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Prevalence and Risk Indicators of Orofacial Trauma and Mouthguard Awareness Among Youth Water Polo Players

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Abstract

Background: Sports-related orofacial injuries are common among young athletes, and water polo carries a moderate risk for dental trauma. However, awareness of emergency management and mouthguard use remains limited.

Objectives: This study evaluated the prevalence of dental and orofacial trauma, avulsion management awareness, and attitudes toward mouthguard use among junior male water polo players in Istanbul.

Methods: A cross-sectional survey was conducted among 80 male athletes (8–18 years) from three youth water polo clubs in Istanbul using a structured 19-item questionnaire. The survey evaluated trauma history, avulsion management awareness, and mouthguard use. Data were analyzed using chi-square tests ($p < 0.05$).



Results: Eighty athletes were included (response rate: 94.1%). The most common orofacial injury was bruising (81.3%), followed by lip/tongue injuries (48.8%), with no reported avulsion cases. Dental trauma occurred more frequently during training (45%) than matches (13.8%) and contact with other players (52.5%) was the leading cause. Injury type was significantly associated with age group ($p=0.0056$) and weekly training time ($p=0.00795$), but not with years of experience ($p=0.352$). Awareness of avulsion management was low, and although 67.5% were aware of mouthguards, none reported using one.

Conclusions: Junior water polo players in Istanbul demonstrated limited awareness of dental trauma management and no reported use of mouthguards. Greater exposure time was associated with trauma risk, while the absence of mouthguard use despite existing awareness indicates a substantial preventive gap.

Keywords: Athletic Injuries, Mouth Protectors, Water sports, Water polo, Dental trauma

Introduction

Children and adolescents are the most affected group for traumatic dental injuries (TDIs), which are included within the broader spectrum of maxillofacial trauma (1, 2). In this age group, sports account for approximately 8.1% of maxillofacial trauma cases (3). With the increasing interest in contact sports and the early involvement of children in athletic activities, the role of dentistry in preventing dental and orofacial trauma has gained greater importance. Dental trauma not only causes pain and functional limitations but may also result in long-term esthetic and psychological consequences if not properly managed (1).

Water polo combines swimming, throwing, shooting, and grappling, and is characterized by frequent physical contact, including blocking and pushing opponents, which demands the optimization of specific physical capacities in players (4). According to the International Dental Federation (FDI) classification, water polo is considered a medium-risk sport due to frequent physical contact between players and ball-related impacts, both of which increase the likelihood of oral and dental injuries (5).

Although some sports-related orofacial injuries are unavoidable, the most effective preventive measure for dental trauma is the use of mouthguards (6). These appliances significantly reduce the risk of tooth fractures, avulsions, and soft-tissue injuries. While the use of caps with plastic ear protectors is mandatory under water polo safety guidelines, the Federation also recommends wearing a mouthguard during both training and competition (5).

However, despite the relatively high incidence of dental injuries among water polo players, mouthguard usage among young athletes remains strikingly low (7-9).

Although several investigations have been conducted in different countries, which collectively reinforce the scarcity of data on youth water polo players, the underuse of protective gear, and the need for targeted research in regions like Türkiye, data on water polo players, especially in the pediatric and adolescent age groups, remain scarce (6-9). Moreover, most available studies focus on professional or adult athletes, with limited evidence concerning young players who may be at higher risk due to insufficient knowledge, less experience, and inadequate preventive education. To date, no study has specifically explored the awareness of dental trauma and mouthguard use among junior water polo players in Turkey.

Despite the growing participation of adolescents in contact sports, limited attention has been paid to the public health implications of sports-related dental trauma in high-risk youth populations (3). Beyond individual clinical consequences, inadequate awareness of emergency management and the absence of preventive practices, such as mouthguard use, reflect a broader gap in community-based oral health education (6). Identifying trauma patterns and knowledge deficiencies in organized sports settings is essential for informing preventive strategies and structured educational interventions. Therefore, this study aimed to assess the prevalence of orofacial injuries, evaluate trauma-related knowledge, and examine preventive behaviors among junior water polo athletes in Istanbul.

Materials and Methods

Study Design and Ethical Approval

This cross-sectional study was conducted among youth water polo players competing in the 2024–2025 Turkish Water Polo Super League under the Turkish Water Polo Federation.

