

The Demographic and Social Characteristics of Patients with Ocular Foreign Bodies in a Greek Tertiary Hospital

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Purpose: To present the demographic and social characteristics of patients with ocular foreign bodies (OFB), who visit the Ophthalmological Outpatient Department of a tertiary hospital in Athens, Greece.

Patients and Methods: During the period January-March 2019, 5181 patients presented to the Ophthalmological Outpatient Department of our hospital, and 543 of them were diagnosed with an ocular foreign body. Moreover, 106 of them were interviewed about their demographic and social factors, regarding among others data about their occupation, level of education, nationality, family, and insurance status.

Results: The patients with ocular foreign bodies were significantly younger compared to the rest of the examined patients (49.5±13.9 vs 56.3±17 years, $p<0.001$). Moreover, the ocular foreign bodies were more frequent in men compared to women (15.5% vs 5.0%, $p<0.001$) and in non-Greek patients (23.7% vs 9.2%, $p<0.001$). Regarding the social characteristics of the patients with ocular foreign bodies, we found that the majority of them were married, employed, insured, while their educational status was middle and high school. Furthermore, the vast majority of the patients practiced manual professions (73.1% of them).

Conclusion: We documented that the introduction of an ocular foreign body is frequently encountered in the Outpatient Department of our tertiary hospital in Athens, Greece. We also demonstrated that these patients are younger, while they are more frequently men, of non-Greek origin, with an educational status of middle and high school, and their occupation is associated with manual labour.

Keywords: ocular foreign body, ocular trauma, demographic characteristics, social characteristics

Introduction

Ocular trauma is a major preventable cause of visual morbidity and unilateral vision loss worldwide,^{1,2} having frequently a significant socioeconomic burden for the patients and their families.³ Ocular foreign bodies (OFBs) represent a significant proportion of the ophthalmic injuries, while according to their location inside or outside the eye ball, they are classified as intraocular (IOFB) and extraocular (EOFB) foreign bodies, respectively.⁴

Multiple previous reports have thoroughly studied the frequency of ocular injuries and OFBs in several countries, with varying results. This heterogeneity could be possibly attributed either to different research methodologies or to unlike characteristics of the studied population. It has been suggested that 55 million ocular injuries occur every year worldwide resulting in 16 million cases of bilateral blindness and 19 million cases of unilateral blindness.^{5,6}

It has been also calculated that the annual rates of ocular injuries range from 490 to 975 per 100,000 persons.^{7,8} The yearly incidence of the cases that require hospital admission is 8–57 cases per 100,000,^{9–15} and it has been estimated to be as high as 12.6 in Singapore, 8.1 in Scotland, 8.3 in Tanzania, and 23.9 in Croatia.¹⁶

Several factors define the visual prognosis in cases of OFBs. First of all, IOFBs are associated with significantly worse outcome compared to EOFBs. Moreover, major determinants of the visual function are the location of injury, the OFB type and size, and finally the possible subsequent complications, such as endophthalmitis, traumatic cataract, corneal scarring, bulbi chalcosis, and siderosis.¹⁷

As for the risk factors for OFBs, population-based studies have identified male gender, younger age, type of work, place of residence, and ethnicity as the more prominent. More specifically, manual labour (especially metal tasks) accompanied by lack of ocular protection is the main risk factor for the occurrence of OFBs. Furthermore, the residents in rural regions are at higher risk for OFBs compared to people that live in urban areas. Concerning the socioeconomic status, the findings of prior studies were ambiguous.¹⁸

Regarding the epidemiology of OFBs in Greece, little information is available in the literature.¹ With this study we aimed to present both the demographic and social characteristics of the patients with OFBs who visited our hospital in Athens, and to the best of our knowledge this is the first in literature to elaborate these factors in Greece.

