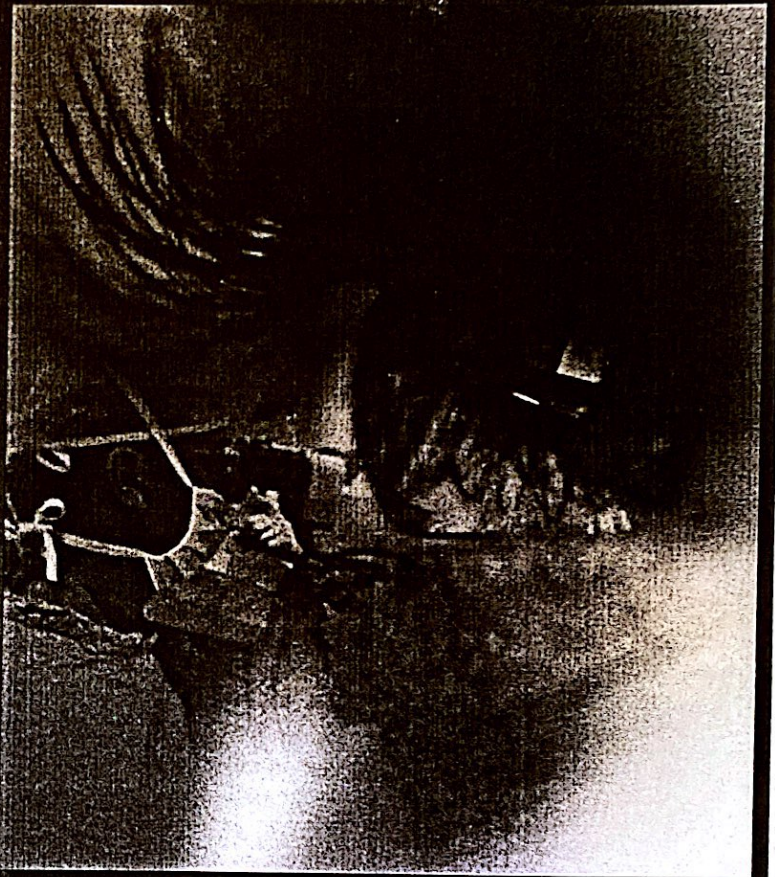




# БЪЛГАРСКИ ОФТАЛМОЛОГИЧЕН ПРЕГЛЕД

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ПРОМЕНА В МЕДИЦИНАТА  
И ТЕХНОЛОГИИТЕ  
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ИЗДАНИЕ НА БЪЛГАРСКОТО ДРУЖЕСТВО ПО ОФТАЛМОЛОГИЯ  
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## ЕПИДЕМИОЛОГИЯ НА МЕХАНИЧНАТА ОЧНА ТРАВМА В ДЕТСКА ВЪЗРАСТ

Е. Гьошевска-Даштевска<sup>1</sup>, Р. Исяновска<sup>2</sup>, В. Челева-Марковска<sup>1</sup>, Г. Иванова<sup>1</sup>, И. Исмаили<sup>1</sup>

<sup>1</sup>Клиника за очни болести, Медицински факултет, Скопие, Република Македония

<sup>2</sup>Институт по епидемиология, Медицински факултет, Скопие, Република Македония

### Epidemiology of children mechanical ocular trauma

E. Gjosevska-Dashtevska<sup>1</sup>, R. Isjanovska<sup>2</sup>, V. Celeva-Markovska<sup>1</sup>, G. Ivanova<sup>1</sup>, I. Ismaili<sup>1</sup>

<sup>1</sup>Eye Clinic, Skopje, Faculty of Medicine, Ss. Cyril and Methodius University, Skopje, R. Macedonia

<sup>2</sup>Epidemiology Institute, Faculty of Medicine, Ss. Cyril and Methodius University, Skopje, R. Macedonia

#### Резюме

**Въведение:** Механичната очна травма е съществен проблем, който води до влошаване на зрението и слепота при децата.

**Целта** на това проучване е анализ на отделните епидемични характеристики на механичните очни травми в детската възраст.

**Материали и методи:** Направено е ретроспективно проучване на 65 пациента на възраст до 15 години, настанени в периода от януари 2010 г. до декември 2012 г. в клиниката по очни болести в Скопие, заради механична очна травма. Анализирани са възрастта, пола, вида на нараняването, мястото и начина на нараняване, общият брой на болничните дни, оценка на зрителната острота при хоспитализация и изписването.

**Резултати:** От общия брой анализирани пациенти 81,5% са от мъжки пол. Процентната разлика, която се регистрира по отношение на застъпеността на пола е статистически значима за  $p=0.0000$ .