Ethical approval was obtained from the Clinical Research Ethics Committee of Marmara University Faculty of Medicine (Protocol No: 09.2024.663). Written informed consent was obtained from all participating athletes, their legal guardians, and respective coaches prior to data collection. All procedures were carried out in accordance with the principles of the Declaration of Helsinki.

Participants and Recruitment

Youth teams based in Istanbul were invited to participate through formal invitation letters. Enrollment was confirmed following official approval from the respective club presidents.



Male athletes aged 8–18 years who were actively participating in regular training sessions during the study period and who agreed to participate were included. Questionnaires were administered during one of the athletes’ routine training sessions.

Sample Size Calculation

The required sample size was calculated based on a previously reported dental trauma prevalence of 14.9% (9). Using a 95% confidence level and a precision of 8%, the minimum required sample size was determined to be 77 participants. To compensate for potential exclusions due to incomplete responses, the target sample size was increased to 85 athletes.

Data Collection and Questionnaire

Data were collected using a standardized, face-to-face questionnaire administered by the researchers. Prior to

completion, participants received detailed verbal instructions to ensure comprehension of all items.

The questionnaire was adapted from previously published studies evaluating sports-related dental trauma and mouthguard use (6-10). The final version consisted of 19 questions covering:

- Demographic characteristics
- History of orofacial and dental trauma
- Circumstances and causes of injury
- Awareness of tooth avulsion and emergency management
- Preventive practices and mouthguard use

The full questionnaire is presented in **Table 1**.

Table 1. *The questionnaire*

Questions	Options
1- Age?	A- 7-12 B- 13-18
2- Level of education?	A- Elementary school B- High school
3- Socioeconomic status?	A- Low B- Middle C- High
4- Current team?	Open-ended
5- How many years have you been playing water polo?	A- < 5 years. B- 5-10 years. C- >10 years
6- What is your average weekly training time?	A- <10 hours. B- 10-15 hours. C- >15 hours
7- Which injuries have you sustained during participation in your sport? (Multiple responses allowed)	A- Bruise. B- Lip and tongue injury C- Fractured tooth D- Tooth loss E- Facial bone fracture F- None
8- If you have experienced a dental injury, did you seek care from a dentist afterwards? (Multiple responses allowed)	A- No dental injury experienced. B- I did not consult a dentist. C- I consulted a dentist within 2 hours after the injury. D- I consulted a dentist within 24 hours of the accident. E- I consulted a dentist within the same week of the accident. F- I consulted a dentist within the same month of the accident. G- I consulted a dentist more than one month after the accident.
9- If you consulted a dentist, what was the type of injury and what treatment did you receive?	open-ended question
10- During which situation(s) did the injury/injuries occur?	A- No injury experienced. B- Training. C- Match / Competition
11- What was the cause of the injury? (Multiple responses allowed)	A- No injury experienced. B- Contact with another player C- Contact with the ball



12- Did you know that a tooth lost as a result of trauma can be replanted?	A- Yes B- No. C- I don't know
13- How long after the injury do you think a tooth can be successfully replanted?	A- Within 30 minutes B- Within 1 hour C- Within 6–12 hours D- Longer than 24 hours E- I don't know
14- In which storage medium should an avulsed tooth be transported to the dentist?	A- In the patient's mouth or saliva B- In water C- In milk D- In a dry tissue/napkin E- I don't know
15- Has any training on dental trauma been organized in your club?	A- Yes B- No
16- Were you aware that mouthguards can prevent dental injuries?	A- Yes B- No
17- Do you use a mouthguard?	A- Yes B- No
18- If you do not use a mouthguard, what is the reason?	A- I have never been advised to use one B- It is expensive C- It is uncomfortable D- I don't think it is necessary
19- Which of the following oral hygiene aids do you use daily? (Multiple responses allowed)	A- Toothbrush B- Dental floss C- Interdental brush D- Tongue cleaner E- Mouthrinse (mouthwash)

Statistical Analysis

Statistical analyses were performed using SPSS software version 22.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized using frequencies and percentages. Associations between variables were evaluated using the chi-square test. A p-value < 0.05 was considered statistically significant.

Results

Of the 5 water polo clubs invited, 3 of them collaborated, all 85 athletes from these 3 clubs responded to the questionnaire and 5 athletes were excluded due to missing information, constituting a response rate of 94.1%. The characteristics of the 80 participants included in this study are shown in **Table 2**.

