediatric diagnoses.

Table 2. Seasonal admission of pediatric and all patients to the emergency room

Season	Number of children n (%)	Number of patients n (%)
Spring	1856 (36.1)	9486 (35.00)
March	591 (11.5)	3114 (11.50)
April	679 (13.2)	3738 (13.80)
May	586 (11.4)	2634 (9.70)
Summer	1127 (21.9)	5521 (20.40)
June	772 (15.0)	3580 (13.20)
July	191 (3.7)	1048 (3.90)
August	164 (3.2)	893 (3.30)
Fall	765 (14.9)	4472 (16.50)
September	259 (5.0)	1796 (6.60)
October	141 (2.7)	697 (2.60)
November	365 (7.1)	1978 (7.30)
Winter	1393 (27.1)	7641 (28.20)
December	537 (10.4)	2750 (10.10)
January	402 (7.8)	2196 (8.10)
February	454 (8.8)	2696 (9.90)
Total	5141 (100.0)	27120 (100.00)

tients admitted to the emergency department of a tertiary care ophthalmology center over a 3-years period and reported the greatest number of admissions during the summer season and the least in the winter months.

Keratitis, chemical eye injuries, and glaucoma crisis were found to be more common in the winter. Supporting this finding, herpes simplex keratitis has been reported as frequently relapsing during the winter[10]. A recently published study analyzing the seasonal variation of infectious keratitis showed a higher frequency in the summer months. Possible factors leading to this increased presentation in summer include warmer temperatures, higher humidity, and greater ocular exposure to water[11]. Epstein et al. found that CRVO had a significant seasonal pattern, with most cases occurring during the winter and spring[12].

Carvalho et al. evaluated patients admitted to the emergency room over the course of one week[13]. They reported that 55.0% of the patients had an inflammatory ophthalmologic condition such as conjunctivitis, meibomitis, blepharitis, chalazion, or hordeolum all of which can be treated in primary or secondary care units[13]. In our study, approximately 44.4% of patients had conjunctivitis.

Our study also evaluated all diagnoses for pediatric patients admitted to the emergency room. Of the 23,584 patients included in this study, 19% were children, a fraction higher than that of the Nelson study (9%)[3]. This difference might arise from differing definitions of "pediatric," with our study including those ≤16 years of age and Nelson's study including those ≤15 years of age. In our study, the most common pediatric diagnoses were infectious and allergic conjunctivitis. We found that emergency room admissions were highest in spring due to the high frequency of pediatric allergic conjunctivitis. About one-third of our pediatric patients had ocular trauma, occurring two times more frequently in boys than in girls. Due to their more aggressive nature and close contact in games, boys have more injuries than girls. Nelson et al.[3] showed that the most common reasons for pediatric ocular emergency service were sports accidents (especially basketball) and injuries caused by another child (accidents or fights). They also reported that 2% of the ocular injuries occurred by cigarette burns[3]. They reported that the number of children admitted for ocular injuries was highest in May and lowest in December[3].

In conclusion, this study is the first long-term prospective study to evaluate the diagnoses and seasonal distribution of all adult and pediatric patients admitted to the emergency room for ocular conditions. Our study demonstrated the male predominance in admissions. The most common reasons for emergency room admissions were viral conjunctivitis, corneal foreign body, bacterial conjunctivitis, and corneal abrasion. Ocular emergency room admissions were highest in the spring and lowest in the autumn. Allergic conjunctivitis, ocular trauma, and corneal foreign body cases were found to be more common in the spring, whereas keratitis and chemical eye injuries were more common in the winter.

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