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Orofacial Injuries Reported by Junior and Senior Basketball Players

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A B S T R A C T

The increased popularity of sports, apart from being beneficial to health, also results in a larger number of injuries, a part of which are also injuries to the stomatognatic system. According to the data from literature orofacial injuries in basketball are frequent, but relatively minor. The World Dental Federation places basketball into the category of medium-risk sports for the occurrence of injuries to the stomatognatic system. The purpose of this investigation was to determine incidence, type and severity of orofacial injuries during basketball and the frequent of the mouthguard use in a selected sample of basketball players from the City of Zagreb and the Zagreb County. The sample consists of 195 athletes who actively participate in basketball, 61 junior and 134 senior players. A total of 2 615 injuries to the stomatognatic system were documented in this research, 529 (20.2%) of those refer to juniors and 2 086 (79.8%) to seniors. The most common injuries are lacerations and contusions of soft tissue 84.4% (21.5% juniors and 78.5% seniors), followed by temporomandibular joint injuries and oral muscles stiffness 13.4% (14.9% juniors and 85.1% seniors) and 2.2% dental injuries (3.5% juniors and 96.5% seniors). Only 6.7% of players (13 players – 2 juniors and 11 seniors) have tried to wear a mouthguard, while only one 1% of them (2 players – one junior and one senior) frequently used it. Total number of injuries shows that sports injuries are common during basketball. Average number of almost 4 injuries per player is relatively high. Dental injuries and temporomandibular joint injuries and oral muscles stiffness are relatively rare, only 16%. Lacerations and contusions of soft tissues represent 84% of all injuries and that minor injuries do not require professional care.

Key words: *juniors, seniors, basketball, orofacial injuries, mouthguard*

Introduction

There is common knowledge that the greater popularity of sports and exercising besides from having health benefits also leads to a larger possibility of dental and oral injuries injuries[1–7]. Such injuries are most likely to occur in football, basketball, hockey and boxing. Moon and Mitchell[8] indicated that 10% of contact sports athletes injure their stomatognatic system during one season. According to Clegg's[9] research, during an athlete's carrier injuries to the stomatognatic system account for 33% to 56% of all injuries. In literature are[10–12] statements that dental injuries are the most common injuries of the stomatognatic system resulting from sports activities, which specifically refers to contact sports such as rugby, ice-hockey, football, baseball, American football and basketball. Chapman[13], Braham and co-workers[14], Harmer[15] as well as dos Santos and Monte Alto[16] confirm that claim, emphasizing the possibility of prevention by wearing custom-made mouthguards. In 2003 Corwell and co-workers[17] proposed that similar injury evaluations and the role of mouthguards are extremely important in the development and implementation of guidelines for using protective gear in basketball. Kumamoto and Maeda[18] proposed that the establishment of mouthguard programs for athletes of all ages and genders who participate in basketball might help to reduce the incidence of dental trauma. Yeşil Duymuş and Gungor observed that the use of mouthguards is rare; therefore it should be a combined duty of dentists, sports physicians, and coaches to encourage the use of mouthguards during practice and sport activities. Doctors and dentists need to recommend a more intensive education of students in sports medicine and sports dentistry[19].

Basketball is considered to be one of the most dynamic sports during the entire forty minutes of the

