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Basketball players' experience of dental injury and awareness about mouthguard in China

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Abstract – The objective of the present study was to describe the occurrence of orofacial, particularly dental injuries in basketball, and to survey the athletes' awareness concerning the use of mouthguards during basketball training and competition. A pilot questionnaire was designed and tested with basketball players. Two hundred and thirty-six male athletes were surveyed. Seventy-seven players were professional players. Exactly 80.6% professionals and 37.7% semi-professional athletes had an experience of oral soft tissue laceration and dental injuries in basketball practice. The difference between the two groups is significant. The incidence of dental and oral injuries was related to the length of training time. About 59% of the athletes ranked the risk of orofacial and dental injury in basketball as medium. Although the awareness of mouthguards among the basketball players was very high (80.1%), only one of them had used the custom-made mouthguard. Most of the athletes gained the knowledge about mouthguards from foreign players (33.5%), media (24.8%) and teammates/classmates (24.3%). The influence of dentists was very weak. Athletes should be informed about the high risk of oral injuries when participating in contact sports. Dentists should play a more significant role in the program of promoting mouthguard use to prevent the occurrence of oral injury in sport participation.

The mouthguard is a resilient appliance placed in the mouth to reduce injuries, particularly to the teeth and surrounding structures. The value of mouthguards in contact sports has been described. The protective roles of a mouthguard are: (i) preventing the tongue, lips, and cheeks from laceration against the teeth; (ii) lessening the risk of injury to anterior teeth following a frontal blow; (iii) lessening the risk to posterior teeth of either jaw; and (iv) lessening the risk of concussion from impacts to the lower jaw (1, 2).

Basketball is recognized as a contact sport with injuries occurring as a result of direct or indirect player-to-player and ball-to-player contact. Compared with other sports, orofacial injuries in basketball are frequent. Injuries to the lower limb are the most common, followed by back, wrist, hand, and fingers (3, 4). Approximately 10% of all injuries in basketball involved the head, neck, or orofacial areas (4). A New Zealand study found that basketball was the third highest contributor to dental injuries compared with the top 10 sports (5). A prospective study of Minnesota high school basketball athletes reported a high proportion of orofacial injury (55.4% player per playing year), and two other surveys among US basketball players showed the incidence of dental injuries were above 30% (6–8). Basketball carries quite a high risk of dental trauma and there is not yet any regulation or recommendations concerning mouthguards.

In China, basketball is very popular among youth and adults. According to a recent public opinion poll conducted in the cities, basketball is one of the most commonly practiced sports. Dental injuries occur during basketball training and games frequently. Reporting such high frequency of dental trauma and, mouthguard is very important in a protective role. On the other hand, public knowledge of dental injury prevention is very limited. Most people have never heard of the mouthguards.

The aims of the study were twofold: to describe basketball players' experience of dental injury and to assess their knowledge concerning the value of mouthguard for injury prevention.

Materials and methods

Study sample

The purpose of this study was explained to the basketball players, and informed consent was obtained from those who agreed to answer a detailed questionnaire. The sample of 236 male basketball players was recruited in 2005 from Beijing Sports University and several basketball clubs belonging to the Chinese Basketball Association (CBA). They were professionals and semi-professionals.

The questionnaire

A pilot questionnaire (Table 1) was designed and tested with the basketball players. The questionnaire contained five demographic questions including the following items: age, height, weight, education, and the time of

