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A RETROSPECTIVE STUDY OF THE MAXILLOFACIAL INJURIES IN TWO EMERGENCY DEPARTMENTS IN TBILISI, GEORGIA

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Abstract.

Introduction: Maxillofacial injuries are a global problem in our modern society. It can be a major cause of increased morbidity and mortality. Maxillofacial trauma can lead to scar distortion accompanied by emotional and psychological problems. The epidemiology of facial fractures varies in terms of trauma type, the extent of injury, and severity.

Aims: The main aim of this research is to explore the scope, the burden, and the etiology of maxillofacial injuries in Tbilisi, Georgia.

Methods: Data was retrospectively collected from two large emergency departments in Tbilisi, Georgia using a cross-sectional design. Inclusion criteria was patients admitted in hospitals during one year with diagnosis maxillofacial injury. SPSS 21 software was used for statistical analysis. Differences in categorical variables were assessed with Chi-square tests of independence.

Results: This research shows that men are still the most frequent victims of maxillofacial injuries. Out of 598 patients, whose age ranged from 1 month to 87 years - 67% were males, and 33% patients were females, including both, maxillofacial trauma alone and also combined injuries. With only maxillofacial injuries, the male patients were still leading, with 51% (307) and female patients were 28% (167), these results gave us a statistically significant difference (p = 0.026). The main causes of maxillofacial injuries were falls, which equaled to 63% (378 patients) from total recorded data, as in many other countries.

Discussion/Conclusion: The results of this research provide really important information about future preventive interventions in the country. It also shows us that educating the public with prevention strategies is substantial.

Key words. Epidemiology, Georgia, hospitalized patient, maxillofacial injury, retrospective study.

Introduction.

Injuries of the body and face are very important public health issues, it was approved that one of the leading causes of death in the first 40 years of life are traumas [1]. Trauma can cause disability and as a result, patients can lose productivity. Research showed that cancer and heart disease combined, causing less loss of working years than traumas [2].

Maxillofacial fractures are the result of various types of injuries to the face and jaw and may occur separately as well as in combination with other traumas of the body [3].

Maxillofacial injuries are one of the most common traumas from general injuries [4,5], about one-third of all injured patients have a type of injury in the maxillofacial area [6]. They are among the most common causes of morbidity and mortality, in developed and developing countries, which can also lead to temporary or permanent disability [7-9]. Maxillofacial injuries occur in approximately 5 to 33 percent of patients experiencing severe trauma [10,11].

Maxillofacial injuries play a really important role in a person's appearance. Facial trauma can lead to scarring, which is accompanied by psychological and emotional problems [12,13]. It also has many important functions, such as eating, breathing, smelling, hearing, and speaking [14]. Post-traumatic stress disorder, depression, and stress syndrome are usually associated with maxillofacial traumas.

The management of maxillofacial trauma includes treatment of facial bone fractures, dentoalveolar trauma, and soft tissue injuries, as well as any injuries, mainly associated with the head and neck [15]. Diagnosis and treatment of facial fractures remain a challenging problem that regularly requires a multidisciplinary approach [16,17]. Therefore, because of their importance and frequency, they need a correct diagnosis and specific treatment [4,18].

Special attention should be paid to mechanisms and etiological factors of trauma [19-21]. Maxillofacial injuries are a consequence of road traffic injuries, falls, various sports activities, interpersonal violence, and workplace injuries [22]. This problem affects every age group of the entire population.

The etiology of Maxillofacial damage varies between countries and within [23]. The epidemiology of maxillofacial fractures is extremely changeable, depending on various factors such as the geographical area, cultural and lifestyle differences, and socioeconomic trends [24,25].

There are many cases of maxillofacial injuries in Georgia, [26] but still, there is a lack of research on this topic.

The objective of the present study was to assess the causes of maxillofacial injuries placed in the two of the highest volume emergency hospitals, one serving children and one adults, in the capital city of Georgia, considering demographic, seasonal, and clinical variables, and provide evidence for future treatment and prevention actions.

Materials and methods.

The present retrospective study was conducted in Tbilisi, Georgia, including one pediatric hospital, Children’s new clinic and the High Technology Medical Centre, University Clinic (which includes both, children, and adults). These clinics were chosen because they have the highest volume of trauma referrals in the country.

