

# Epidemiological Study of Common Ocular Disorders in the Islamic Republic of Iran Army Ground Forces and Their Families

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## ABSTRACT

**Aim:** To determine the incidence of ocular diseases in the target community, their prevention and treatment, and the identification of epidemiological information in the patients.

**Methods:** This prospective study was conducted on the Islamic Republic of Iran (I.R.I) Army Ground Forces and their families who referred to the Army Hospital. Patients' information, such as the history of ocular diseases, was collected, the patients were examined for refractive error, and a comprehensive ophthalmic examination was performed. In the end, the results statistically were analyzed.

**Results:** A total of 384 subjects, including 134 females (34.9%) and 250 males (65.1%) from the Islamic Republic of Iran Army Ground Forces and their families, were examined. The mean intraocular pressure of the subjects was 14.53 mmHg. Then, eyelid margin inflammation, conjunctivitis, and dry eye were observed in 203 (52.9%), 97 (25.3%), and 159 (41.4%) subjects.

**Conclusion:** Eyelid margin inflammation and dry eye syndromes are the most common ocular disorders reported in Army Ground Forces and their families.

**Keywords:** Ocular disorders, Myopia, Dry eye, Eyelid margin inflammation.

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## INTRODUCTION

The prevalence of serious ocular diseases such as cataracts, glaucoma, diabetic retinopathy, age-related macular degeneration, and degenerative myopia has increased in recent decades, which has had a significant impact on life and increased economic<sup>1</sup>. In the United States, 3% of all visits to the emergency department were due to eye injuries<sup>2</sup>. Age, gender, economic status, and lifestyle are among the major risk factors for eye injuries<sup>1</sup>. Since eye care is a significant part of the medical services provided in military medical centers, understanding the prevalence and distribution of refractive errors in the target population is very important for resource planning<sup>3,4,5</sup>.

Ocular disorders account for a wide range of approximately 5 to 83% of cases in the military population<sup>7</sup>. The military forces play an important role in the combat capabilities of any country<sup>6</sup>, and it is essential to examine and screen the military for ocular diseases for preventive measures<sup>7</sup>. Visual impairments and refractive errors are among the main factors in the unpreparedness of the reserve forces in the military<sup>9</sup>. In developed countries, to prevent the secondary costs of regular ophthalmic examinations in flight readiness review (FRR), the prevalence of ocular diseases and refractive errors are also investigated<sup>10</sup>. Investigating the condition of meibomian glands in retired military personnel showed that while 9.28% of them had normal meibomian glands, 1.71% had meibomian gland dysfunction<sup>11</sup>. Analysis shows that 44% of army personnel have never had a comprehensive ophthalmic examination<sup>12</sup>.

Improper training and poor equipment design have been the main causes of eye injuries in the military. Intentional laser eye injury is a growing concern. In 1992, a study was conducted in the U.S. Air Force Hospital on army staff, retired personnel, and their families. The results showed that most patients needed glasses for myopia. By the age of 30, the myopia would increase; however, by 60,

the hyperopia would increase<sup>4</sup>. Eye injuries are also very common in the Chinese military, and trauma accounted for 51.13% of ocular diseases in the army staff<sup>5</sup>.

In Poland, high refractive errors along with chronic and recurrent diseases of the posterior part of the eye are the important causes of medical referral in the military forces<sup>3</sup>. In Nigeria, the incidence of ocular refractive errors is significantly high and the prevalence of ocular disorders among military personnel is relatively high<sup>14</sup>. There are few epidemiological studies that describing the broad spectrum and prevalence of eye injuries in an adult population. Most epidemiological studies are based on specific types of injuries, exposure, or limited adjustment<sup>15</sup>. In developed countries, eye protection in the workplace has reduced work-related eye injuries. Eye trauma is one of the most important reasons for the prevention of monocular and bilateral loss. Appropriate eye protection reduces the burden of eye trauma<sup>16</sup>. Investigation of risk factors, awareness, and timely prevention can prevent the spread of many ocular diseases, thus reducing treatment costs<sup>8</sup>. According to previous studies, comprehensive information on the prevalence of ocular diseases is necessary to better prevent eye injuries. In this regard, the present study aimed to determine the incidence of ocular diseases in the target community, their prevention and treatment, and the identification of epidemiological information in the patients.

## MATERIALS AND METHODS

**Sampling method:** This descriptive-cross-sectional and prospective study was conducted on the I.R.I Army Ground Forces, retired personnel, and their families. The study population was randomly selected from a number of people referred to Imam Reza (AS) Army Hospital, especially army personnel and their families. All subjects were recruited based on the inclusion and exclusion criteria.

**Inclusion and exclusion criteria:** Army Ground Forces, retired personnel, and their families volunteer to participate in the study were recruited. The exclusion criteria were

unwillingness to participate, congenital or acquired blindness, and chronic and severe illness.