Patients and Methods

Our study was conducted at the 1st Department of Ophthalmology, Medical School of Athens, General Hospital of Athens “G. Gennimatas”, which is a tertiary referral hospital. It is located in the northern suburbs of Athens, admitting emergency cases every day from Athens and the surrounding areas, with a population of about 4,000,000 inhabitants. The study was performed according to the Helsinki Declaration and was approved by the ethical committee of our hospital.

The data for our study were extracted from the Emergency Ophthalmological Department of our hospital, during the period January – March 2019. All the people that visited it were recorded (N=5181) and their clinical characteristics were evaluated. For our study, we selected the patients that were diagnosed with an OFB (N=543), either EOFB or IOFB. Moreover, 106 of them gave written informed consent and agreed to get interviewed about their demographic factors. More specifically, data about their occupation, level of education, nationality, family status, and insurance were assessed among others.

Statistical Analysis

All variables were tested for normal distribution of the data. Normally distributed quantitative variables were expressed as mean values \pm standard deviation (SD), while qualitative variables were expressed as absolute and relative frequencies. Independent samples Student's t-tests were used for the comparison of mean values of normally distributed and continuous variables between two groups. For the comparison of proportions chi-square tests were used. All reported p values are two-tailed. Statistical significance was indicated by p values <0.05 . All statistical calculations and analyses were conducted using SPSS statistical software (version 22.0).

Results

Sample consisted of 5181 recorded cases (2701 men and 2480 women) with a mean age of 55.6 ± 16.8 years. The proportion of cases with OFB was 10.5% (95% CI: 9.6–11.3%). In [Table 1](#) the participants' characteristics are presented both in total and according to the presence of OFB. OFBs were more frequent in men compared to women (15.5% vs 5.0%, $p < 0.001$) [Odds: 3.06, 95% CI (2.41, 3.89), $p < 0.001$] and in those that had nationality other than Greek (23.7% vs 9.2%, $p < 0.001$) [Odds: 3.49, 95% CI (2.83, 4.80), $p < 0.001$]. Also, cases with OFB were significantly younger than the rest of the examined patients in our Department (49.5 ± 13.9 vs 56.3 ± 17 years, $p < 0.001$). It should be underlined that 4.5% of the studied patients in our department needed hospitalization, whilst all the patients with an IOFB were hospitalized (4.5% vs 100%, $p < 0.001$).

In [Table 2](#) are presented the clinical and demographic characteristics of the patients with OFB that were interviewed. Their mean age was 45.3 ± 12.7 years old, while most of them were men (97.2%). Furthermore, majority of them were married (74.5%), lived in Athens/Attica (97.2%), were employed (82.9%), and had insurance (90.3%). Concerning their educational status, it was mainly middle and high school (51.9% and 14.2%, respectively). The most common reason for choosing the hospital was randomly, due to being on call (55.6%) and the second one was its good reputation (33.0%). For 37.7% of the patients it was their first visit at the hospital.

Table 1 Sample Characteristics in Total and According to the Presence of Foreign Body

| | Foreign Body in the Eye | | | P |
|----------------|-------------------------|--------------------|--------------------|----------|
| | Total Sample N=5181 | No (N=4638; 89.5%) | Yes (N=543; 10.5%) | |
| | N (%) | N (%) | N (%) | |
| Gender | | | | |
| Men | 2701 (52.1) | 2282 (84.5) | 419 (15.5) | <0.001+ |
| Women | 2480 (47.9) | 2356 (95.0) | 124 (5.0) | |
| Nationality | | | | |
| Other | 451 (8.7) | 344 (76.3) | 107 (23.7) | <0.001+ |
| Greek | 4730 (91.3) | 4294 (90.8) | 436 (9.2) | |
| Age, mean (SD) | 55.6 (16.8) | 56.3 (17.0) | 49.5 (13.9) | <0.001++ |

Notes: +Pearson's chi-square test; ++Student's t-test; Total sample: The total number of patients that referred to our department.

