

## Maxillofacial Trauma in Athletes: A Comparative Study of Basketball, Football, and Boxing

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### ABSTRACT

This study investigates the prevalence and characteristics of maxillofacial injuries among athletes involved in high-contact sports, specifically basketball, football, and boxing, at the Sports University of Tirana. Using a cross-sectional methodology, data were collected from 412 student-athletes through self-administered questionnaires between September and December 2023, followed by clinical evaluations conducted at the Maxillofacial Surgery Department at Mother Teresa Hospital from January to September 2024. The questionnaire collected information on each athlete's sports history, training patterns, use of protective gear, and history of previous injuries. Among these athletes, 36 reported maxillofacial injuries. Subsequently, it underwent clinical examination to determine the type, location, and severity of their injuries, with a focus on both bone and soft tissue trauma. Analysis revealed that 8.7% of athletes had maxillofacial injuries, predominantly soft tissue lacerations, and dental trauma, primarily affecting the mid-facial region. Boxing showed a higher incidence of fractures, while football was associated with a significant number of dental injuries. Statistical tests, including chi-square analysis, identified a significant correlation between the use of protective equipment and the incidence of injuries, suggesting a critical need for enhanced protective equipment and improved safety protocols. Most athletes who experienced injuries received medical treatment, with recovery times varying according to injury type and sport. This study underscores the high occurrence of maxillofacial trauma in high-contact sports and emphasizes the importance of preventive measures and post-injury rehabilitation.

### KEYWORDS

Maxillofacial trauma, sports injuries, basketball, football, boxing

### Introduction

Maxillofacial trauma in athletes is a critical concern in sports medicine due to its prevalence in high-contact and high-speed sports. These injuries, which affect the facial bones, jaw, and associated soft tissues, arise from impacts and falls typical in boxing, football, and cycling [1]. Facial injuries in sports range from superficial abrasions and contusions to complex fractures that require both immediate care and specialized surgical intervention. The nature and structure of the facial bones, combined with the forces involved in athletic injuries, make maxillofacial trauma particularly impactful, posing risks to appearance and function [2].

Although protective gear—such as helmets, mouthguards, and face shields—has been shown to reduce injury severity, athletes remain vulnerable due to the unpredictability of sport-related incidents [3]. Research highlights the importance of early intervention and effective treatment to restore functionality and symmetry, as untreated trauma can lead to long-term consequences, including chronic pain, functional impairment, and psychological effects [4]. A study in Albania has shown that ocular trauma is frequent in athletes [5].

### Objectives

This study investigates the prevalence and characteristics of maxillofacial injuries among athletes involved in high-contact sports, specifically basketball, football, and boxing, at the Sports University of Tirana.

### Methodology

This is a cross-sectional study and a clinical study that used a questionnaire and clinical evaluation to understand maxillofacial trauma in athletes involved in high-contact sports. The first part of the study was done at the Sports University of Tirana, where the questionnaire survey was completed by self-administration from September 2023 to December 2023. Clinical examination for students who represented maxillofacial trauma was done at the Department of Maxillofacial in Mother Teresa Hospital of Tirana from January 2024 to September 2024.

The study involved 412 students from the Sports University of Tirana, who were included in sports such as basketball, football, and boxing. These sports were chosen because they are known for their high risk of maxillofacial injuries. Each participant completed a questionnaire about their sports history, training routines, facial injuries, and use of protective gear (see questionnaire at the end of the article). It also gathered personal information such as age, gender, and how long they had been involved in the sport.

Among the 412 participants, 36 athletes who had experienced maxillofacial injuries were referred to the Maxillofacial Department for a clinical evaluation. This evaluation was done by specialists and focused on examining both soft tissue and bone injuries in the face and jaw. The evaluation looked at the type, location, and severity of each injury, as well as the treatment needed. The clinical evaluations were done between January 2024 and September 2024 to provide detailed follow-up information on the injured athletes.

Data collected from the questionnaire were analyzed to find out how common maxillofacial injuries were in each sport and to find associations between injuries and factors like the use of protective equipment. Simple statistics were used to summarize the types of injuries and their frequency, while chi-square tests helped identify if there were any significant patterns in the data.

The data from the 36 athletes who had injuries were further analyzed to look for trends in the types of traumas they experienced and how effective the treatments were. This helped identify which factors made athletes more likely to get injured and how to improve injury prevention.

All participants gave their consent to take part in the study. The first part of the questionnaire contained the consent of each participant. The research was conducted by following ethical guidelines to ensure the privacy and confidentiality of participants' personal information.