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game, so that basketball players need to possess a wide range of basic and specific functional and physical skills. The game is therefore dominated by explosive strength, coordination in the execution of specific physical tasks, spatial orientation, agility in efficient dealing with new situations, the speed of neuromuscular reaction and the speed of the movement's themselves[20,21]. Guyette[22] notes that as time progresses and the game with its rules evolves, injuries occur more often, there are also a larger number of injuries to the stomatognatic system in basketball mostly due to a greater number of basketball players. Frequent contacts in the heat of the game often result in both intentional and unintentional injuries. The analysis of sports-related injuries shows that in 51% of the cases the responsible party for the occurrence of the injury is the athlete himself. This is mostly the result of carelessness, fatigue, bad physical shape or poor technique. Someone else, an opposite team player, intentionally or unintentionally causes an injury in 28% of the cases. All other causes, such as equipment, field conditions, footwear, clothes and others will result in an injury in 21% of the cases[23]. This often results in torn lips, loosened teeth or a fractured mandible when an athlete is hit in the face either with the other player's elbow or some other part of the body. In 1996 Bayliss and Bedi[24] compared athlete's talent with injury incidence. Because a talented athlete spends more time playing, there is a greater possibility of an injury. The FDI World Dental Federation places basketball into the category of medium-risk sports as far as the occurrence of injuries to the stomatognatic system is concerned[25]. Contrary to the position of the FDI World Dental Federation, Morrow and Kuebker[26] have established that the incidence of injuries to the stomatognatic system is greater in basketball and football than in American football (rugby), which is according to the same categorization a high-risk sport. In their article Garon and co-workers[27] mention a large number of injuries to the stomatognatic system as well as a large number of concussions which occur while playing baseball, basketball and unorganized American football, whereby they also state that 52% of injuries to the stomatognatic system occur while taking part in some other sport, besides American football. This especially refers to baseball and basketball. In their respective researches many authors[28–31] points to the greater incidence of injuries to the stomatognatic system in basketball in comparison to other sports. Maestrello-deMoya and Primosch[32] show in their research the extent of injuries to the stomatognatic system of high school basketball players that varies from 1% to 30%. The reason for such a significant range of injuries lies in different criteria of reported injuries. Flanders and Bath[33] noted that 34% of all physical injuries in basketball refer to the injuries to the stomatognatic system, whereas in American football these injuries account for only 0.07%. Teo and co-workers[28] point out that according to dental injuries basketball is in third place. Love and co-workers[29] concur with them stating in their research that among the ten most popular sports basketball is according to injuries to the stomatognatic system in third place, excluding rugby.

Johnson[34] states in his research that younger athletes are at greater risk of injury than older athletes. Contrary to him, Hayes[35] in 1978, Nilsson and Rooas[36] in 1978 and Baxter-Jones and co-workers[37] in 1993 based on their respective researches state that there are fewer injuries in younger athletes (juniors) than in older athletes (seniors). Jarvinen[38], Davis and Knott[39], Sane and Ylipaavalnimei[40] and Caliskan and Turkun[41] point out that children constitute a significant group in the etiology of dental injuries. Kujala and co-workers[42] have come to a conclusion that athletes between the ages of 20 and 24 are at the greatest risk of injuries, most likely because this is the period when athletes practice and compete the most.

The purpose of this research was to establish the representation and the severity of injuries to the stomatognatic system in a selected sample of basketball players from the City of Zagreb and the Zagreb County.

Materials and Methods

The sample consists of 195 athletes who actively participate in A1 and A2 basketball league in Croatia, including some of the members of the National Basketball Team, as well as of basketball non-professionals. All of the athletes are male, aged between 16 and 49 years and all of them come from the City of Zagreb or the Zagreb County. Before a questionnaire survey was conducted, the athletes had been given directions and explanations of the purpose of the survey. The questionnaires were completed personally with the help of a researcher. All of the questioned athletes were placed into categories of juniors and seniors. In total, 61 junior and 134 seniors were interviewed Table 1.

The average age of junior athletes is 16.6 years, and the average age of senior athletes is 22.9 years, which

TABLE 1
STRUCTURES OF SAMPLE

	Number of players
Juniors	61
Seniors	134
Total	195

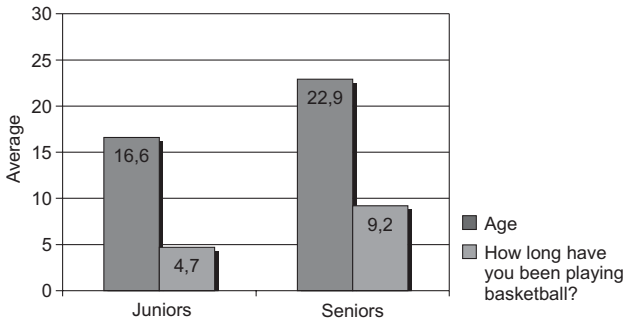

Fig. 1. Average age and years of practicing basketball juniors and seniors (n=195).

makes them statistically significantly older, which is also expected. Juniors have been playing basketball for 4.7 years and seniors for twice as long i.e. 9.2 years Figure 1.