**Table 2.** *Characterization of the whole sample.*

Characteristics	n (%)
Age	
7-12	21 (26.25%)
12-18	59 (73.75%)
Level of Education	
Elementary School	27 (33.75%)
High School	53 (66.25%)
Socioeconomic status	
Low	0 (0%)
Middle	57 (71.25%)
High	23 (28.75%)
Current team	
Galatasaray	57 (71.25%)
Kıraliada	15 (18.75%)
Adalar	8 (10%)
Waterpolo experience	
<5 years	38 (47.5%)
5-10 years	41 (51.25%)
>10 years	1 (1.25%)
Average weekly training time	
<10 hours	21 (26.25%)
10-15 hours	43 (53.75%)
>15 hours	16 (20%)

Among all athletes, the most common orofacial injury was bruising (81.25%). No cases of tooth avulsion were reported, and 10 athletes (12.5%) reported no history of orofacial injury (**Figure 1**). Among those with a trauma history, 11 (13.8%) experienced trauma only during matches, 36 (45.0%) only during

training, and 23 (28.7%) during both matches and training sessions. Regarding the etiology of trauma, 42 (52.5%) athletes reported that the trauma occurred due to contact with another player, 12 (15.0%) due to contact with the ball and 16 (20.0%) due to a combination of player and ball contact.

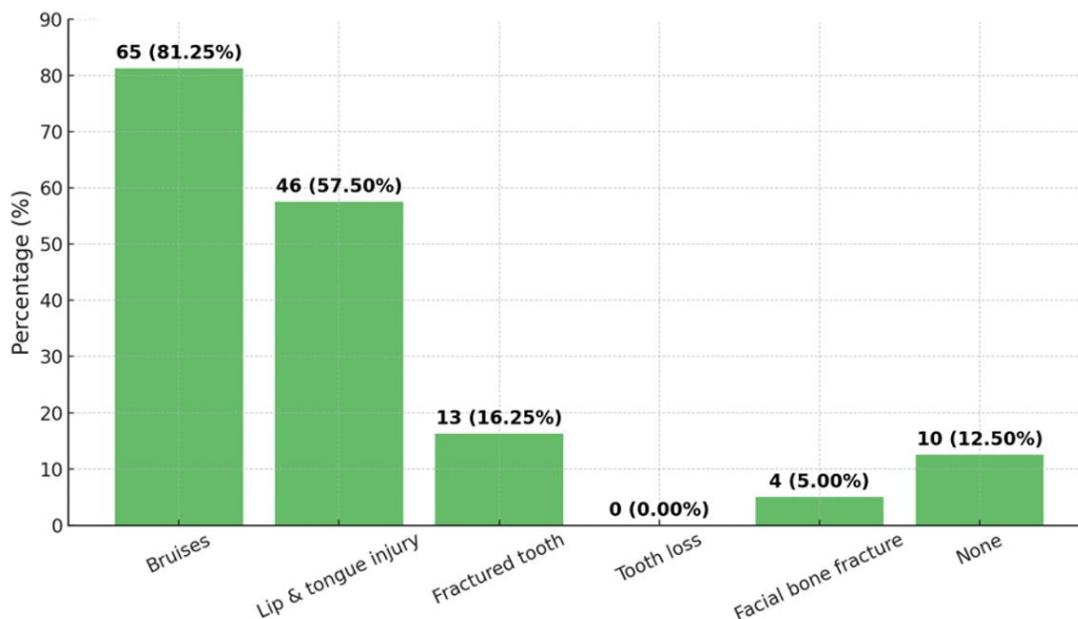


Figure.1 Distribution of Orofacial Injuries in Water Polo Male Athletes (n=80)

When the distribution of orofacial injuries was evaluated by age groups, bruises (n=52) and lip/tongue injuries (n=39) were found to be more common in the 13–18 age group. The relationship between age groups and injury types was found to be statistically significant (p=0.0056). In contrast no statistically, significant

difference was observed between the groups when the distribution was evaluated according to years of water polo experience (p=0.352). However, a statistically significant association was found between type of injury and average weekly training time (p=0.00795) (**Table 3**).

Table 3. Distribution of dental injuries by type of injury in groups of age experience and average weekly training time.