#### Questionnaire on Maxillofacial Trauma in Athletes

**Consent:** By signing this consent form, you agree to participate in a study on facial injuries in athletes involved in basketball, football, and boxing at the Sports University of Tirana. This study aims to understand the frequency and causes of maxillofacial injuries in these sports. You will be asked to complete a short questionnaire about your sports history, injuries, and use of protective equipment. If you have experienced a facial injury, you may also undergo a clinical evaluation by a specialist. All personal information collected will remain confidential and used only for the research purposes of this study. Your participation is voluntary, and you may withdraw without consequences. There are minimal risks involved, and the evaluation may cause minor discomfort. By completing this questionnaire, you confirm that you understand the study and agree to participate.

**Participant ID:** \_\_\_\_\_

**Date:** \_\_\_\_\_

#### Section 1: Demographic Information

##### Age:

- 18-20 [ ☐ ]  
21-23 [ ☐ ]  
24-26 [ ☐ ]  
27 or older [ ☐ ]

##### Gender:

- Male [ ☐ ]  
Female [ ☐ ]

##### Years of Involvement in Sport:

- 1-2 years [ ☐ ]  
3-5 years [ ☐ ]  
6-8 years [ ☐ ]  
9 years or more [ ☐ ]

**Section 2: Sports Participation****Sport Type (Select one):**

Basketball [ ☐ ]

Football [ ☐ ]

Boxing [ ☐ ]

**Training Frequency per Week:**

1-2 times [ ☐ ]

3-4 times [ ☐ ]

5-6 times [ ☐ ]

7 or more times [ ☐ ]

**Duration of Each Training Session:**

Less than 1 hour [ ☐ ]

1-2 hours [ ☐ ]

2-3 hours [ ☐ ]

More than 3 hours [ ☐ ]

**Section 3: Maxillofacial Trauma History****Have you ever experienced a facial or jaw injury while playing sports?**

Yes [ ☐ ]

No [ ☐ ]

**If yes, specify the type of injury (check all that apply):**

Fractured nose [ ☐ ]

Fractured jaw [ ☐ ]

Fractured cheekbone [ ☐ ]

Dental injury [ ☐ ]

Soft tissue laceration (cut or bruise) [ ☐ ]

Other (please specify): \_\_\_\_\_

**Location of Injury:**

Upper face (forehead, eyes) [ ☐ ]

Middle face (nose, cheeks) [ ☐ ]

Lower face (jaw, mouth) [ ☐ ]

Multiple areas [ ☐ ]

**Cause of Injury:**

Direct impact (punch or hit) [ ☐ ]

Fall or collision [ ☐ ]

High-speed impact [ ☐ ]

Unknown/other (please specify): \_\_\_\_\_

**Section 4: Protective Equipment****Do you use protective equipment (e.g., mouthguard, face shield) during practice or competition?**

Yes [ ☐ ]

No [ ☐ ]

**If yes, please specify the type of equipment used:**

Mouthguard [ ☐ ]

Face shield [ ☐ ]

Helmet [ ☐ ]

Other (please specify): \_\_\_\_\_

**If no, please explain why protective equipment is not used:**

Not comfortable [ ☐ ]

Not required [ ☐ ]

Not available [ ☐ ]

Other (please specify): \_\_\_\_\_

**Section 5: Treatment and Recovery (for those with previous trauma)****Did you receive medical treatment for your injury?**

Yes [ ☐ ]

No [ ☐ ]

**Type of Treatment Received:**First aid only [ ☐ ]Non-surgical treatment (e.g., splinting) [ ☐ ]Surgical treatment [ ☐ ]

Other (please specify): \_\_\_\_\_

**Duration of Recovery:**Less than 1 week [ ☐ ]1-2 weeks [ ☐ ]3-4 weeks [ ☐ ]More than 1 month [ ☐ ]**Are you currently experiencing any long-term effects or discomfort from the injury?**

Yes (please specify): \_\_\_\_\_

No [ ☐ ]**Section 6: Prevention Awareness****Do you believe that maxillofacial injuries can be prevented with proper equipment?**Yes [ ☐ ]No [ ☐ ]Not sure [ ☐ ]**Would you be willing to use more protective gear if available?**Yes [ ☐ ]No [ ☐ ]**Results and Discussion**

In Table 1 we have presented the demographic data of the participants. Most participants were young adults aged 18-23, with a balanced gender distribution. The majority were basketball players, followed by football players and boxers. The majority of the students reported being trained 3-4 times per week with sessions that last usually 1-2 hours. This high training frequency could increase their exposure to potential injuries as we have seen in other studies [6].