It is also necessary to point out that the examinees aged between 16 and 17 years constitute the largest share of all examinees i.e. 31.1%. Examinees aged between 18 and 19 years constitute 25.1%, examinees aged between 20 and 25 years 26.2% and examinees aged between 26 and 49 years 17.4% of all examinees.

Results

A total of 2 615 injuries to the stomatognatic system were documented in this research, 529 (20.2%) of those refer to juniors and 2 086 (79.8%) to seniors. The most common injuries are lacerations and contusions of soft tissue 2 208 (84.4%) as shown in Table 2, followed by temporomandibular joint injuries and oral muscles stiffness (a total of 350 injuries i.e. 13.4%) and 57 dental injuries (2.2%). Out of 2 208 lacerations of soft tissue, 475 (21.5%) refer to juniors and 1 733 (78.5%) to seniors. As far as lacerations of soft tissue in juniors are concerned, lip lacerations account for 64%, followed by 19.2% internal cheek lacerations and 16.8% tongue injuries. In seniors lip lacerations account for 64.6%, internal cheek lacerations for 18.9% and tongue injuries for 16.5%. Tongue, internal cheek and lip lacerations in juniors constitute 21.5%, which is in average 7.9 injuries during career; and in seniors 78.5%, an average of 12.93 injuries during career (Table 2).

Larger number of lacerations of soft tissue was recorded during practice 59.8% than during actual games, 40.2%. During practice lacerations of soft tissue in juniors accounted for 19.5% and in seniors for 80.5%, while during games 24.5% lacerations of soft tissue were recorded in juniors and 75.5% in seniors. No lip injuries were recorded in 50.8% of juniors and 33.6% of seniors during practice, and in 55.7% of juniors and 45.5% of seniors during games. Internal cheek injuries were recorded in 14 juniors and 39 seniors during practice and in 10 juniors and 22 seniors during games. Tongue injuries were recorded in 12 juniors and 45 seniors during practice and in 14 juniors and 22 seniors during games. Out of a total of 195 athletes no juniors and no seniors suffered only one laceration injury during their sports career, 2 juniors (3.3%) were injured 20 times in training and games, while only one senior suffered no less than 80 laceration injuries.

Out of a total of 350 temporomandibular joint injuries and oral muscles stiffness cases during career 14.9% refer to juniors and 85.1% refer to seniors. In juniors the most common injury reported was pain while opening and closing the mouth – 53.8%, followed by oral muscle stiffness and pain – 40.4% and temporomandibular joint injuries – 5.8%. In seniors the most common injury reported was pain while opening and closing the mouth – 67.1%, followed by oral muscle stiffness and pain – 29.5% and temporomandibular joint injuries – 3.4% (Table 3).

It should also be noted that 3 seniors and one junior received no less than 10 blows to the mandible during their career and subsequently reported pains while opening and closing the mouth.

Out of a total of 57 dental injuries as many as 96.5% were recorded in seniors and 3.5% in juniors during career. Two dental injuries (3.5%) i.e. broken teeth were recorded in juniors, while in seniors 55 (96.5%) dental injuries were recorded, out of which there were 21 broken teeth during practice sessions and the same number of broken teeth during games, 6 loosened teeth during practice and 4 during games and 2 avulsion teeth during practice and one during games (Table 4).

A total of 64 injuries were medically treated, 48 of which (75%) were dental injuries treated by doctors of dental medicine and 16 (25%) were injuries treated by doctors of medicine.