Table 1. Questionnaire for the basketball players

No.	Question
1	Age
2	Height
3	Weight
4	Education
5	How long have you been practicing basketball?
6	Have you ever experienced a soft-tissue injury around the mouth and/or dental injuries during training or competitions? (yes, no) If yes, what sort of dental injury? (soft-tissue laceration, tooth fracture, dislocation, avulsion)
7	Please evaluate the risk of dental trauma in basketball (high, medium, low).
8	Are you aware of mouthguards as a preventive device against dental trauma? (yes, no)
9	From whom did you get the advice to use a mouthguard? (coach/teacher, teammate/classmate, foreign athlete, dentist, media)
10	Do you know which kind of mouthguard is best for preventing dental trauma? (stock, boil and bite, and custom-made)
11	Have you used a mouthguard during training and competition? (yes, no)
12	Why did you not accept a mouthguard? 1) I did not know that mouthguards can prevent dental injury. 2) It is unnecessary to wear the mouthguard. 3) I do not know where I can get the mouthguard. 4) I am afraid that it will be uncomfortable to wear the mouthguard. 5) The mouthguard is too expensive.
13	Do you have any plan to use a custom-made mouthguard after this survey? (yes, no)
14	What color would you like to choose if you buy a custom mouthguard? (vivid single color, multiple color, colorless and translucent)

basketball training. There were eight multiple choice questions dealing with the knowledge and attitude toward mouthguards, the evaluation of the dental injury risk in basketball, and the awareness of dental injury prevention. An epidemiological survey was carried out among the basketball players. The purpose was to evaluate the prevalence of oral trauma which occurred in basketball practice, as well as to analyze the type of injury.

Management of data

All data were entered into the SPSS 10.0 (SPSS Inc., Chicago, IL, USA) database. Descriptive statistics were used for the data while the chi-square statistic was employed to test the significance of association between variables.

Results

All the athletes were males. The average age, height, weight, and length of training time are shown in Table 2. All the semi-professionals were undergraduates. In the professional group, 57 (74.0%) players' education experience was equal to junior college or higher. The others were in high school.

The total number of dental and oral soft-tissue injuries experienced during the basketball training and matches was 122 which was divided into the following categories: (i) injury to the soft tissues (lips, oral mucosa); and (ii) hard and periodontal tissues of teeth, such as: tooth fracture, lateral dislocation, and avulsion. The oral injury incidence in the professional players was 80.5%, and in the semi-professionals 37.7%. The difference between professionals and semi-professionals was significant ($P < 0.01$, two-sided). In each training age group, the incidence of oral injury was different ($P < 0.05$, two-sided). There was an increasing trend correlated with the length of training period ($P < 0.01$, two-sided). The results are shown in Tables 3–5.

In the item 'Please evaluate the risk of dental trauma in basketball', most of the athletes ranked it medium. Among the male players who regarded basketball as a high-risk sport, the number of professionals was more than semi-professionals. The result is shown in Table 6.

Most players (189, 80.1%) declared that they were aware that the mouthguard could prevent dental trauma occurring in basketball training and competition. In the

Table 2. General status of the athlete

Average	Professional	Semi-professional
Age (year)	25.3	21.9
Height (cm)	197.3	184.5
Weight (kg)	91.2	77.7
Training period (year)	11.2	4.3

Table 3. Oral injury incidence in basketball players [*n* (%)]

	Professional	Semi-professional
Injured	62 (80.5)	60 (37.7)
Not injured	15 (19.5)	99 (62.3)

Table 4. Types of oral injury [*n* (%)]

Type of injury	Professional	Semi-professional
Soft-tissue laceration	20 (32.2)	41 (68.3)
Tooth fracture	8 (12.9)	4 (6.7)
Dislocation	8 (12.9)	5 (8.3)
Avulsion	5 (8.1)	0
No detail	21 (33.9)	10 (16.7)

Table 5. Incidence in various groups of training time

	Length of training time (year)						
Group	<2	2–4	4–6	6–8	8–10	10–12	≥12
Total (*n*)	26	74	49	37	14	12	24
Injured (*n*)	7	33	20	22	11	9	20
Incidence (%)	26.9	44.6	40.8	66.7	78.6	75.0	83.3

Table 6. The risk of dental trauma in basketball [*n* (%)]

Rank of risk	Professional	Semiprofessional
High	27 (35.1)	28 (17.6)
Medium	45 (58.4)	95 (59.7)
Low	5 (6.5)	36 (22.6)

