

Is Childhood Ocular Trauma More Often in Families with Low Socio-economic Level?

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Authors' contributions

This work was carried out in collaboration between all authors. Authors AK and AG designed the study, wrote the protocol, and wrote the first draft of the manuscript. Authors AK and IU managed the literature searches, analyses of the study performed the spectroscopy analysis and author CC managed the experimental process and author HIY identified the species of plant. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To examine whether socioeconomic status as determined by the number of siblings, educational level, and monthly household income is associated with childhood eye injuries.

Materials and Methods: Eighty six patients with ocular trauma and 86 subjects without trauma (control group) were enrolled. A questionnaire was completed by the parents. Age, sex, type of trauma, educational status of the mother and father, the number of siblings, working status of the mother, the number of the individuals in the residence, and the monthly household income were recorded.

Results: The average age of the patients was 7.52±3.24 (range 1-13) years in the ocular trauma group and 7.59±2.47 (range 3-12) years in the control group. Ocular trauma was caused by the

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children themselves in 68.6% and by another person in 31.4%. The educational status of the mothers/fathers was similar in both groups. The average number of siblings was higher in the ocular trauma group (2.24 ± 1.09) than the control group (1.90 ± 1.02). The average monthly income per capita was lower in the ocular trauma group (113.5 ± 47 US\$) than the control group (148.1 ± 77 US\$). The monthly income per capita was lower than 100 US\$ in 47.7% and 25.6% of the ocular trauma and control group subjects, respectively.

Conclusion: We found that the families of children with ocular trauma were slightly larger and had lower income than the families of the control group subjects.

Keywords: Children; eye injury; education; monthly income per capita; socioeconomic status.

1. INTRODUCTION

Ocular trauma in childhood is a common and important public health problem worldwide, leading to many complications and even the loss of vision [1-3]. It has been estimated to cause approximately four million cases of bilateral blindness or low vision and 19 million cases of unilateral blindness or low vision per year [4-5]. Children in families with low socio-economic status mostly lack financial, social, and educational support and are more prone to ocular trauma [6].

Ocular trauma can occur in many different settings due to various causes. The type of injury varies from closed globe (contusion or lamellar laceration) to open globe injuries including penetration and even perforation of the globe [7-9]. Many eye injuries can be prevented with increased awareness and subsequent elimination of the common risk factors [10].

There is little epidemiological data on childhood ocular trauma in developing countries and only a few studies on the connection between eye injuries and the socioeconomic status of children [6,11]. We therefore planned this study to analyze this issue. Our aim was to evaluate whether socioeconomic status including the educational level of parents, number of siblings, and monthly household income of the patient's family was associated with childhood eye injuries.

2. MATERIALS AND METHODS

The study was performed prospectively in the northeastern part of Turkey. Written informed consent was obtained from the parents of the subjects and the study was conducted in accordance with the tenets of the Declaration of Helsinki.

All patients were under 14 years of age. The study group was composed of 86 consecutive

children who had suffered ocular trauma while 86 healthy children without a history of eye trauma participated as controls. The 86 patients with trauma had suffered open and closed globe injuries at school, in the playground or at home. Causative agents, place of injury, visual acuity and ocular examination findings were recorded. Furthermore, parents/patients were asked whether ocular trauma was caused by the children themselves or another person. A surgical approach under general anesthesia was used for open globe injuries and in some closed globe injuries that needed surgery such as canalicular repair, conjunctival tear repair and anterior chamber irrigation.

The control group consisted of 86 children who had presented for an eye examination, mostly for refractive problems or allergic eye conditions.

A questionnaire was completed by parents. Age, sex, type of trauma, educational status of the mother and the father, number of siblings, working status of the mother, the number of individuals in the residence and the household income were recorded.

The educational level was categorized as follows: illiterate, graduated from primary school, graduated from secondary school and graduated from high school.

Household income was based on monthly income per capita.

Data analysis was with the *t*-test for continuous variables and the chi-square test for categorical variables. Statistical significance was accepted as $P < 0.05$.

3. RESULTS

The ratio of boys to girls was 56/30 (65%/35%) in the ocular trauma group and 40/46 (46.5%/53.5%) in the control group. The average

age was 7.52±3.24 years (range 1-13) years in the ocular trauma group and 7.59±2.47 (range 3-12) years in the control group. The average ages in the study and control groups were similar.

In the ocular trauma group, visual acuity ranged from light perception to 10/10 and could be assessed in 63 (73%) patients. All eye injuries were monocular. Ocular trauma was caused by the children themselves in 68.6% and by another person in 31.4%. Eye injuries were of the closed type in 70 (81.4%) and the open type in 16 (18.6%) patients. The most common causative agents were stones (24.4%), knives (19.8%), plastic materials (18.6%) and wooden pieces (15.1%) (Table 1).