Out of 195 basketball players 99% didn't use a mouthguard, and only 1% (2 players – one junior and one senior) have used a mouthguard during practices and games. In addition to that out of the total number of players (195) 93.3% have never even tried to wear a mouthguard while only 6.7% (13 players – 2 juniors and 11 seniors) have tried to wear one.

Our research should be expanded to include a larger number of basketball players (juniors and seniors) in Croatia, in order to obtain further insight into injuries to the stomatognatic system in basketball players.

TABLE 2
LACERATION OF SOFT TISSUE

	Lip lacerations	Internal cheek lacerations	Tongue lacerations	Total
Juniors	304	91	80	475
Seniors	1 120	327	286	1 733
Total	1 424	418	366	2 208

TABLE 3
INJURIES OF TEMPOROMANDIBULAR JOINTS AND ORAL MUSCLES STIFFNESS

	Pain during opening/closing	Oral muscle stiffness	Injuries of temporomandibular joints	Total
Juniors	28	21	3	52
Seniors	200	88	10	298
Total	228	109	13	350

TABLE 4
DENTAL INJURIES

	Broken teeth	Loosened teeth	Avulsed teeth	Total
Juniors	2	0	0	2
Seniors	42	10	3	55
Total	44	10	3	57

Discussion

Results of this investigations shows that basketball is a sport with a high number of injuries to the stomatognatic system. Many authors[43–46] agree with this resource. Results of this investigations reveals that the most common injuries were lacerations and contusions of soft tissue, followed by temporomandibular joint injuries and oral muscles stiffness and dental injuries. Dilberović and co-workers[47] in their investigation agree with this statement. In a research by Jerolimov and co-workers[48] 69.3% of injuries to the stomatognatic system on a relatively small sample, refer to lacerations of soft tissue, while other injuries account for the remaining 30.7%. While in Jerolimov and coworkers research dental injuries comprise 20.16% of all injuries, in this research they account for 2.2%. The significant difference in the number of dental injuries points to different samples. Diab and Mourino[49], Flanders and Bath[33] agree with Jerolimov and co-workers, and this investigation noting that lacerations of soft tissue are the most represented injuries to the stomatognatic system. As a difference in their investigations, dental injuries followed by and injuries to the temporomandibular joint were less in number. In their research Jerolimov and Carek[50] conclude that most common injuries were injuries of soft tissue, mostly in the lip region, followed by dental injuries. Maestrello-de Moya and Primosch[32] also state that most represented injuries were lacerations of soft tissue Results of this investigations, accordingly with other investigators, reveals that lips are most injured part of the system. That can be explained by position (»first in row«), and this is further aided by shape (slightly protruding outwards), the structure (gentle and soft mucous membrane of the lips, friable tissue) and the positioning (leaning against the teeth), whereby the layout of teeth and the position of the incisal edge to the lips result in different kinds of lip lacerations. Wearing of a fixed orthodontic apparatus causes even more laceration injuries in athletes, unless they are wearing a mouthguards[5,51]. Internal cheek lacerations mostly result from a bite during a blow to the lower jaw. Due to exertion, normal breathing through the nose does not meet the increased need for oxygenation so that mouth is opened to create an additional airway. The administered blow to the stomatognatic system moves the mandible, the cheek mucous membrane comes between the upper and the lower teeth line, the mouth is closed and an injury occurs. Tongue lacerations are less frequent. The most common mechanism of tongue injury is a tongue bite.