This study is a retrospective case series using medical records. All patients in both hospitals who were admitted for a maxillofacial injury between January 1 and December 31,
2018, were included. Maxillofacial injuries were identified by a manual search of medical records, by defining the diagnosis with ICD codes. The lesions were isolated or combined with other parts of body injuries.


The questionnaire used for our research was developed within the framework of the project iCREATE - Increasing Capacity in Research in Eastern Europe, funded by the United States National Institutes of Health. The questionnaire was translated and used in Georgia, as well as in other participating countries: Romania, Armenia, and Moldova. Data was collected by manual review of the medical records.

The patients were identified using the hospital database. There was the possibility to find out most details for the research, from the database. The questionnaire information explains the demographics, causes and characteristics of maxillofacial injuries. The research data includes age, sex, date of referral, mode of injury, type of trauma, number of injuries, the severity of injuries, and etiology. Data were collected directly from the medical records of the hospitals, all the medical records of these patients (children and adults) were reviewed and analysed retrospectively.

Data were tabularized and analysed using the Statistical Package for the Social Sciences (SPSS 21). Based on these data, a descriptive analysis was made, presenting the absolute and relative frequencies of the variables under consideration.

Results.

During the year 2018, starting from January 1st till December 31st, 598 patients with maxillofacial injuries were treated in two of the largest emergency departments in Tbilisi. Out of those patients, 67% (n=401) were males, and 33% (n=197) patients were females. It includes both children and adults. The age of these patients was divided into 4 age groups: >18; 18-34; 34-61 and 61<. The age of patients ranged from 1 month to 87 years. The average age was 16.4 and the median age was 10, which is reflective more of our sample of one children’s and one University hospital than the population distribution of maxillofacial injuries. The modal age group was 0–18 accounting for 408 (68%) patients, followed by 18–34 years accounting for 92 (15%) patients. The percentage of patients between 34 and 61, summed up to 13% or 79 patients, while the remaining 3% or 18 patients were older than 61.

Furthermore, most of the patients under 18, were males with only one maxillofacial injury 35% (207 patients), while the rest were females 20% (122). (Table 1) The number of male patients between the age of 18 and 34, was 9% (56) and the number of female patients from the same age group, was 3% (20). The number of male patients between 34 and 61, was 6% (37) and while the number of females was 4% (21). As for the last age group of 61 and above, it included 1% (4) males and 1% (4) females.

Besides the patients with one injury, in the same age groups, we got the information about the multiple injuries. The number of male patients in all age groups was 16% (97 patients) and only 5% (30 patients) were female patients. Multiple injuries in male patients were more common in all age groups, except for the oldest group 61 and above, where the number of female patients (1%, 6 patients) was higher than the number of male patients (1%, 4 patients). The distribution of gender and age was similar for patients with only a maxillofacial injury and for those who also had other injuries, although single injuries were more common. From the given results, it appeared that there was a statistically significant difference (p = 0.026).

Face (except eye) was the most common anatomical site in both male and female patients, (Table 2) in all age groups of examined people appeared that: Males under age 18 equaled to 35% (208 patients) when female in the same age group was 19% (115 patients); The number of males, between age 18-34 was 10% (62patients) and females between age 18-35 were 2% (13) patients; As for age group between age 34-61, males were equal to 8% (45 patient) and female to 3% (18 patients); And in the last age group which was 61 and above, the results was 1% (7 patients) for each, male and female patients.

With the highest rate of numbers, the injury of the face was followed by the head/skull/forehead injuries. Where it was

### Table 1. Patient type by sex and age.

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;18</td>
<td>207</td>
<td>60</td>
<td>122</td>
</tr>
<tr>
<td>18-34</td>
<td>56</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>34-61</td>
<td>37</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>61&lt;</td>
<td>4</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>97</td>
<td>167</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Maxillofacial injury</th>
<th>Multiple injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;18</td>
<td>207</td>
<td>60</td>
</tr>
<tr>
<td>18-34</td>
<td>56</td>
<td>16</td>
</tr>
<tr>
<td>34-61</td>
<td>37</td>
<td>17</td>
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<tr>
<td>61&lt;</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>97</td>
</tr>
</tbody>
</table>