	Bruises	Lip and tongue injury	Fractured tooth	Tooth loss	Facial bone fracture	None	p
Age							0.0056
7-12	13	7	3	0	1	7	
13-18	52	39	10	0	3	3	
Experience							0.352
<5 years	27	17	5	0	0	7	
5-10 years	37	28	7	0	4	3	
>10 years	1	1	1	0	0	0	
Average Weekly Training Time							0.00795
<10 hours	13	6	3	0	0	7	
10-15 hours	38	26	8	0	4	2	
>15 hours	14	14	2	0	0	1	



p-values were calculated using the chi-square test; *p*<0.05 was considered statistically significant.

Of the 80 athletes included in the study, 66 reported no history of dental trauma. An overview of dental trauma history, dental consultation and management approaches is presented in **Figure 2**.

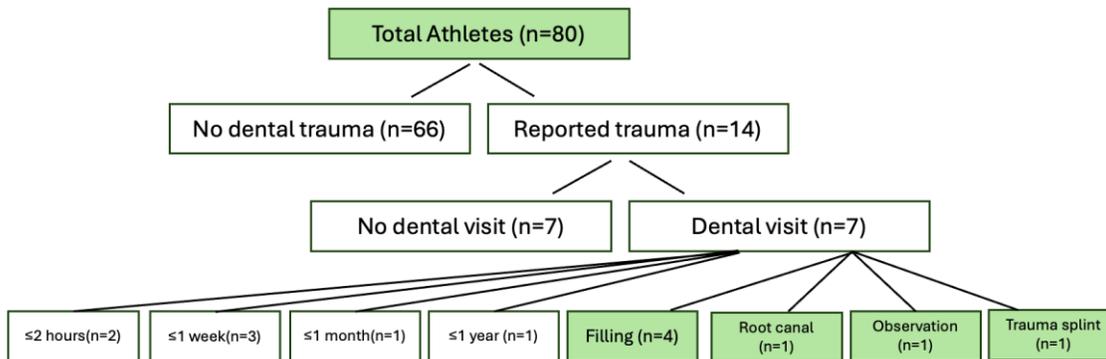


Figure.2 Flow diagram of the distribution of dental trauma history and subsequent dental management among the participating athletes

The participants’ awareness of tooth avulsion and emergency management procedures was seen generally low. Less than half of the athletes knew that an avulsed tooth can be replanted, and the proportion correctly identifying the time frame for successful replantation was particularly low. Thirty participants (37.5%)

selected dry tissue, an unfavorable option for storing an avulsed tooth. Among the more favorable choices, 19 (23.8%) preferred milk, 17 (21.3%) saliva, and 14 (17.5%) waters as storage media. Details of responses are presented in **Table 4**.

Table 4. Distribution of responses to the questions regarding awareness of tooth avulsion and corresponding emergency procedures

	True	False	Do Not Know	Correct response rate
Did you know that a tooth lost as a result of trauma can be replanted?	36	44	0	45%
How long after the injury do you think a tooth can be successfully replanted?	13	23	44	16.25%
In which storage medium should an avulsed tooth be transported to the dentist?	31	30	19	38.75%

All participants stated that no training on dental trauma had been organized in their clubs. A total of 67.5% (n=54) reported being aware that mouthguards can prevent dental injuries. However, none of the athletes reported using a mouthguard. The distribution of reasons for not using a mouthguard is presented in **Figure 3**.