**Procedure:** Upon entering the study, the demographic information of the patients was recorded and then they were examined for refractive error, and comprehensive ophthalmic examination were performed. Intraocular pressure was measured using Goldmann tonometer (on slit lamp). Also, to evaluate the meibomian glands function, the secretion of 5 the glands in the upper and lower eyelids and the quality of the produced fat were measured. Finally, the amount of tear meniscus was evaluated by measuring the tear height after 5 minutes of the instillation of fluorescein drop. During the eye refractive error examination, both eyes were examined separately. The best-corrected visual acuity method was used to evaluate patients' visual acuity.

**Demographic information:** Demographic information of patients such as age, gender, occupation, and family relationship was recorded in a special questionnaire. The data were initially acquired using interviews on the history of eye and systemic diseases or eye symptoms.

**Statistical analysis:** Quantitative data were presented as mean, standard deviation, and percentage. Student t-test and Chi square test were used to compare quantitative and qualitative data, respectively. Data were analyzed by SPSS 25 software ( $P < 0.05$ ).

**Ethical considerations:** A written consent obtained from the patients, and they were assured that their information would be treated as strictly confidential. Also, none of the patients were deprived of routine treatment and based on the principles of follow-up, no additional costs were imposed on patients.

## RESULTS

A total of 384 subjects, including 134 females (34.9%) and 250 males (65.1%) from the Islamic Republic of Iran Army Ground Forces and their families, were examined. The mean age of the patients was  $47.96 \pm 19.40$ , (range 9-82 years). The ophthalmological examination showed that 228 patients (59.4%) had a history of eye diseases.

The most common ocular diseases were dry eye, cataract, pterygium, diabetic retinopathy and age-related macular degeneration (AMD), presbyopia, glaucoma, and diplopia which reported in 91 patients (23.7%), 44 patients (11.5%), 41 patients (10.7%), 16 patients (7%), 14 patients (3.6%), 5 patients (1.3%), and in 1 patient (0.3%), respectively. Also, 72 patients (18.7%) had a history of eye surgery, among which 68 (17.7%) underwent LASIK or similar surgeries because of refractive eye errors, and 4 patients (1%) received surgical treatment due to cataracts.

In the examination of refractive error in the right eye, 177 patients (46%) (with the mean  $-1.23 \pm 1.02$  D), 157

patients (40.8%) (with the mean of  $+0.82 \pm 0.72$  D), and 50 patients (13.2%) had myopia, hyperopia, and no visual impairment, respectively. Also, in the left eye, 199 patients (51.8%) (with the mean  $-1.09 \pm 1.83$  D), 138 patients (35.4%) (with the mean of  $+0.85 \pm 0.76$  D), and 49 patients (12.7%) had myopia, hyperopia, and no visual impairment, respectively.

The examination of astigmatism due to corneal surface roughness in the right eye showed that 207 patients (53.9%), 2 patients (0.6%), and 172 patients (44.7%) had positive cylinder power, negative cylinder power, and no visual impairment, respectively. Also, in the left eye, 207 patients (53.9%), 5 patients (0.6%), and 172 patients (44.7%) had positive cylinder power, negative cylinder power, and no visual impairment, respectively.

In the examination of intraocular pressure, the lowest and highest pressure were reported to be 11 and 19 mmHg, respectively, both of which were within the normal range of intraocular pressure, so none of the subjects had an increased intraocular pressure. The mean intraocular pressure of the subjects was  $14.53 \pm 1.88$  mmHg.

Eyelid margin inflammation was observed in 203 patients (52.9%) and 97 patients (25.3) had conjunctivitis (Figure 1). The prevalence of eyelid margin inflammation was significantly associated with the patients' occupational. And Army Ground Forces and retired personnel were significantly more likely than others to suffer from eyelid margin inflammation ( $P < 0.0001$ ). Also, in the examination of conjunctivitis and occupation, there was a significant relationship between the two variables, and the prevalence of this complication in the conscripts was significantly higher than other participants ( $P < 0.028$ ). Dry eye was also reported in 159 patients (41.4%) and there was a significant relationship between the dry eye and occupation. The prevalence of this complication in retired personnel was significantly higher than the other participants (Table 5) ( $P < 0.0001$ ).

In the examination of meibomian glands, all 8 glands were observed in 264 patients (68.8%). The results showed that 193 patients (50.3%) and 71 patients (18.5%), who were the retired personnel, had dark and turbid secretion, respectively. Also, 62 patients (16.1%), 49 patients (12.8%), and 27 patients (7%) of army staff, army medical staff, and conscripts had clear and colorless secretion (Figure 1).