### Table 2. Injury to a part of the body by sex and age.

<table>
<thead>
<tr>
<th>Injury to a part of the body by sex and age</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>&gt;18</td>
<td>18-34</td>
<td>34-61</td>
</tr>
<tr>
<td>Head / Skull / Forehead</td>
<td>51</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Eye</td>
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<td>62</td>
<td>45</td>
</tr>
<tr>
<td>Neck</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Shoulder bone</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Head / Skull / Forehead</td>
<td>24</td>
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<td>6</td>
</tr>
<tr>
<td>Face (except eye)</td>
<td>115</td>
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<tr>
<td>Eye</td>
<td>2</td>
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<tr>
<td>Neck</td>
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<td>Shoulder bone</td>
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<td>Other</td>
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<td>1</td>
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<tr>
<td>Total</td>
<td>408</td>
<td>93</td>
<td>79</td>
</tr>
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</table>
evident that most patients with head/skull/forehead injuries appeared in the youngest age group, 18 and under with 9% (51 patients).

Our study showed that the most frequent cause of injury was fall, which equaled to 63% (378 patients) from total recorded data, while cut/wound equaled to 14% (84 patients), traffic injuries equaled to 4% (26 patients), and other damage mechanisms equaled to 16% (98 patients). Also, according to the research, poisoning was only 0.2% (1 patient) while unknown causes (which was uncertain) equaled to only 2% (11 patients) (Figure 1).

Most of the injuries 92% (552 patients), were unintentional, followed by assaults - 3% (19 patients); intentional self-harms - 0.8% (5 patients), and unidentified intents – 0.8% (5 patients). Only 1 patient (0.2%) experienced other violence, while 16 patients (1%) suffered from other established intentions and unspecified intentions, 8 patients per each accident (Figure 2).

One of the most important information was about the mechanism of injury by month and age, there was a statistically significant difference (p = 0.001). It turned out, that the youngest age group, 18 and under, was suffering the most from the listed injuries, during all months, which was equal to 68% (408 patients). There was also a significant difference in the mechanism of injury "Fall" by age and months (p = 0.001). The total number of “Fall” injuries was 378 patients (63%). From where the most patients were, manifested in the first age group, 18 and under, which equaled to 45% (267). The highest number of fall cases was identified in October, which amounted to 6% (36 patients). Followed by April 5,5% (34 patients) and by May with 5% (32 patients). The next month with an outlined number was June 5% (30 patients). Also, an interesting result was shown in November and in December, which was 4,5% (27), per month. The highest frequency of all injury mechanisms was detected in May 12% (69 patients), followed by December 11% (64 patients) and by October 11% (64 patients) (Table 3 and Table 4).

Discussion.

This is the first retrospective study, which was conducted in Tbilisi, Georgia, about the epidemiology of maxillofacial injuries. There is still no detailed information about this topic, which is very important for future prevention events and proper treatment planning.

![Figure 1. According to the research, poisoning was only 0.2% (1 patient) while unknown causes (which was uncertain) equaled to only 2% (11 patients).](image)

The cause, incidence, etiology, clinical presentation, and characteristics of facial injuries depend on some contributory factors, such as sociodemographic, economic, cultural environmental, cultural and socioeconomic factors [27].

This retrospective study shows the epidemiology of maxillofacial injuries studied on the example of two large emergency hospitals The male-female ratio was 2:1. As with almost all studies, it has been revealed here that, men are more often injured by the trauma, than women [28,29]. The result may be caused by the fact, that men are more exposed to risk factors, making them weaker to accidents. Men are more likely to commit physical violence, are more active in contact sports, in drinking alcohol, and have more irregularities driving the car [14,30-32].

The majority of cases were within the age range of 18 years and under (68% - 408), followed by 18-34 (15% - 92) and 34-61 (13% - 79). This shows us almost the same result, as in other countries [33]. People are more active, at a young age and that’s why they are more often the victims of maxillofacial injuries. Maxillofacial injuries affect 1 out of every 3 individuals annually, especially with children [34-36].

Georgia has similar results as other low, middle, and high-income countries related to the mechanism of maxillofacial injuries [37-39]. From our research, it was revealed that falls were generally the leading driver of high incidence rates of maxillofacial traumas for both sexes, which was equal to 63% (378 patients).