There is a significant difference between the number of injuries in juniors and seniors, where juniors suffer fewer injuries than seniors. During practice seniors have therefore suffered the most lacerations of soft tissue, while juniors and seniors together have suffered more lacerations of soft tissue during practice than in games. Seniors have reported almost five and a half times more injured of temporomandibular joint and oral muscles stiffness than juniors. The most pains were reported while opening and closing the mouth. This is the result of a larger number of blows to the head i.e. the mandible, which causes pain while opening and closing the mouth. Also seniors have reported almost twenty-eight times more dental injuries than juniors. This can be explained by a longer practicing time as well as more practice sessions and games during career also account for a larger number of injuries in seniors. Junior category begins at the age of 16 and ends at the age of 18, while senior category begins at the age of 18 and ends at the age of 35. The greatest training intensity and subsequently athlete's greatest physical strength and body mass are developed in the senior age group, so that these factors also account for a larger number of recorded injuries. Larger body mass, in seniors, means greater punching power and subsequently larger number of injuries. Kujala and co-workers[42] agree with our research, stating that an athlete is at his peak between the ages of 20 and 24, pointing out that this is the most common reason for a larger number of injuries in athletes in this age group. Hayes[35], Nilsson and Rooas[36] as well as Baxter-Jones and co-workers[37] concur with this investigation noting that younger athletes suffer fewer injuries than older athletes. Corwell and co-workers[17] also agree with this investigation. The senior age group is also more prone to injuries to the stomatognatic system due to the intensity of the trainings. Such a big difference in the number of injuries in juniors and seniors can be explained by the attitude towards basketball i.e. the Croatian senior league is better represented in competitions (Croatian Championship, Euro League, NLB League and The National basketball Cup of Croatia), while juniors do not participate in as many competitions. »Professionalism« is therefore also one of the reasons for injuries. In this research more medically treated injuries to the stomatognatic system were recorded in seniors than in juniors. Medical treatment is much more frequent in senior category because the injuries were significant. Athlete injuries were treated three times more by doctors of dental medicine then by doctors of medicine. Such a large number of medically treated dental injuries imply the severity of the injuries. Diab and Mourino[49] mention identical results in their research. In a research conducted by Sporowski and co-workers[52] as many as 94% of injuries required dental treatment.

In this research only one junior and one senior used a mouthguard on a regular basis in trainings and games while only 2 juniors and 11 seniors have tried to wear one. Levin and co-workers[53] state that in Israel only 1.9% of basketball players use a mouthguard during playing basketball, although 30.2% of them are aware of the advantages of using one. Concurring with them Ferrari and Ferreria de Mederios[7] state in their research that only 2.1% of basketball players wear a mouthguard during practice and games. Maestrello-de Moya and Primosch[32] note that only 4.2% of basketball players wear a mouthguard. According to the results gathered by Corwell and co-workers[17] out of 496 interviewed basketball players 25% of them (125) use a mouthguard (juniors 51.2%, seniors 48.8%). In most countries, as well as in Croatia,

basketball is a sport in which mouthguards are not obligatory. Injuries to the stomatognatic system can be alleviated or almost eliminated by wearing intraoral custom-made mouthguards. A mouthguard mitigates and amortizes the blow as well as disperses the force that could cause tooth fracture or luxation. Garon and co-workers[27] also suggest a mandatory use of mouthguards in all sports with a larger number of athletes and a higher percentage of oral injuries e.g. for basketball or baseball players. Diab and Mourino[49] concur with them stating that mouthguards should be mandatory for basketball, football and baseball players alike. The results of this research are in accordance with the results obtained by McNutt and co-workers[46] who state that there are a significant percentage of injuries to the stomatognatic system in unorganized American football, baseball and basketball, while at the same time there are a negligible number of athletes actually wearing a mouthguard. Maestrello-deMoya and Primosch[32] also recommend mandatory use of mouthguards for basketball players. Flanders and Bath[33] point out in their research that out of all injuries in American football injuries to the stomatognatic system account for only 0.07% because the players have to wear a mouthguard, while 34% of basketball players were injured because none of them wore a mouthguard. Frequent and mandatory use of a mouthguard would reduce the number of injuries to the stomatognatic system in basketball players. Morrow and co-workers[54] as well as Ma[55] believe that doctors of dental medicine ought to emphasize the need for the usage of mouthguards in all sports where there is a possibility of injuries to the stomatognatic system, and especially in basketball, baseball and football where there is a greater incidence of injuries to the stomatognatic system.

Our research should be expanded to include a larger number of basketball players (juniors and seniors) in Croatia, in order to obtain further insight into injuries to the stomatognatic system in basketball players.