Table 7. Reasons of not accepting mouthguard

Reason	Number*	Percentage (%)
Never known its function	18	7.6
Cannot get it	55	23.3
It is not necessary	67	28.4
Disturbing/uncomfortable	63	26.7
Too expensive	32	13.6

*Total number was 236, one player had ordered a mouthguard.

item 'From whom did you get the advice to use a mouthguard?', most of the players received information about mouthguards from foreign athletes (33.5%), media (24.8%) and teammates/classmates (24.3%). Others included teachers/coaches (11.2%). Only 6.3% learned about the mouthguard from a dentist.

In the question 'Which kind of mouthguard is best for preventing dental trauma?', most (80.5%) of the players thought that the custom-made mouthguards were better than boil and bite mouthguards and stock mouthguards. Others believed the opposite. Only one player used a custom-made mouthguard that represented 0.4% of the total. For the item 'Why didn't you accept the mouthguard?', the answers are shown in Table 7.

In the item 'Do you have any plan to use a custom-made mouthguard after this survey?', approximately half of the players answered 'yes' while the other half answered 'no'. For the item 'What color would you like to choose if you buy a custom-made mouthguard?', there were answers such as colorless and translucent (43.2%), multiple color (35.6%), and vivid single color (21.2%), respectively.

Discussion

Injuries to the orofacial area often mean life-long sequelae with considerable follow-up costs. Different studies have shown that such injuries could be significantly reduced or even avoided by wearing a mouthguard (1, 2, 8–13).

We must face an unfortunate reality that the area of sport dentistry in China is almost not existent. No report about dental injury incidence of Chinese athletes has been previously presented. In this study, the professional athletes' average age was 25.3 years and the semi-professionals' average age was 21.9. The participants' age seemed older than that of some similar studies (6, 7, 14, 15), but close to the athletes' age in other surveys (13, 16). In the present study, the incidence of oral injury in professional basketball athletes was reported as 80.5%. This was higher than the semi-professionals' (37.7%) and the results of other similar surveys (6–8, 13–16). This value reflected the athletes' dental and oral injury experience during their entire basketball career, not just a single competition season or playing year. The professional players' average career period was more than 11 years and most of them played in the domestic elite field. The cumulative total of oral injury, just like other sport trauma, was less for athletes whose training period was shorter and competition level was lower, and vice versa. The statistical analysis results proved that the incidence of dental and oral injuries was related to the length of training time. On the other hand, the oral injury's components in reviewed similar studies were not identical. In the present study, oral injury was divided into soft-tissue laceration, tooth fracture, dislocation, and avulsion. Soft-tissue laceration was not included in a Swiss survey (16). Other items, such as hematoma, jaw dislocation, jaw soreness, jaw fracture, cerebral concussion, and severe craniocerebral injury were also included partially in some studies (6–8, 11, 13, 15). In a survey of professional athletes in Switzerland (13), the ratio of basketball players' soft-tissue laceration was 57%. Others were tooth fracture (27%), tooth dislocation (6%), avulsion (4%), and cerebral concussion (6%). Soft-tissue laceration occurred most frequently in the present study as well as in other surveys. The ratio was 32.2% in professionals and 68.3% in semi-professionals. The professionals' total incidence of dental injuries was 33.9%. It included eight tooth fractures (12.9%), eight tooth dislocations (12.9%), and five avulsions (8.1%) separately. The ratios were all higher than that of a Swiss study among the semi-professionals in which there were four tooth fractures (6.7%), five dislocations (8.3%), and no avulsion. It should not be neglected that 21 professionals (33.9%) and 10 semi-professionals (16.7%) had not described the detail of oral injury in present study. It reflected that most athletes always pay more attention to severer trauma which might affect their sports career but ignore the 'milder' injury. It also demonstrated that sports dentistry was absent in China in another aspect. When a professional athlete suffered an oral or dental trauma, he or she only obtained the treatment from a team physician but not a dentist usually unless the injury was very severe. It induced no clear diagnoses.