We also determined the most common injury sites. Our findings showed that nasal injuries were the most involved trauma 24% (141), followed by an open wound of lip and oral cavity 21% (123), on the third place were eye injuries 16% (94), and traumas of mandibles were only in the fourth place by frequency 8% (49). These results are slightly different from other countries' data. For example: In the first place by the frequency of most common injury site was mandible bone in the Northeast of Iran [40]. One more example is Nigeria, where most of the fractures of maxillofacial skeleton patients were of the mandible [41]. Besides these countries, the research which was conducted at several European departments of oral and maxillofacial surgery over one year also showed a slight difference compared to Tbilisi, Georgia, where the most frequently observed fractures involved the mandible, the second was OZM (Orbital zygomatic-maxillary) fractures, followed by orbital fractures and nose fractures [27]. As anticipated, the mandible jaw is mobile and has less bony support than the maxilla and other parts of the face. Nevertheless, mandible injuries are only in
fourth place in Georgia, which should be considered as one of the most distinctive features.

The research gives us the opportunity to understand detailed information about the characteristics of maxillofacial injuries and helps us to identify main epidemiological features for the patients with maxillofacial traumas in all age groups during one year (2018) in Tbilisi Georgia, based on which it can be possible to plan relevant preventive measures.

Face is the most vulnerable area of the body, that is why it is important to protect it from different trauma. Using safety equipment can reduce the risk and severity of maxillofacial injuries. In our study population falls was a leading cause of maxillofacial injuries. Appropriate falls prevention strategies should be elaborated and implemented in the country. Furthermore, raising awareness of injury prevention is pivotal. For all these reasons, we believe it is appropriate to conduct an educational event to prevent fall injuries.

Limitations of the study.

The research was done about two emergency departments, where most patients with maxillofacial traumas were taken. Furthermore, we cannot be absolutely sure that the results of our research will be generalized, like other retrospective research, this study may be subject to information prejudice. However, the results presented are connected with other studies and the analysis of these cases provides important data for the prevention events and for better management of such injuries.

Conclusion.

Epidemiological studies of maxillofacial traumatic injuries are important not only for identifying the burden of trauma, but also for the effective management and planning of resources in the field of health care and for improving the quality of medical care in hospitals. Epidemiological studies of maxillofacial traumatic injuries are important means of preventing maxillofacial injuries.

Table 3. Mechanism of injury by month and age.

<table>
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<tr>
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<th>Age</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Total</th>
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Table 4. Mechanism of injury by month and age.

<table>
<thead>
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<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
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<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
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This is the first retrospective study, conducted by using data from hospitalized patients, in Tbilisi, Georgia. Which shows important information for designing specific plans and prevention events for avoiding future maxillofacial injuries. Therefore, it gives us direction to raise the level of education of society.

Acknowledgments.
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The authors gratefully acknowledge all members of the iCREATE grants for their work on the project overall and for the contributions of project documentation used in this manuscript.

Conflict of Interest. None

REFERENCES

41. сопровождающейся эмоциональными и психологическими проблемами. Эпидемиология переломов лица зависит от типа травмы, степени повреждения и тяжести. 

**ВВЕДЕНИЕ:** Челюстно-лицевые травмы являются глобальной проблемой современного общества. Это может быть основной причиной повышенной заболеваемости и смертности. Челюстно-лицевая травма может привести к деформации ртути, сопровождающейся эмоциональными и психологическими проблемами. Эпидемиология переломов лица зависит от типа травмы, степени повреждения и тяжести.

**ЦЕЛИ:** Основная цель этой статьи — изучить масштабы, тяжесть и этиологию челюстно-лицевых травм в Тбилиси, Грузия.

**МЕТОДЫ:** Данные были ретросpektivно собраны в двух крупных отделениях неотложной помощи в Тбилиси, в Грузии, с использованием метода поперечного сечения. Критериями включения были пациенты, госпитализированные в стационар в течение одного года с диагнозом челюстно-лицевая травма. Для статистического анализа использовалось программное обеспечение SPSS 21. Различия в категориальных переменных оценивались с помощью критерия независимости Хи-квадрат.