Най-голям процент от 10,8 % представлява възрастта от 10 год., но не е статистически значима за  $p>0.05$ .

При 50,8% от децата са регистрирани закрити травми на очите, а при 49,2% открити травми на очите. Процентната разлика, която се регистрира е статистически незначима. Средно децата с механична очна травма са били хоспитализирани от  $5,0 \pm 2,7$  дни, минимум 1 един ден, а максимум 14 дни.

В най-голям процент при 55,4% (36) от децата механичната очна травма е възникнала в домашни условия, като при 13% от случаите - по време на детска игра. Процентната разлика на травми в домашни условия в сравнение с останалите условия е статистически значима за  $p=0,0000$ .

**Заключение:** Механичните очни травми в детска възраст са често срещани при деца от мъжки пол, по-често се случват в домашни условия и най-често това са затворени очни наранявания.

На голяма част от причините, които предизвикват механичните очни травми, може да бъде направена превенция. Ето защо е необходимо подходящ надзор от възрастни, законодателни мерки, образование и на родителите и на децата за потенциалните рискове от възникване на очна травма, както в домашни условия, така и по време на дейности извън дома, както и за усложненията и последствията от травмата.

**Ключови думи:** епидемиология, механична очна травма, детска възраст

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#### For correspondence:

Emilija Gosevska Dastevska MD  
Eye Clinic, Faculty of Medicine, Cyril and Methodius University,  
Vodnjanska 17,  
1000 Skopje, Republic of Macedonia  
tel: +38978350140  
E-mail: egosevska@yahoo.co.uk



### Abstract

**Introduction:** Mechanical ocular trauma is a very important problem which causes reduction of visual acuity and blindness in pediatric population.

**Aim:** The aim of this study is to analyse some epidemiologic characteristics of mechanical ocular traumas in children.

**Material and methods:** A retrospective study of 65 children, aged up to 15 years, hospitalized at the Eye Clinic in Skopje, due to mechanical ocular trauma, within the period January 2010 to December 2012. The following parameters were analysed: age, gender, type of injury, place and way of injuring, total hospital days, evaluation of visual acuity at admission and discharge.

**Results:** Of the total analysed patients, 81.5% were males, and 18.55% females. Percentage difference which was registered relating the gender distribution has been statistically significant for  $p=0.0000$ .

The age of 10 years was represented in greatest percentage in 10.8%, but was not statistically significant for  $p>0.05$ .

Closed globe injuries were recorded in 50.8% of the children, while in 49.2% there were open injuries. Registered proportional difference has been statistically non-significant.

In average, the children with mechanical globe trauma were hospitalized  $5.0 \pm 2.7$  days, minimum one, and maximum 14 days.

In greatest percent, in 36 (55.4%) of children, the mechanical injury occurred in domestic conditions, in 13 of them, during the children's game. Proportional difference of the injuries in domestic conditions versus other modalities has been statistically significant for  $p=0.0000$ .

**Conclusion:** Mechanical globe traumas in children were more frequently present in male gender, most frequently occurred in domestic conditions, and more frequently in closed globe injuries.

The greatest part of the causes making mechanical ocular traumas could be prevented. So, adequate supervision by the adults, legal acts, parents' and children's education for potential risks for the occurrence of ocular trauma in domestic conditions and during outside activities, as well as for the complications and consequences of the trauma are needed.

**Key words:** epidemiology, mechanical ocular trauma, children

### Introduction

Mechanical ocular trauma is the largest cause for reduction of visual acuity and monocular blindness worldwide (1).

A half million people worldwide are blind due to ocular trauma, and almost 2.5 million new cases occurred in USA every year (2).

A USA study showed unusual ocular trauma incidence in childhood, at the age of 15.2/100 000 (3).

Various studies made in more countries worldwide showed variations ranging between 2% and 14% in disturbing of visual acuity or

blindness caused by ocular trauma in childhood (4-8).

Children very often are exposed to ocular trauma due to impaired reasoning and carelessness when playing, especially when they are not under parental supervision.

Ocular injuries present an important problem in further life of the injured children, in sense of the long-term treatment, rehabilitation, disability, and great socio-economic expenses (9).

Regardless the cause of occurrence an ocular trauma, the treatment does not differ in adults and in children, except when amblyopia occurs, which could appear in every child being injured



at the age younger than 6 and 7. (9, 10).

Almost 90% of the globe injuries could be prevented by relatively simple measures (2).

The most effective measures to prevent complications and vision loss could be determined by establishing the most frequent causes for occurrence of ocular injuries in children.