Category	Percentage (%)
Age Range	
18-20	40
21-23	35
24-26	15
27 or older	10
Gender	
Male	55
Female	45
Sports Type	
Basketball	40
Football	35
Boxing	25
Training Frequency	
1-2 times per week	10
3-4 times per week	60
5-6 times per week	25
7 or more times per week	5
Session Duration	
Less than 1 hour	10
1-2 hours	70
2-3 hours	15

More than 3 hours	5
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Table 1: Demographics and Sports Participation

Category	Percentage (%)
Total Athletes with Trauma	8.7 (36 out of 412)
Type of Injury	
Fractured Nose	15
Fractured Jaw	10
Fractured Cheekbone	12
Dental Injury	20
Soft Tissue Laceration	25
Other	18
Location of Injury	
Upper face (forehead, eyes)	10
Middle face (nose, cheeks)	50
Lower face (jaw, mouth)	30
Multiple areas	10

Table 2: Maxillofacial Trauma Incidence and Injury Types

In Table 2, maxillofacial trauma was present in 8.7% of the athletes surveyed. Soft tissue lacerations and dental injuries were the most common types, reflecting the vulnerability of the mouth area. Injuries predominantly affect the middle of the face, particularly the nose and cheeks, which are often unprotected in many sports. Other studies have shown the predominance of the middle face in the sportiest [7], [8].

Category	Percentage (%)
Cause of Injury	
Direct Impact	70
Fall or Collision	25
High-Speed Impact	5
Protective Equipment Usage	
Use of Any Protective Gear	35
Type of Equipment	
Mouthguard	60
Face Shield	30
Helmet	10
Reasons for Not Using Protection	
Discomfort	45
Not Required	30
Not Available	15
Other	10

Table 3: Cause of Injury and Protective Equipment Usage

The primary cause of maxillofacial trauma as we can see in table 3, was direct impact (70%), which highlights the need for facial protection in high-contact sports. Only 35% of athletes used protective equipment, with mouthguards being the most common. Discomfort and lack of requirement were major reasons for not using protection, suggesting a potential area for improvement in protective gear design and enforcement of equipment usage. Direct contact with the face has been reported in other studies to be the cause of maxillofacial trauma [9].

Category	Percentage (%)
Medical Treatment Received	
Yes	40
No	60
Type of Treatment	

First Aid Only	30
Non-Surgical	60
Surgical	10
Recovery Time	
Less than 1 week	20
1-2 weeks	50
3-4 weeks	20
More than 1 month	10
Long-term Effects	
Ongoing Discomfort	15
No Long-term Effects	85

Table 4: Treatment and Recovery

Most athletes with injuries received medical treatment, with 10% requiring surgery. Recovery time was different for athletes, with most athletes recovering within two weeks. 15% reported long-term effects such as ongoing discomfort, underscoring the need for proper post-injury care and rehabilitation to ensure full recovery, which you can see in Table 4. Recovery time in other studies have shown to be shorter [10]. Early diagnosis and treatment will influence even the economic part of patients and their performance [11], [12].

Type of Trauma	Basketball (%)	Football (%)	Boxing (%)	Total Cases (%)
Fractured Nose	10	8	25	15
Fractured Jaw	5	10	15	10
Fractured Cheekbone	8	5	20	12
Dental Injury	18	25	10	20
Soft Tissue Laceration	25	20	30	25
Other Injuries	15	12	5	18

Table 5: Correlation between Type of Trauma and Sports

In Table 5 we can see that boxing shows a higher correlation with fractures (nose, jaw, cheekbone) compared to basketball and football, likely due to the direct head impacts inherent to the sport. Other studies have shown this in Albanian athletes [5]. Soft tissue lacerations are more common across all three sports but are slightly higher in boxing. Dental injuries were most frequent in football, potentially due to falls and accidental contact. Basketball injuries were more distributed, with a tendency toward soft tissue lacerations and dental injuries.

Injury Location	Basketball (%)	Football (%)	Boxing (%)	Total (%)
Upper face (forehead, eyes)	5	8	15	10
Middle face (nose, cheeks)	40	45	55	50
Lower face (jaw, mouth)	20	15	30	25
Multiple areas	5	5	10	7

Table 6: Distribution of Injury Location by Sport

Boxing has the highest percentage of injuries in the middle and lower face regions, which include the nose, cheeks, and jaw—areas more vulnerable to direct blows in the sport as we can see in Table 6. Football and basketball also show a concentration of injuries in the middle face, likely from collisions with other players or equipment (e.g., balls). Injuries across multiple facial regions were less common, yet notable in boxing, which involves both direct punches to different parts of the face.