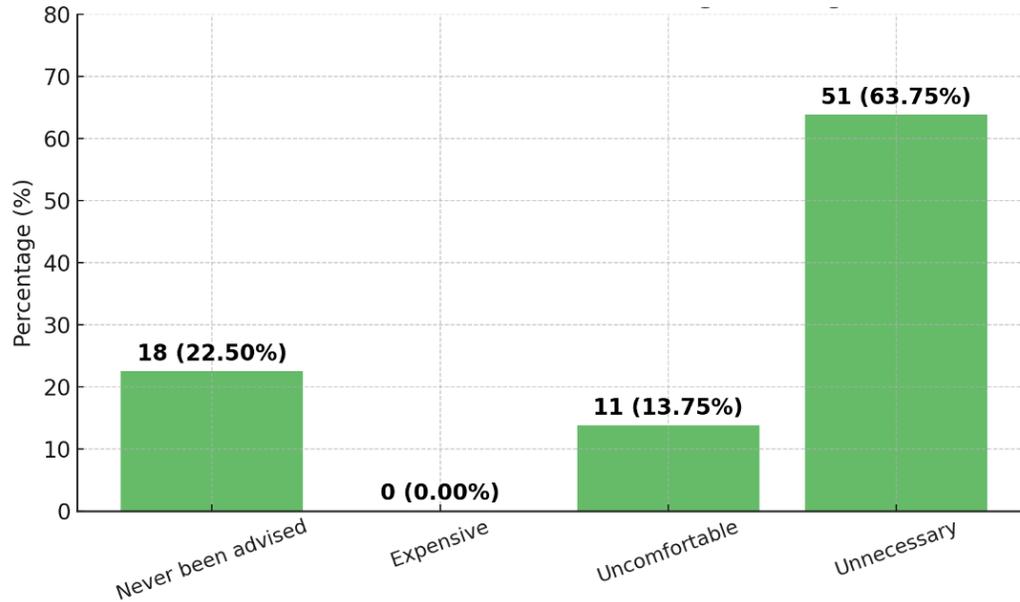


Figure 3. Distribution of reasons for not wearing a mouthguard

The majority of athletes reported regular toothbrushing, while the use of other oral hygiene aids such as dental floss, interdental brushes, tongue cleaners, and mouth rinse was considerably lower. Details of oral hygiene practices are presented in **Figure 4.**

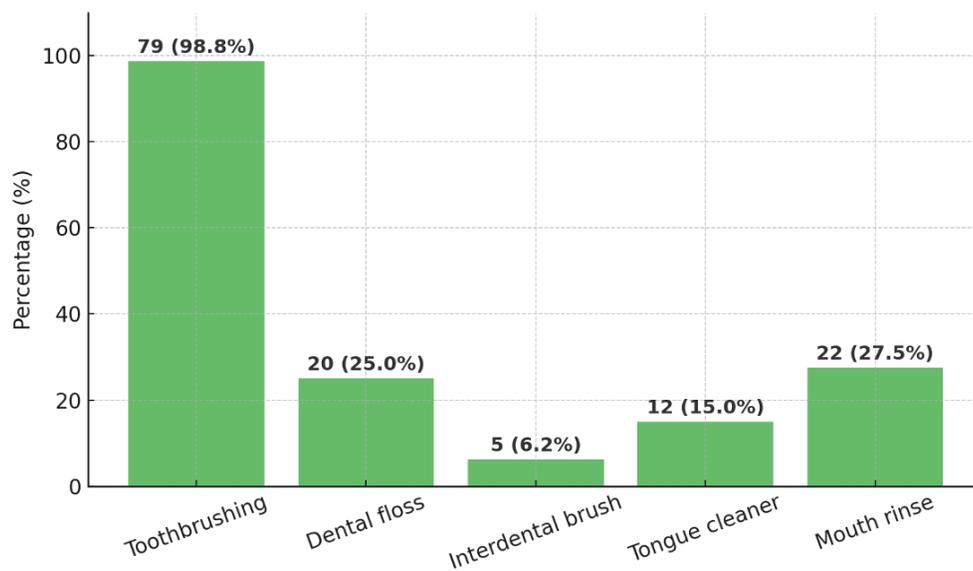


Figure.4 Oral hygiene practices of young male water polo players



Discussion

This study investigated the prevalence of orofacial and dental trauma, awareness of avulsion management, attitudes toward mouthguard use and oral hygiene habits among junior male water polo players in Istanbul. Unlike earlier reports with lower response rates, the present study reached a high level of participation (94.1%) (7). Nevertheless, this broad inclusion revealed that awareness of dental trauma management among junior water polo players remains insufficient.

Of the 80 athletes included in the study, 70 (87.5%) reported a history of maxillofacial trauma. While 87.5% reported some form of orofacial injury, dental trauma specifically was less common. The findings revealed that bruising and soft-tissue injuries were the most common trauma types, while no cases of avulsion were reported. In the present study, traumas were most frequently reported during training sessions, with the main etiological factor being player-to-player contact. Water polo is classified as a sport at moderate risk of dental trauma (5). Previous studies in water polo and other contact sports have reported dental trauma prevalence ranging from approximately 13% to 27%, with crown fractures and avulsions frequently described as common injury types (6–8,11,12). Although the reported patterns vary across age groups and competitive levels, player-to-player contact consistently emerges as the predominant etiological factor. These findings, together with our results showing high rates of soft-tissue injuries and training-related trauma, reinforce the need for preventive strategies in organized youth sports settings.