Table 1. Demographic information and history of eye diseases

Gender	Percentage
Male	34.9%
Female	65.1%
History of eye diseases	59.4%

Table 2. The prevalence of ocular disorders and the percentage of surgery among the patients

History of eye diseases							
Dry eye	Cataracts	Pterygium	Diabetic retinopathy	AMD	Presbyopia	Glaucoma	diplopia
23.7%	11.5%	10.7%	7%	7%	3.6%	1.3%	0.3%
Surgery percentage							
Cataracts			18.7%		refractive error		
1%			17.7%				

Table 3: Refractory errors

Refractory errors	Right eye		Left eye	
	Percentage	Mean	Percentage	Mean
Myopia	177 (46%)	1.02±1.23	199 (51.8%)	0.83±1.09
Hyperopia	157 (40.8%)	0.72±0.82	136 (35.4%)	0.76±0.85
No visual impairment	50 (13.2%)		49 (12.7%)	

Table 4: Types of astigmatism

Types of astigmatism	Right eye		Left eye	
	Positive cylinder power	Negative cylinder power	Positive cylinder power	Negative cylinder power
Visual impairment	207 (53.9%)	2 (0.6%)	207 (53.9%)	5 (1.3%)
No visual impairment	172 (44.7%)		172 (44.7%)	

Figure 1. a) The prevalence of eyelid margin inflammation; b) The prevalence of conjunctivitis; c) Prevalence of dry eye syndrome among the participants based on their occupation; d) Meibomian gland scores of participants based on their occupation.

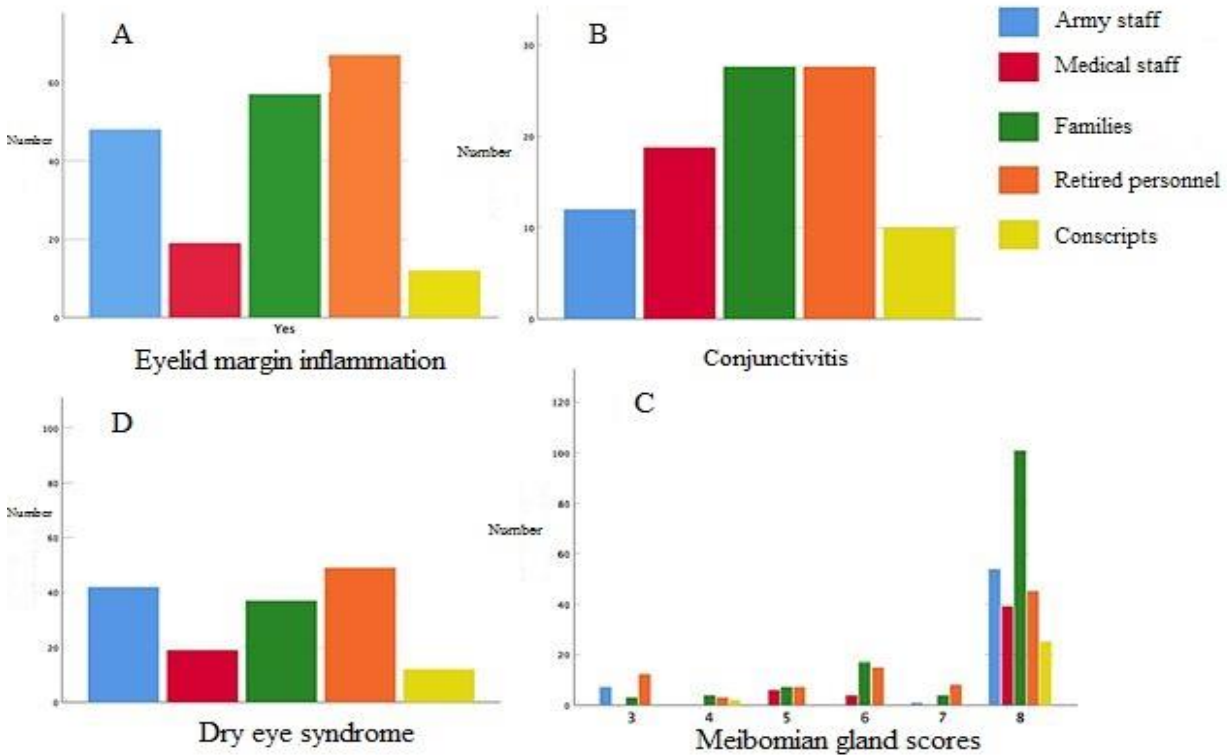


Table 5. Clinical results of the patients based on their occupation.

