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Oro-facial injuries and mouthguard use in elite female field hockey players

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Abstract – The objectives of this study were to assess the prevalence of oro-facial injuries, frequency of mouthguard use and players' attitudes towards the use of mouthguards among elite English female field hockey players. All 140 players of the English Hockey Association female Premiere League were asked to complete a questionnaire. Main outcome measures were prevalence of oro-facial injuries, frequency of wearing of mouthguards and attitudes to mouthguard wearing. One hundred and ten completed questionnaires were returned (79% response rate). Facial injuries were common. Nineteen percent had sustained dental injury. Five percent of the respondents had at least one tooth avulsed. Eighty-eight percent of the players said that they owned a mouthguard. Mouthguards were worn regularly during matches by 69% but were used less frequently during training. Six percent thought that mouthguards were ineffective. Eighteen percent of the subjects refused to play if they did not have their mouthguard. Sixty-nine percent of the subjects felt that the mouthguards should be worn compulsorily at all times during the game. The following were finally concluded from the study: oro-facial injuries were commonly reported; 88% of the players possessed a mouthguard; and mouthguards were worn regularly during matches by 69% but were used less frequently during training.

Although field hockey is classified as a non-contact sport, accidental contact can occur with other players' heads, elbows and shoulders as well as from the stick and the ball. A hockey stick can weigh up to approximately 750 g and can be made of any material other than metal. It is fabricated most commonly from wood or composite, and can be reinforced with Kevlar, carbon fiber and fiberglass. The hockey ball is hard and weighs approximately 160 g. It can reach speeds of more than 70 km h^{-1}. Rules state that the hockey stick should not be raised above shoulder height and the ball must be played along the ground, in a non-dangerous manner, unless it is a shot at goal. Despite this, both stick and ball are capable of inflicting significant accidental damage.

There is little information regarding the prevalence of oro-facial injuries in field hockey. A previous survey of 279 players from 15 different countries was conducted by Bolhuis et al. (1) at major international hockey tournaments. It was found that 54% of the players had sustained oro-facial injuries that resulted in a visit to a physician or a dentist.

Hockey players use a variety of personal protective equipments including protective headgear, padded gloves, shin pads and mouthguards. At present, in England, mouthguards are not mandatory in the game of field hockey. The English Hockey Association (EHA) and the International Hockey Federation (FIH) however strongly recommend in the 'Rules of Hockey' that players wear them at all times when participating in the sport (2). Furthermore, the EHA insists that it is compulsory for all current international players to wear a mouthguard at all times, during both training and matches. The study by Bolhuis et al. (1) determined that less than 25% of the international players wore a mouthguard consistently during matches and training.

There is therefore a lack of information regarding both the prevalence of dental injuries and the use of mouthguards in field hockey. The objective of the study was to assess the prevalence of oro-facial injuries, frequency of mouthguard use and players' attitudes towards the use of mouthguards among elite English female field hockey players.

Methods

A questionnaire (Table 1) was distributed by post to the 140 players in the 10 teams of the Premier Division of the English Hockey League. All players in all of the teams were asked to complete the questionnaire. Goalkeepers were excluded from the study because, in the premier division, they wear helmets with full-face protection and are exempt from wearing mouthguards.

The information requested related to the following:

1. Age.
2. Standard (level) at which hockey had been played.
3. Number and type of oro-facial injuries sustained.
4. Whether a mouthguard was worn when injured.
5. Frequency of wearing of the mouthguards.

Table 1. The questionnaire

How many mouth and facial injuries have you sustained playing hockey?
1. How many of these resulted in the need to consult a doctor or dentist?
2. What was the nature of the injury (injuries)?
3. Were you wearing a mouthguard at the time of injury?
4. Are you aware of the recommendations regarding mouth protection in the rules of hockey?
5. Do you think that you comply with these rules?
6. Do you own a mouthguard? (If no, please move to question 13)
7. How effective do you think your mouthguard is in protecting your mouth?
8. After how many years of playing hockey did you start wearing a mouthguard?
9. What type of mouthguard do you have?
   – Preformed shop bought
   – Mouth formed/Hot water mouth moulded
   – Made by dentist/technician from impressions of the mouth
10. When do you wear your mouthguard?
   – During matches
   – During training
   – During matches and training
   – Sometimes
   – Hardly ever
   – Never
11. Would you refuse to play a hockey match without your mouthguard?
12. What do you perceive as the problems in wearing a mouthguard?
13. Do you think the use of mouthguards should be compulsory?