In our study, 45% of athletes were aware that an avulsed tooth could be replanted, yet only 16.3% correctly identified the appropriate time frame, and unfavorable storage media were frequently selected. Previous studies similarly report moderate awareness of replantation but poor knowledge of critical timing and transport conditions across different populations (7,11–13). Despite variations between countries and age groups, misconceptions regarding emergency management remain common. These findings emphasize the need for structured educational initiatives targeting young athletes within organized sports settings.

Although 67.5% of the athletes were aware that mouthguards can prevent dental trauma, none reported using one, revealing a significant gap between knowledge and practice. Similar discrepancies have been documented in Türkiye, where over 90% of athletes recognized the benefits of mouthguards but only 26% used them regularly (14). International literature supports this pattern: in India, 43% of children acknowledged the protective role of mouthguards yet none used them, and only 7.7% of Swiss

water polo players reported wearing one, often due to the belief that it was unnecessary (7, 12). Usage also varies widely across sports; while taekwondo and karate athletes show high compliance (73.7% and 70.7%), water polo players consistently demonstrate very low uptake—approximately 5% (6). Even among professional Croatian players with high awareness (93.9%), only 7% used a mouthguard, most commonly citing discomfort as the main barrier (8).

Recent evidence further indicates that compliance differs substantially between sports disciplines. Mouthguard use in combat sports can approach full adherence, whereas only 29.5% of team sport athletes report wearing them (17). Water polo fits this low-compliance profile, being a contact team sport with frequent physical collisions yet persistently poor mouthguard adoption. Collectively, these findings show that despite adequate awareness, multiple barriers—including perceived lack of necessity, limited recommendation by coaches, and comfort-related issues—continue to hinder actual use. The complete absence of mouthguard use in the present cohort, despite documented trauma exposure, highlights an urgent need for sport-specific preventive strategies and stronger institutional guidance to improve acceptance of protective equipment.

Knowledge deficits identified in this cohort mirror those reported in other athletic and pre-athletic populations. Even sports science students, physical education teachers, and active athletes have been shown to demonstrate limited awareness regarding the role and correct use of mouthguards (18). Given that these individuals are expected to act as informed role models for younger athletes, such low knowledge levels raise additional concern for more vulnerable or less educated groups, including athletes with disabilities or those requiring additional support. These observations underscore the need for targeted educational initiatives that address specific misconceptions and barriers within different subgroups of athletes.

Higher trauma exposure has also been reported in vulnerable athletic populations, including individuals with disabilities and chronic conditions (19,20). Despite elevated risk, mouthguard use remains consistently low across these groups. Together with findings from general athletic populations in Türkiye (21), these observations suggest that preventive gaps are systemic rather than sport specific. Community-level policies and targeted education are therefore essential to protect high-risk subgroups within organized sports environments.

Although daily toothbrushing was commonly reported, the use of additional preventive oral hygiene practices was limited. Similar patterns have been observed in other athletic populations (6,8,22),



suggesting that basic hygiene habits may not translate into comprehensive preventive behavior. From a public health perspective, integrating broader oral health promotion strategies into youth sports programs could strengthen both trauma prevention and general oral health outcomes.

The absence of organized dental trauma education within clubs reflects a structural preventive gap. Previous studies have similarly reported limited awareness and low adoption of preventive measures among athletes (7,11,13). Effective prevention therefore requires coordinated efforts between dental professionals, sports federations, coaches, and educational institutions. Although water polo is classified as a medium-risk sport according to the FDI (5), mouthguard use remains non-mandatory, which may contribute to persistently low compliance observed across different populations (6,14,21). Introducing standardized trauma-awareness programs and stronger regulatory policies within youth sports systems could substantially reduce preventable injuries and improve long-term oral health outcomes.

The main strengths of this study are its focus on junior athletes, an underrepresented group in sports dentistry. However, limitations include the single-city sample, male-only participants, and reliance on self-reported data. Future multicenter studies involving both genders and assessing educational interventions are recommended.

Conclusion

Our findings underline the urgent need for structured education and stronger policy measures, including mandatory mouthguard use, to effectively reduce the risk of dental trauma in young water polo players.

Conflict of interest

The authors had no conflict of interest to declare.