**РЕЗУЛЬТАТЫ:** Это исследование показывает, что мужчины по-прежнему являются наиболее частыми жертвами челюстно-лицевых травм. Из 598 пострадавших, возраст которых колебался от 1 месяца до 87 лет, 67% мужчин и 33% женщин, в том числе как с ЧЛТ отдельно, так и с сочетанными повреждениями. При только челюстно-лицевых травмах по-прежнему лидировали пациенты мужского пола - 51% (307), а пациенты женского пола - 28% (167), этот результат указывает нам статистически значимую разницу (p = 0,026). Основными причинами травм челюстно-лицевой области были падения, что составило 63% (378 пострадавших) от общего количества зарегистрированных данных, как и во многих других странах.

**ОБСУЖДЕНИЕ/ЗАКЛЮЧЕНИЕ:** Результаты этого исследования предоставляют действительно важную информацию о будущих профилактических вмешательствах в стране. Это также показывает нам, что обучение населения стратегиям предотвращения является существенным.

**Ключевые слова:** Эпидемиология, Грузия, госпитализированный больной, челюстно-лицевая травма, ретроспективное исследование.
ჩიხლაძე 3, დაიანა დალფი 4, კორინ პიკ-ასა 5

1. საზოგადოებრივი ჯანდაცვის დეპარტამენტი, ივანე ჯავახიშვილის სახელობის თბილისის სახელმწიფო უნივერსიტეტ;
2. სამედიცინო ფაკულტეტი, ივანე ჯავახიშვილის სახელობის თბილისის სახელმწიფო უნივერსიტეტ;
3. საჰაეროსანი ჯანდაცვის დეპარტამენტი, ივანე ჯავახიშვილის სახელობის თბილისის სახელმწიფო უნივერსიტეტ;
4. საზოგადოებრივი ჯანდაცვის დეპარტამენტი, პოლიტიკური, ადმინისტრაციული და კომუნიკაციის მეცნიერებათა კოლეჯი, ბაბეს-ბოლიაის უნივერსიტეტ, კლუჰ-ნაპოკა, რუმინეთი.
5. კალიფორნიის უნივერსიტეტი, სან დიეგო, ლა ჯოლა კალიფორნია, ამერიკის შეერთებული შტატები.

შესავალი: ყბა-სახის დაზიანებები გლობალური პრობლემაა ჩვენს თანამედროვე საზოგადოებაში. ყბა-სახის ტრავმამ შეიძლება გამოიწვიოს ნაწილური დამახინჯება, რომელსაც თან ახლავს ემოციური და ფსიქოლოგიური პრობლემები. სახის მოტეხილობების ეპიდემიოლოგია განსხვავდება ტრავმის ტიპის, დაზიანების და სიმძიმის მიხედვით.

მიზნები: კვლევის მთავარი მიზანია შევისწავლოთ ყბა-სახის დაზიანებების მასშტაბი, სიმძიმე და ეტიოლოგია თბილისში, საქართველოში.

მეთოდები: მონაცემები შეგროვდა რეტროსპექტულად, თბილისის მაღალი მიმართვიანობის, ორ გადაუდებელ დახმარების განყოფილებით. მონაცემები შეღერილია 1 თვიდან 87 წლამდე, 67% მამაკაცი იყო, ხოლო - 33% ქალი, რაც მოიცავდა როგორც ყბა-სახის ტრავმას ასევე კომბინირებულ დაზიანებებს. მხოლოდ ყბა-სახის დაზიანებებით, მამრობითი სქესის პაციენტების რაოდენობა 51% (307), მდედრობითი სქესის პაციენტებთან შედარებით 28% (167), პაციენტებთან შედარებით შედარების მიხედვით (p = 0.026). ყბა-სახის დაზიანებების ძირითადი მიზეზები იყო დაცემა, რომელიც შეადგენდა 63% (378 პაციენტი) მთლიანი დაფიქსირებული მონაცემებიდან, როგორც ბევრ სხვა ქვეყანაში.

დისკუსია/დასკვნა: დასკვნის სახით, ამ კვლევის შედეგები იძლევა მართლაც მნიშვნელოვან მონაცემებს, რათა ქვეყანაში სამომავლოდ მოხდეს დაზიანებების თავიდან აცილება. ეს ასევე განსხვავდება, რომ საზოგადოების გარშემოდგომა პრევენციის სტრატეგიებით არსებით.

საკვანძო სიტყვები: ეპიდემიოლოგია, საქართველო, ჰოსპიტალიზირებული პაციენტი, ყბა-სახის დაზიანება, ერთობლივი კვლევა.