#### Aim

The aim of this study is to analyse some epidemiologic characteristics of mechanical ocular traumas in children.

#### Material and Methods

A retrospective study of 65 children, aged up to 15 years, hospitalized at the Eye Clinic in Skopje, due to mechanical ocular trauma, within the period from January 2010 to December 2012. Patients' data were taken from hospital histories or were obtained by hetero-anamnesis from their parents. The following parameters were analysed: age, gender, type of injury, place and way of injuring, total hospital days, evaluation of visual acuity at admission and discharge.

All patients underwent a detailed ophthalmologic examination which included determination of visual acuity in children who cooperated, measure on IOP with Schiottz tonometer in those children who cooperated or its digital evaluation, bio-microscopy and direct ophthalmoscopy.

Definition and classification of the ocular trauma in our study was in line to Ocular Trauma Classification Group and Birmingham Eye Trauma Terminology guidelines (11-13).

Types of open globe injuries are classified as: ruptures, penetrant injuries, intraocular foreign bodies or perforant injuries.

Types of closed globe injuries are classified as: superficial foreign bodies, injuries of the front segment (limited to conjunctiva, sclera, cornea, anterior chamber and lens) or posterior segment injuries (all internal structures behind the posterior capsule of the lens).

All patients having open globe injuries were subjected to x-ray exam of the orbits in different directions, and magnetic resonance imaging (MRI) of the orbits if there was a suspicious existence for intraocular foreign bodies. MRI of the orbits was not performed when there was a suspicious presence of intraocular foreign body of metal character.

Attributive statistic series were analysed by determination of relation coefficients and proportions with making statistical significance among the differences found. Numerical series were analyzed by central tendency measures and measures of dispersion data. Statistical significance of differences among attributive series were tested by means of Student's t-test.  $p > 0.05$  was taken for Confidence Interval (CI). Results are presented tabular and graphically.

#### Results

A total of 65 children aged up to 15 years within the period of three years, 2010 to 2012 participated in this investigation. They represented 21.5% of total number of hospitalized patients with mechanical ocular trauma at the Eye Clinic in Skopje, in researched period.

The age of 10 years was most present (10.8%), followed by the age with 9.2% (3, 8 etc.), but was not statistically significant ( $p > 0.05$ ).

81.5% of investigated patients belonged to male gender, and 18.5% of females. Gender difference which was registered relating gender distribution has been statistically significant for  $p = 0.0000$  (Graf 1).

According to the place of living, 35 (53.8%) of the examinees were from urban, and 30 (46.2%) from rural surroundings (Table 1).

Closed globe injuries were found in 33 (50.8%) children, open globe injuries in 32 (49.2%). Proportional difference being registered statistically non-significant (Table 1).

In average, the children with mechanical



globe trauma were hospitalized 5.0 ± 2.7 days, minimum one, and maximum 14 days (Table 1).

In highest percentage, in 36 (55.4) children the mechanical injury occurred in domestic conditions, in 13 (20.0%) of them during the game (Graph 2). In 8 (12.3%) children the injury occurred due to their presence at the place where their parents or some other adult person were working without using preventive measures. Proportional difference of the injuries in domestic conditions versus other modalities was statistically significant for p=0.0000.

Within the period of hospitalization, in majority of children visus was examined in 61.5% at discharge. Visual acuity was not examined in the other children, due to their non-cooperation, which mostly, was due to their age. In the first group (≥0.5), in the second group (0.4-0.2), and in third group (0.01-L+P+), improvement of the visual acuity was registered as to the visual acuity during admission. Visual acuity was with no change at admission and discharge in the fifth group (L-P-) (Table 2).

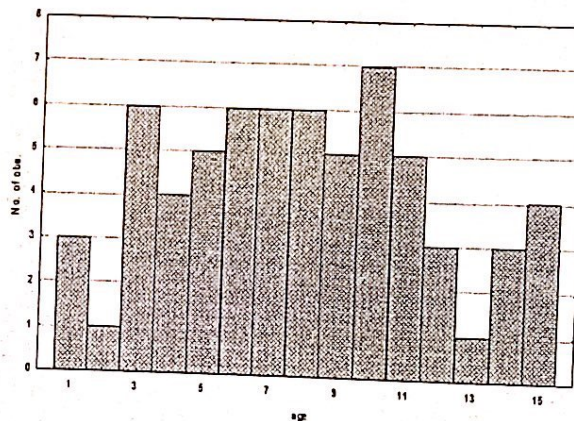
Table.1

<b>Gender</b>				
Male		53		
Female		12	18.5	
<b>Place of living</b>				
Urban		35	53.8	
Rural		30	46.2	
<b>Type of mechanical injury</b>				
closed globe injury		33	50.8	
open globe injury		32	49.2	
<b>Hospital days</b>				
No	Mean	min	max	±St.Dev
65	5.0	1.0	14.0	2.7