Financial disclosure

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References

- Gassner R, Tuli T, Hächl O, Moreira R, Ulmer H. Craniomaxillofacial trauma in children: a review of 3,385 cases with 6,060 injuries in 10 years. *Journal of Oral and Maxillofacial Surgery*. 2004;62(4):399–407.
- Levin L, Day PF, Hicks L, O'Connell A, Fouad AF, Bourguignon C, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: General introduction. *Dent Traumatol*. 2020;36(4):309–13.
- Mohammadi H, Roochi MM, Heidar H, Garajei A, Dallband M, Sadeghi M, et al. A meta-analysis to evaluate the prevalence of maxillofacial trauma caused by various etiologies among children and adolescents. *Dent Traumatol*. 2023;39(5):403–17.
- Spittler J, Keeling J. Water Polo Injuries and Training Methods. *Curr Sports Med Rep*. 2016;15(6):410–6.
- Federation Dentaire Internationale (FDI). Commission on dental products. Working party No. 7; 1990.
- Galic T, Kuncic D, Poklepovic Pericic T, Galic I, Mihanovic F, Bozic J, et al. Knowledge and attitudes about sports-related dental injuries and mouthguard use in young athletes in four different contact sports-water polo, karate, taekwondo and handball. *Dent Traumatol*. 2018;34(3):175–81.
- Hersberger S, Krastl G, Kühl S, Filippi A. Dental injuries in water polo, a survey of players in Switzerland. *Dent Traumatol*. 2012;28(4):287–90.
- Tadin A, Buzov J. Knowledge and Self-Assessment of Dental Injuries and Oral Health among Croatian Professional Water Polo Players: A Cross-Sectional Study. *Sports (Basel)*. 2023;11(11).
- Zamora-Olave C, Willaert E, Montero-Blesa A, Riera-Punet N, Martinez-Gomis J. Risk of orofacial injuries and mouthguard use in water polo players. *Dent Traumatol*. 2018;34(6):406–12.
- Lieger O, von Arx T. Orofacial/cerebral injuries and the use of mouthguards by professional athletes in Switzerland. *Dent Traumatol*. 2006;22(1):1–6.
- Lang B, Pohl Y, Filippi A. Knowledge and prevention of dental trauma in team handball in Switzerland and Germany. *Dent Traumatol*. 2002;18(6):329–34.
- Pranitha V, Mounika PB, Dwijendra SK, Shaik N, Ramana PU, Meghana C. Sports Cult in Hyderabad: Role of a Pedodontist in Protecting Winning Smile. *Int J Clin Pediatr Dent*. 2021;14(5):652–6.
- Świątkowska M, Kargol J, Turska-Szybka A, Olczak-Kowalczyk D. What do polish parents know about dental trauma and its management in children's



- treatment? A questionnaire study. *Acta Odontol Scand.* 2018;76(4):274–8.
- 14.** Baglar S, Kurdal M, Torun E. Evaluation of Turkish Athletes' Awareness Regarding the Use of Mouthguards. *Current Research in Dental Sciences.* 2025;35:128–32.
- 15.** Özkal Eminoğlu D, Kaşali K, Gençoğlu C, Ulupınar S, Özbay S, Şeran B, et al. Mouthguard use, hygiene, and maintenance practices among combat and team sports athletes: A comparative study. *PLoS One.* 2025;20(1):e0317952.
- 16.** Sogukpınar A, Eroğlu H, Aksoy C. Faculty of sports science students, physical education teachers, and athletes' level of knowledge and attitude about mouthguards. *BMC Oral Health.* 2024;24.
- 17.** Gerreth K, Hoffmann-Przybylska A, Kicerman M, Alejski M, Przybylski P. Traumatic Dental Injuries Among Individuals with Disabilities and Chronic Diseases Practicing Sports. *J Clin Med.* 2025;14(14).
- 18.** Dagon N, Blumer S, Peretz B, Ratson T. Prevalence of dental trauma in individuals with special needs participating in local Special Olympics games. *Spec Care Dentist.* 2019;39(1):34–8.
- 19.** Topdağı B, Özen GY, Özen AK. Mouthguard use and awareness among athletes in Turkey: a cross-sectional study with multivariable analysis. *BMC Sports Sci Med Rehabil.* 2025;17(1):339.
- 20.** Zebrauskas A, Birskute R, Maciulskiene V. Prevalence of Dental Erosion among the Young Regular Swimmers in Kaunas, Lithuania. *J Oral Maxillofac Res.* 2014;5(2):e6.