Forty-five professional athletes (58.4%) and 95 semi-professional players (59.7%) regarded the risk of dental injury in basketball as medium. It was similar to the previous survey (17). The difference comparing the professional athletes and semi-professional players was significant in the group of high- and low-risk groups. Twenty-seven professional players (35.1%) ranked the risk as high (vs 17.6% semi-professionals). Thirty-six semi-professional players (22.1%) ranked the risk of basketball as low (vs 6.5% professionals). The difference is easy to explain. The risk is related to the competition level. If the competition level was higher, then there existed more risks of dental and oral injury.

The present study demonstrates a marked discrepancy between the players' awareness of preventing dental trauma and their reported behavior. While most of the players (80.1%) acknowledged the value of mouthguards in the prevention of dental injury, the ratio of mouthguard wearing in these basketball players was very low. Only one semi-professional (0.4%) had used a custom-made mouthguard. It is a low figure compared with US basketball surveys (4.4%) (6), a Brazilian study (2.1%) (18), and a Swiss study (1.4%) (16). In an Australian survey (15), the ratio of mouthguard use was 25%.

Although most athletes in this study regarded basketball as a medium- or high-risk sport, 28.4% players insisted that it is not necessary to wear a mouthguard in basketball training and games. Exactly 26.7% athletes considered that it was not comfortable and that it would hinder communication. It demonstrated that people's behavior mode was very difficult to be changed. The only player wearing a mouthgurd in our study ordered the mouthguard after a severe dental injury, in which a strong impact occurred during basketball training and two incisors were dislocated. This incident demonstrated a typical human attitude. People will only start to think about prevention once an accident has happened. The reasons stated for not wearing mouthguards varied and were identical with other surveys (13–15, 19–21). In this survey, 23.3% players expressed that they did not know where they could buy a mouthguard or who could make a mouthguard for them. Several of the players have tried to use the boil and bite mouthguard but failed whereas others had never actually seen a mouthguard. The athletes did not have much information about professionally fitted mouthguards.

Although only 13.6% players considered the custom-made mouthguard too expensive, the price of a mouthguard appeared to be a barrier restricting its popularity. In the Chinese capital of Beijing, the cost of a custom-made mouthguard is approximately RBM 400–560 (US$50–70). The price cannot be paid very easily, especially by growing youths who should replace the mouthguard regularly. Due to the high price, the cheaper boil and bite mouthguard should be popularized in growing youth who participate in contact sports exercise frequently. But dentists have the obligation to help the users achieve good occlusal relationships (22). Promoting awareness of using a properly fitted mouthguard in contact sports is necessary, especially among children because a child is more willing to accept new things than an adult. A good habit should be established in childhood.

The results of this study embarrassed our dentists very much. We had to face the fact that dentist's influence in the area of dental trauma prevention and mouthguard popularization was very weak. In the present study, the dentists were ranked behind the foreign athletes, media, teammates/classmates, and teachers/coaches in the queue of influence force. It should be emphasized again that the area of sports dentistry in China is almost not existent. Mouthguard have never been taught in Chinese basic dental education courses. Even among general dentists and dental school students the awareness of sports dental trauma prevention and the knowledge of mouthguards were very limited. Only certain specialists can make custom-made mouthguards for the amateur athletes. It should be the combined duty of dentists, sports physicians, and coaches to encourage the use of mouthguards during training and games (13, 16, 23).

Conclusion

This study demonstrated a high incidence of oral injury and a high risk of potential injury during basketball training and competition. Limited knowledge about oral injury prevention and limited use of mouthguards are a reality. Athletes and the public should be informed about the high risk of oral injuries when participating in contact sports. The use of mouthguards among athletes of various levels should be promoted in China. Physicians and dentists need to recommend a more intensive education of students in sports medicine and sports dentistry.

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