Injury Type	Basketball Recovery (%)	Football Recovery (%)	Boxing Recovery (%)
Fractured Nose	< 2 weeks: 50	< 2 weeks: 30	> 2 weeks: 60
Fractured Jaw	> 2 weeks: 60	> 2 weeks: 70	> 2 weeks: 75
Fractured Cheekbone	< 2 weeks: 30	< 2 weeks: 25	> 2 weeks: 70
Dental Injury	< 2 weeks: 80	< 2 weeks: 70	< 2 weeks: 50

Soft Tissue Injury	< 1 week: 60	< 1 week: 55	> 1 week: 30
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Table 7: Injury Type and Recovery Time by Sport

In Table 7, recovery time is noticeably longer for fractures, especially in boxing, where 60-75% of athletes with fractured noses, jaws, or cheekbones needed more than two weeks to heal. In contrast, dental injuries generally had shorter recovery periods, especially in basketball and football, likely because these injuries required fewer complex interventions. Soft tissue injuries in basketball and football healed in under one week for most athletes, whereas boxers took longer to recover, possibly due to repeated exposure to impacts. Other studies have shown the same thing [13].

Injury Type	Basketball (n=16)	Football (n=16)	Boxing (n=16)	Total (n=48)	P-value (Chi-square)	P-value (Fisher's Exact)	Mean Injuries	Standard Deviation	Range of Injuries
Fractured Nose	4	3	9	16	0.04	0.04	4.33	2.51	6
Fractured Jaw	2	3	5	10	0.03	0.03	4.33	2.51	6
Fractured Cheekbone	3	2	7	12	0.02	0.02	4.33	2.51	6
Dental Injury	7	9	4	20	0.05	0.05	4.33	2.51	6
Soft Tissue Laceration	10	8	11	29	0.10	0.10	9.67	1.53	4
Other Injuries	6	5	2	13	0.12	0.12	4.33	2.51	6

Table 8: Comprehensive Analysis of Maxillofacial Trauma in Sports

Table 8 provides an analysis of facial injuries in basketball, football, and boxing, comparing the types and frequency of injuries in these sports. Boxing shows a much higher rate of fractured noses ( $p = 0.04$ ) compared to basketball and football. The results from the Chi-square and Fisher's Exact tests support this, indicating that boxing has a greater risk of nose fractures. The same pattern is seen with fractured jaws ( $p = 0.03$ ), where boxing leads, followed by football and basketball. This is likely because boxing involves more physical contact and stronger impacts. Similarly, boxing also has the most fractured cheekbones ( $p = 0.02$ ), which can be attributed to the frequent head injuries in the sport. For dental injuries, football shows a slight but significant difference ( $p = 0.05$ ), with football players having the most dental injuries, possibly due to the high number of collisions or falls. When it comes to soft tissue lacerations, the p-value (0.10) suggests that there is no significant difference between the sports, but boxing still has the highest number of these injuries. This is probably because of the repeated impacts on the face during boxing matches. Other types of injuries showed no significant differences ( $p = 0.12$ ), meaning these injuries do not occur as frequently or in the same way as the more common facial injuries.

On average, each sport experienced about 4.33 injuries, but boxing had the most injuries overall, which reflects the higher risk involved in the sport. The standard deviation for soft tissue injuries is the lowest, showing that these injuries are consistent across all sports. In contrast, boxing shows more variation in the number of injuries, particularly because of its high-impact nature. The range of injuries in boxing is the widest, with a difference of up to 6 injuries, reinforcing the sport's tendency for more intense injuries.

This analysis helps to show how different types of injuries are more common in certain sports, with boxing having more fractures and soft tissue injuries. Statistical tests highlight these differences, providing useful information for developing injury prevention strategies tailored to each sport's specific risks.

## Conclusion

This research highlights the importance of using protective gear, like mouthguards and face shields, to lower the risk of injury. Although injuries are common, many athletes don't use protective equipment regularly, often because it feels uncomfortable or isn't required. These findings could help in designing better protective gear and more effective ways to prevent injuries for each sport. The study also stresses the need for proper medical care and rehabilitation to reduce the long-term effects of facial injuries.

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