		Army staff	Medical staff	Families	Retired personnel	Conscripts	Pv
Eyelid margin inflammation	Yes	48(77.4%)	19(38.8%)	57(41.9%)	67(77.9%)	12(44.4%)	<0.0001
	No	14(22.6%)	30(61.2%)	79(58.1%)	19(22.1%)	15(66.6%)	
Conjunctivitis	Yes	12(19.4%)	19(38.8%)	28(20.6%)	28(32.6%)	10(37%)	0.028
	No	50(80.6%)	30(61.2%)	108(79.4%)	58(67.4%)	17(63%)	
Dry eye	Yes	42(77.8%)	19(38.8%)	37(28.5%)	49(58.3%)	12(44.4%)	<0.0001
	No	12(22.2%)	30(61.2%)	93(71.5%)	35(41.7%)	15(66.6%)	

**DISCUSSION**

Yearly, approximately 34 million patients are hospitalized due to eye injuries worldwide, and many suffer from ocular disorders. Paying special attention to the prevalence of these disorders is effective in reducing treatment costs and increasing patients' quality of life [17, 16]. The prevalence

of ocular disorders has been investigated in many studies and dry eye syndrome and cataracts have been reported in a large number of patients [23-26]. The study found that more than 59% of the patients had a history of eye disorders, the most common of which dry eye syndrome and cataracts. However, the results of examinations showed that the eyelid margin inflammation was the most

common complication and disorder among the studied samples, followed by dry eye and conjunctivitis. In another similar study, the incidence of refractive errors was one of the patients' problems in the Army [14].

The present study found that dry eye syndrome in the retired personnel was significantly higher than the other groups, which can be attributed to their age. In a similar 11-years study in Iran, the prevalence of 7.1% of eye injuries in the study population has caused early disability [6].

Studies in the United States estimated the prevalence of ocular disorders between 1 and 2.4 million cases per year, with 75% visual impairment. Trauma is one of the leading causes of unilateral blindness in the United States and ranks second to cataracts in terms of prevalence. Most eye injuries occur at the home and workplace, and young men are the most common victims. Fortunately, most injuries are minor (e.g. corneal abrasions) and probably do not lead to permanent visual impairment [19]. Unlike in the United States, the prevalence of ocular injuries in India is reported to be 1 in 25 people, and at least 1 in 167 people is estimated to be blind in one eye. Most ocular injuries leading to blindness occur in childhood and during play. The targeting of mothers and children of the lower socioeconomic strata in ocular health awareness strategies seems necessary to reduce the trauma-related blindness in India [20].

The prevalence of ocular injuries in soldiers during the war and peace is very high. Most injuries occur in the workplace, which, given the government's commitment to fully cover the treatment costs, ocular injuries are among the most costly injuries to military insurance companies. However, various studies have shown that if appropriate preventive measures are taken, the incidence of eye diseases and related complications will be reduced [3, 4, 17, 6]. Eye trauma is one of the most important causes of ocular injuries, which its global classification and protocol are changing and completing. 15-20% of ocular injuries in war are bilateral eye injuries [21].

Ocular injuries are common in war with a prevalence of approximately 10%, most of which with high side effects. The majority of war injuries are a combination of primary and secondary blasting mechanisms, although third and fourth types are also common. There is also evidence of the effects of toxic elements from the explosion. Thermal eye burns are also relatively common in war [22]. The results of two studies in the United States showed a high prevalence of ocular injuries in the military population. These studies have also clearly shown that since visual impairments and refractive eye errors are among the main factors influencing the unpreparedness of the reserve forces in the military, timely and regular examinations in conscripts are essential. In their study, they stated that the investigation of the prevalence of eye diseases and refractive errors in the US military community was essential to prevent secondary costs<sup>10,9</sup>

In our study, the prevalence of conjunctivitis in conscripts was significantly high, which can be attributed to environmental pollution and dust. A similar study conducted in Nigeria Army in 2015 found that the incidence of refractive errors was significantly higher in the military than in the population. This study clearly showed that the prevalence of ocular injuries in the military increased due to

environmental hazards, the working conditions, and the need to have ready personnel<sup>14</sup>.

Given that the majority of the study population included retired personnel and their families, the high prevalence of eyelid margin inflammation and dry eye in the present study can be attributed to old age in participants. In many studies, the role of aging as a contributing factor to dry eye has been confirmed<sup>27-29</sup>. It is recommended that the difference in the prevalence of eye diseases in the various occupations of the military be examined and compared with the population. It is hoped that such researches could take an important step towards the health of community, especially the military, and increase health awareness about eye diseases in the army staff.

## CONCLUSION

The results showed that eyelid margin inflammation and dry eye syndromes are the most common ocular disorders reported in Army Ground Forces and their families. Also, the prevalence had a significant relationship with age. It is recommended that the patients be regularly screened to prevent the complications and progression of the disease by early diagnosis and treatment. Also, the study population in future studies should be wider than before, so that obtain stronger and more reliable results.

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