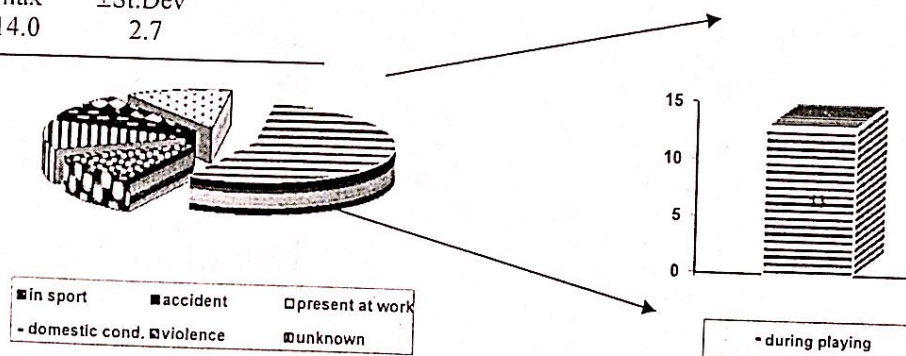
Table.2

<b>Visual acuity – at admission</b>		
≥0.5	14	21,5
0.4-0.2	6	9,2
0.1 - 0.02	2	3,1
0.01– L+P+	16	24,6
L-P-	2	3,1
did not cooperate	25	38,5
<b>Visual acuity – at discharge</b>		
≥0.5	27	41,5
0.4-0.2	3	4,6
0.1 - 0.02	3	4,6
0.01– L+P+	8	12,3
L-P-	2	3,1
did not cooperate	22	33,8

Graph 1. Distribution of examinees having mechanical globe injury according to age



Graph 2. Graphical distribution of the place and way of injuring





### Discussion

Serious ocular injuries in childhood bring to irresistible structural damages and to lifelong disability. More than 1/3 of the globe injuries included the pediatric age group (9).

The consequences of ocular trauma are reflecting on further education, career and life quality of the injured child.

Important problem for children having ocular trauma is development of amblyopia in injured eye. The younger the child is in the period of visual deprivation, the sooner amblyopia develops (10).

This kind of study of mechanical ocular trauma in children was made in Republic of Macedonia for the first time.

It showed that a high percent (64.6%) of children are pupils in elementary schools. On that age, they have a tendency to overtake risks and want to reach and be equal to more mature persons.

In our study as well as in other studies, ocular trauma was mostly represented in males (1, 9-14). This most probably has been due to their temper, more dangerous and more aggressive games practiced by the boys.

The open globe injuries are the leading cause for unilateral non-congenital blindness in children (10, 12)

Closed globe injuries cause damages on the anterior as well as on posterior eye segment (15).

In our study closed globe injury was more represented, similar to studies of Ching-Hsing et al. and Bukhari et al. (1, 16).

In average, the children with mechanical globe trauma were hospitalized 5.0±2.7 days, minimum one, and maximum 14 days.

This study showed that the most frequent place of occurring injuries was at home, with distribution of 55.4%, as in the study of Bukhari et al. and Kaur et al. (16, 17).

In 10.8% of the children the eye injury occurred

when the children were present at the place where their parents or some other adult person worked without using preventive measures, i.e. beating metal, crushing rocks, chopping wood etc. All these patients were males, and most of them lived in rural environment.

In 10.8%, the injury occurred due to violence such as fighting, throwing stones or with other dangerous object by some other person or child.

Concerning the visual acuity, there was improvement of the visual acuity at discharge compared to admission, due to hospitalization and administering adequate therapy, except for the last, the fifth group, in which, in fact, there were the most serious injuries, in whom the visual acuity was without change at admission and at discharge. Part of the patients did not cooperate for determination of visual acuity, which was due to their age. In some of the patients the treatment is not completed, it continues and this is not a final visual acuity in injuries children.

Nowadays, with timely and adequate application of modern diagnostic techniques and surgical methods, improvement of retention of visual acuity as well as prevention of complications could be reached in the injured children (15).

### Conclusion

Majority of causes which evoke mechanical ocular traumas could be prevented. So, adequate supervision by the adults, legal acts, parents' and children's education for potential risks for the occurrence of ocular trauma in domestic conditions and during outside activities, as well as for the complications and consequences of the trauma are needed.

Also, programs for public education, as well as generally more aggressive primary prevention are necessary in order to prevent the occurrence of ocular traumas.



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