Table 1. Percentages of the causative agents according to frequency in trauma group

Percentages of the agents n (%)	
Stone	21 (24.4)
Metals	17 (19.8)
Plastic materials	16 (18.6)
Wooden materials	13 (15.1)
Glass	8 (9.3)
Hand or finger	5 (5.8)
Explosives	4 (4.7)
Glue	1 (1.2)
Soil	1 (1.2)

The most common findings were periocular ecchymosis/edema (20.9%), corneal epithelial defect (17.4%), subconjunctival hemorrhage (15.1%), hyphema (12.8%) and corneal-scleral lacerations (8.1%) (Table 2).

Table 2. Ocular findings in trauma

Findings	n (%)
Periocular ecchymosis/edema	18 (20.9)
Corneal epithelial defect	15 (17.4)
Subconjunctival hemorrhage	13 (15.1)
Hyphema	11 (12.8)
Corneal-scleral lacerations	7 (8.1)
Corneal laceration	6 (6.9)
Conjunctival laceration	6 (6.9)
Scleral laceration	3 (3.5)
Eyelid laceration	4 (4.7)
Hyphema+subconjunctival hemorrhage	3 (3.5)

The place of injury was playground areas (46.5%), houses (44.2%), and schools (9.3%).

No significant difference was seen between open and closed type injuries in terms of the age of

patients (p=0.06), the age of mothers (p=0.75), the number of siblings (p=0.19), number of the individuals in the residence (p=0.08) and household income (p=0.69) in the ocular trauma group.

The educational status of the mothers in the ocular trauma group was distributed as follows: illiterate 19.8% (n: 17), graduated from primary school 57% (n: 49), graduated from secondary school 17.4% (n: 15), and graduated from high school 5.8% (n: 5). The distribution for the mothers in the control group was as follows: illiterate 17.4% (n: 15), graduated from primary school 50% (n: 43), graduated from secondary school 24.4% (n: 21) and graduated from high school 8.1% (n:7).

The educational status of the fathers in the ocular trauma group was as follows: illiterate 2.3% (n: 2), graduated from primary school 54.7% (n: 47), graduated from secondary school 30.2% (n: 26) and graduated from high school 12.8% (n: 11). The distribution for the fathers in the control group was as follows: illiterate 0% (n: 0), graduated from primary school 59.3% (n: 51), graduated from secondary school 17.4% (n: 15) and graduated from high school 23.3% (n: 20) (Fig. 1).

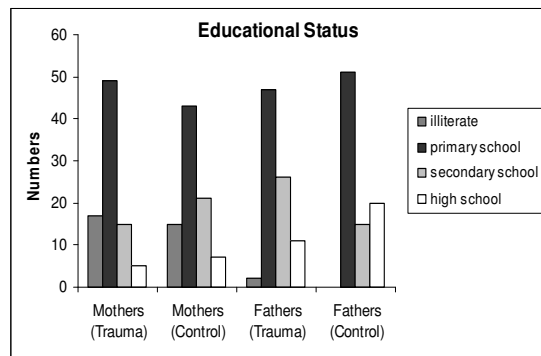


Fig. 1. Educational status of the parents of both groups

The relationship between the educational status of mothers/fathers and ocular trauma was not statistically significant (mothers p=0.25, fathers p=0.59).

The rate of working mothers was 10.5% in the ocular trauma group and 8.1% in the control group. There was no significant relationship between the working status of mothers and ocular trauma.

The average number of siblings was 2.24 ± 1.09 (range 0-5) in the ocular trauma group and 1.90 ± 1.02 (range 0-5) in the control group with a statistically significant difference between the groups ($P=0.033$).

The average number of individuals staying in the residence was 5.20 ± 1.10 (range 3-8) in the ocular trauma group and 4.71 ± 0.96 (range 3-7) in the control group, again with significant difference between the groups ($P=0.002$).

The average monthly income per capita was 113.5 ± 47 US\$ (range 40-390) in the ocular trauma group and 148.1 ± 77 US\$ (range 33-414) in the control group. The difference between the groups was found to be significant ($P=0.008$). The monthly income per capita was lower than 100 US\$ in 47.7% and 25.6% of the subjects in the ocular trauma and control groups, respectively (Fig. 2).

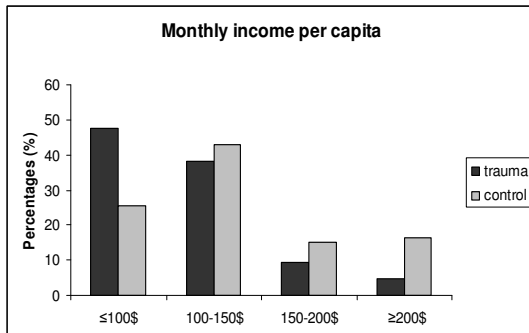


Fig. 2. Monthly income per capita in both groups

4. DISCUSSION

There are few reports on the association between eye injuries and socioeconomic status [6,12]. Epidemiological data on ocular trauma in the childhood period is especially scarce in developing countries [4]. Most published studies regarding childhood eye injuries are based on data related to the etiology and type of trauma. Although there are some studies on the socioeconomic status of the families, there is a paucity of data, particularly from comparative studies. We focused on data related to the income and educational level of the parents, and the number of siblings in this study to evaluate socioeconomic status in childhood ocular trauma.