Conclusion

There is a significant presence of injuries to the stomatognatic system in basketball. Out of a total of 2 615 recorded injuries to the stomatognatic system seniors reported more injuries (79.8%) than juniors (20.2%). On the first place are lacerations and contusions of soft tissue 84.4% (21,5% juniors and 78,5% seniors), followed by temporomandibular joint injuries and oral muscle stiffness 13.4% (14,9% juniors and 85,1% seniors) and dental injuries with 2.2% (3,5% juniors and 96,5% seniors). Out of 195 basketball players only 6.7% of them (13 players – 2 juniors and 11 seniors) have tried to wear a mouthguard, while only one 1% of them (2 players – one junior and one senior) frequently use a mouthguard. Majority of reported injuries could be reduced, alleviated or even prevented by using intraoral custom-made mouthguards. It is therefore necessary to encourage more education and provide more information on mouthguards for basketball players, but also for trainers, parents and doctor of dental medicine in order to increase their usage.

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OROFACIALNE OZLJEDE U KOŠARCI KOD JUNIORA I SENIORA

S A Ž E T A K

Sve veća popularnost športa i vježbanja, pored zdravstvene koristi, dovodi i do većeg broja ozljeda, a dio tih ozljeda otpada na ozljede stomatognatskog sustava. Prema podatcima iz literature, stomatognatske ozljede u košarci su česte, ali relativno lagane. Košarka spada u srednjerizične športove za nastanak ozljeda stomatognatskog sustava po kategorizaciji Svjetske stomatološke udruge. Svrha ovog istraživanja bila je utvrditi zastupljenost i težinu ozljeda stomatognatskog sustava i učestalost korištenja zaštitnih sredstava kod izabranog uzorka košarkaša iz grada Zagreba i Zagrebačke županije. Uzorak se sastojao od 195 športaša koji se aktivno bave košarkom, 61 junior i 134 seniora. Prema podatcima dobivenih anketom evidentirano je ukupno 2 615 ozljeda stomatognatskog sustava, od toga juniori su zabilježili 529 (20,2%), a seniori 2 086 (79,8%) ozljeda. Najviše je zabilježeno laceracija i kontuzija mekih tkiva 84,4% (21,5% kod juniora i 78,5% kod seniora), zatim slijede ozljede temporomandibularnih zglobova i ukočenosti žvačnih mišića 13,4% (14,9% kod juniora i 85,1% kod seniora) i na kraju zabilježeno je 2,2% dentalnih ozljeda (3,5% kod juniora i 96,5% kod seniora). Samo 6,7% (13 košarkaša – 2 juniora i 11 seniora) pokušalo je koristiti štitnik za zube, dok je samo 1% (2 košarkaša – jedan junior i jedan senior) učestalo koristilo štitnik za zube. Ukupan broj ozljeda ukazuje da su športske ozljede uobičajene tijekom bavljenja košarkom. Prosječno gotovo 4 ozljede po košarkašu ukazuje na veliki broj ozljeda. Na dentalne ozljede, ozljede temporomandibularnih zglobova i ukočenosti žvačnih mišića otpada 16%. Laceracije i kontuzije mekih tkiva predstavljaju 84% svih ozljeda te one spadaju u lake ozljede i ne zahtijevaju medicinsko liječenje.

APPENDIX: QUESTIONNAIRE

1. Number: _____
2. Date of birth: _____
3. Sex: M F
4. Years of playing basketball: _____
5. Position in basketball: _____
6. Mark: Junior Senior
7. Have you ever tried to wear a mouthguard:

During practice		During games	
Yes	No	Yes	No

8. Do you frequently wear a mouthguard:

During practice		During games	
Yes	No	Yes	No

Injuries	Practice	Games	Medically treated: DMD/MD
Lip lacerations			
Internal cheek lacerations			
Tongue lacerations			
Broken teeth			
Loosened teeth			
Avulsed teeth			
Pain during opening/closing			
Oral muscle stiffness			
Injuries of temporomandibular joints			

DMD – Doctor of dental medicine, MD – Doctor of medicine