Table 2 Sample Characteristics in the Patients with Ocular Foreign Body (N=106)

| | N (%) |
|--|-------------|
| Gender | |
| Men | 103 (97.2) |
| Women | 3 (2.8) |
| Nationality | |
| Other | 32 (30.2) |
| Greek | 74 (69.8) |
| Years in Greece ^a , mean (SD) | 22.4 (5.8) |
| Age, mean (SD) | 45.3 (12.7) |
| Family status | |
| Unmarried | 25 (23.6) |
| Married | 79 (74.5) |
| Divorced | 2 (1.9) |
| Place of residence | |
| Athens/ Attica | 103 (97.2) |
| Out of Attica/ Abroad | 3 (2.8) |
| Employed | 87 (82.9) |
| Insurance | 93 (90.3) |
| Educational status | |
| Primary school | 16 (15.1) |
| Middle school | 55 (51.9) |
| High school | 15 (14.2) |
| Technical high school | 5 (4.7) |
| Technical university | 10 (9.4) |
| University | 2 (1.9) |
| MSc | 3 (2.8) |
| Reason for visit | |
| Ocular foreign body | 106 (100) |
| Reason for choosing the hospital | |
| Re-examination | 8 (7.5) |
| Hospital's good reputation | 35 (33.0) |
| Hospital close to residence | 4 (3.8) |
| Randomly, due to being on call | 59 (55.6) |
| First time visit | 40 (37.7) |

Note: ^aonly for participants with nationality other than Greek.

Table 3 Occupation

| Occupation | N | % |
|--------------------------------|----|------|
| Manual occupations | 77 | 73.1 |
| Various non-manual professions | 16 | 14.8 |
| Public officials | 4 | 3.7 |
| Retirees | 8 | 7.5 |
| Students | 1 | 0.9 |

Further analysis of the data, demonstrated that the vast majority of the interviewed patients with OFBs (77 persons - 73.1% of the total sample) practiced manual professions (such as, electrician, welder, fireplace – oven cleaner, aluminum – iron constructor, wood constructor, vehicle mechanic, metal manufacturer, builder, air conditioner technician, elevator technician, plumber, refrigerant). In **Table 3** the data concerning the patients' occupation are presented in detail. Furthermore, the vast majority of OFBs were metallic (90%), while the rest of them were plastic (4%), wood (4%), and thorns (2%).

As mentioned earlier, the majority of the interviewees (90,3%) had an insurance and all of them were insured with the Electronic National Social Insurance Institution, the main social insurance institution in Greece. Regarding our sample, most of the patients (68 persons – 66.8% of the total sample) were at the time of the interview active or former (retired) private employees, 21 persons (19,8%) were self-employed, and 4 of them (3,7%) worked at the public sector.

Discussion

OFBs consist a severe ophthalmological emergency, which can cause visual morbidity and blindness across the world.⁵ Not only does mechanical damage occur to ocular tissues, but also persistent chemical damage, infection, or even perforation may develop, because of the injury. Moreover, even EOFBs that cause only superficial corneal injuries and can be removed safely from the eye with the appropriate caution and current techniques,^{19–21} may result in vision-threatening complications, while they also have a remarkable economic burden for both the patients, since they frequently need to stay away from their work, and the healthcare systems.²² Therefore, the visual function is negatively affected in many ways.^{5,6}

According to the American Academy of Ophthalmologists (AAO), three of the main risk factors for OFBs consist of metal-on-metal tasks, male gender, and lack of ocular protection.⁶ It has been also postulated that the alteration in many factors, such as decrease in manual labour, rise of awareness, and improvements at the offered health services and safety, have led to a decrease in the incidence of OFBs in the developed countries.²³