Careless use of common household and classroom items may often result in childhood

eye injuries. Many of these objects are thrown by another child during unsupervised play. Cariello et al. [13] and Türkcü et al. [14] reported that the main cause was trauma due to external agents such as a stone or a piece of iron or wood, generally thrown by another child. Accidents with household items and leisure objects were also frequent. Nelson et al. [15] reported that the items commonly associated with eye injuries were scissors, forks, jewelry, screwdrivers, clothes hangers, rope, pencils, and rubber bands. Perforating metals, stone and organic agents are major causative agents in rural areas. These items are commonly used as toys by children.

We similarly found the main cause of ocular trauma to be another child as seen in 58.1% and the most common causative agents to be stones (24.4%), knives (19.8%), plastic materials (18.6%), and wooden items (15.1%). In our study, ocular trauma most frequently occurred on playgrounds (46.5%), followed by at home (44.2%), and at school (9.3%). Cariello et al. [13] reported that the most frequent site was at home (53.1), followed by leisure areas (27.1%), schools (12.1%), and while traveling by road (2.2%). Some other studies report the home as the most frequent site [12,16-18], while others report this as the playgrounds [19-22]. Mac Ewen et al. [16] reported that the most common location for an injury was the home as it was almost the exclusive place for preschool children's injuries and also a very common site in schoolchildren, which reflects both the amount of time that all children spend at home and also the surrounding risks. Many of these risks remain unrecognized as most of the younger children were injured by toys or domestic utensils that are found in any home. In another study, the most frequent site was reported to be playgrounds (53.5%) followed by home injuries (25.5%) [6]. This difference may result from playgrounds being preferred for children to play in rural areas. Unsuitable and unsafe playgrounds lead to high rates of play or playmate-related injuries.

Keklikci et al. [6] reported that pediatric ocular trauma was more common in families where the parents' educational level was low. They found that two third of the mothers and one third of the fathers in their study were illiterate. One of the goals of our study was to compare the educational status of parents in the ocular trauma and control groups and we did not find any difference between the groups (mothers $p=0.25$, fathers $p=0.59$). The educational level of

the mothers and fathers was primary school or illiterate in both group, at rates of about 70% and 60%, respectively. The low educational level of the general population in eastern Turkey may explain these results.

Working mothers have decreased capacity to protect their children. The rate of working mothers was similar in the two groups (10.5% vs 8.1%) with no significant difference ($p=0.60$).

The monthly income per capita in the southeastern part of Turkey is 83 US\$ in 80% of families [6]. The average monthly income per capita in our study was 113.5±47 US\$ (range 40-390) in the ocular trauma group and 148.1±77 US\$ (range 33-414) in the control group with a statistically significant difference between the groups ($P<0.05$). The monthly income was <100 US\$ in 41 families in the ocular trauma group and 19 families in the control group.

One of the most important findings of this study involved the number of siblings. The average number of siblings was 2.24±1.09 (range 0-5) in the ocular trauma group and 1.90±1.02 (range 0-5) in the control group. The statistically significant difference showed that the families of the children subjected to an ocular trauma were slightly larger than the families of the control group ($p=0.03$). Parents may not have the energy, time, or knowledge to protect their children in larger families. A greater number of siblings may reduce the interest of parents in each particular child [6]. There was also a significantly larger number of individuals residing in the homes of the ocular trauma group. The amount of care, attention and control devoted to children are decreased in crowded or larger families. Less attention from the parents may lead to an increased risk of childhood ocular trauma. It has been reported that a high rate of ocular trauma might be seen in families with low socioeconomic status [12,23]. We believe that the divided attention and interest in larger families predispose children to eye injuries. Crowdedness and a larger number of siblings decreases the care giver's ability to pay attention and to protect their children, which may predispose such children to eye injuries.

One of the possible disadvantages of our study was a possible statistical problem concerned with the number of siblings and income per capita. Both parameters were dependent statistically on each other regarding the number of accidents.

5. CONCLUSION

Eye injuries in childhood may be associated with low socioeconomic status. The most effective treatment of trauma is prevention. Many childhood injuries can be prevented by a high level of interest in the subject and good supervision from the parents. It is necessary to identify high-risk situations, increase parental awareness by education, improve the socioeconomic level and create safe playground areas to avoid eye injuries in children.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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