In our study, 10.5% of the almost 5200 registered cases of our department in a three-month period had a foreign body in the eye. The majority of the patients with OFBs were men (77%) with a mean age of 49.5 years. The predominance of male patients is consistent with the demographic characteristics of similar cases reported in previous studies,^{5,24,25} simulating also the universal finding of reported male:female ocular injuries ratio of 7.8:1.²⁵ However, the mean age of men with OFBs in Greece presented slightly higher in comparison with data from other countries. The mean age in Bangladesh was 35 years,²⁶ in the United Kingdom (UK) 39 years,²³ in Ireland 37.4 years,²⁷ while in Korea it was 46.7 years.²⁸ In our study, the predominance of middle aged men could be partially attributed to the ageing of the regional population.²⁹ Moreover, a plausible explanation for the dominance of men is that they more frequently spend time outdoors, either for work or for other activities, such as sports; thus they are at higher risk of an ocular injury.²⁴

The vast majority of OFBs injuries (73.1%) occurred to persons with manual occupations, a finding which is in accordance with previous studies, which also have identified hammering as the most common cause worldwide.^{5,24,27–29} The great incidence of OFB injury cases raises questions about the implementation of precautionary measures in industry jobs and in cases of machine-tools use. In the UK, employees in factories are reminded to wear eye protection through warning notices placed at work and most of the tools, especially hammers, have warning labels.²³ The use of protective eyewear with side guards could offer a more effective protection against every possible trajectory of foreign bodies towards the eye.²³ However, data from many countries indicate limited use of Personal Protection Equipment (PPE), (ie

safety goggles, face protection), ranging from 0.77 to 6%.^{5,30} In Greece, the use of PPE in working environment is non-obligatory, as there is only an EU Commission directive (2019/1832) and not yet a law.³¹ Also the elevated number of OFB injuries indicates that the use of PPE in industrial working places is far from ideal. The aforementioned statements highlight the need for new policies that would make compulsory the use of PPE and other instruments that protect the eyes and the face.

Regarding the socioeconomic status of the patients with OFBs, it was demonstrated that more than two thirds (67%) of them had less than a high school education, highlighting the elevated frequency of injuries among a deprived population. Higher education often leads to a non-manual labour and consequently to a significantly reduced risk of a possible OFB injury. In agreement with our findings were the results of a previous study which was conducted in south India by Nirmalan et al, suggesting that the cumulative incidence for OFBs was significantly lower in people of higher education.³²

We also demonstrated that people of non-Greek origin had almost 3.5 times elevated risk for suffering from a trauma with OFB compared to people with Greek nationality. The last two decades, significant numbers of immigrants have arrived in Greece and they are mainly employed in manual labour. It could be suggested that our finding is possibly reproducible in all the western societies and further research will confirm or reject this hypothesis, underlying the need for specific safety precautions in this special population.

Last but not least, 90.3% of patients, who visited the Outpatient Clinic of our hospital during the study, were insured. The majority of the interviewed sample came from the greater area of Athens/Attica. The aforementioned data establish the direct access of patients in healthcare services and feature our institution, as one of the most important treatment providers for ocular injuries in the capital of Greece, Athens.

Despite the interesting findings of our study, some inherent limitations are also present. The relatively small sample size of the interviewed patients and the fact that the data were derived from a single tertiary hospital in Athens, which is an urban region, limit the generalizability of our findings. Furthermore, another limitation is the lack of information concerning the circumstances under which the ocular trauma occurred (work, sports, or any other activity).

Conclusion

In conclusion, this study has provided a detailed insight, into epidemiology and demographic characteristics of patients with OFBs in Athens. According to our findings, the introduction of an OFB is a common situation that the ophthalmologists of the General Hospital of Athens “G. Gennimatas” encounter daily, while most of the time it occurs in men in their productive age. The majority of them had a job, insurance, and a family. Furthermore, we documented that lower educational status and nationality other than Greek were more prevalent in the patients with OFBs. To the best of our knowledge, this study is the first that examines the socioeconomic characteristics of these patients in our country. It also indicates the necessity for more drastic measures against the limited use of PPE and underlines the need of strategies for prevention programs and measures to enhance occupational safety.

Disclosure

The authors report no conflicts of interest in this work.

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