6. Knowledge of regulations and recommendations about mouthguard use.
7. Attitudes to mouthguard wearing.

The completed questionnaires were returned anonymously by the respondents in self-addressed, prepaid envelopes.

Results

One hundred and ten completed questionnaires were returned with a response rate of 79%. The age distribution of the respondents is given in Fig. 1. Fifty-one percent of the subjects were aged 20–25. The highest standard at which the respondents had played hockey is shown in Table 2. Sixty-five percent of the players had played international hockey at either Under 21 or the senior level.

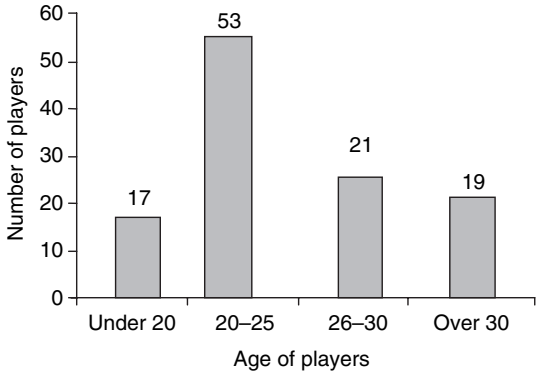


Fig. 1. Age distribution of the respondents (n = 110).

Table 2. Standard at which hockey had been played

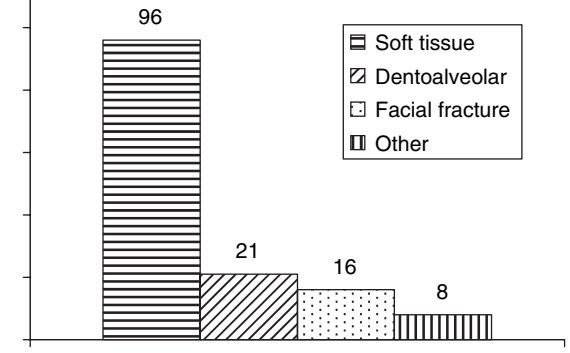
Standard (level)	*n*
Senior international	39
Under 21 international	33
Under 18 international	17
Under 16 international	3
Territory	13
County	5

Oro-facial injuries

Sixty-eight percent of the respondents had sustained an injury to the face. The nature of the injuries is summarized in Fig. 2. Of these injuries, 67% resulted in a visit to the doctor or dentist.

The most common injury (37%) was soft tissue damage. Thirty-two percent had suffered a black eye and 18% had injured their nose. Eleven percent had broken facial bones with 4% having fractured bones at least once. Nineteen percent had suffered some type of dental trauma. Ten percent reported loosened teeth, 5% had avulsed at least one tooth and 3% had broken a tooth. Table 3 shows the number of injuries per player. Forty-three percent had sustained three or more oro-facial injuries. Sixty percent of the subjects were wearing a mouthguard at the time of the injury.

(a)



(b)

Nature of injury	Tooth avulsion	Loose tooth	Broken tooth
Number of injuries	6	11	4

Fig. 2. (a) Number of injuries sustained; (b) number of dental injuries sustained.

Table 3. Number of oro-facial injuries sustained per player

Number of injuries reported	0	1	2	3 or more
Number of players	28	12	27	47

Table 4. Reported wearing of mouthguards (%) during matches and training

Percentage	Always	Sometimes	Rarely	Never
Matches	69	12	7	12
Training	50	22	16	12

Attitudes to mouthguard use

Only 56% of the respondents stated that they were aware of the EHA and FIH recommendations regarding the wearing of mouthguards. Forty-two percent of the subjects stated that they believed that they complied with the regulations. Seventeen percent said they did not comply and 41% were unsure.

Fifty-four percent of the subjects thought of mouthguards as being very effective, 38% fairly effective and 6% thought them to be ineffective. Eighteen percent of the subjects would refuse to play if they did not have their mouthguard. Sixty-nine percent of the subjects felt that the wearing of mouthguards should be compulsory at all times during the game.

Mouthguard use

Eighty-eight percent of the players said that they owned a mouthguard. Of those, 96% wore custom-made mouthguards. The remaining 4% were of the 'boil-and-bite' type. No subjects had stock (preformed) mouthguards. Forty-nine percent of the subjects started wearing a mouthguard within 1 and 3 years of first playing hockey, while 18% waited for at least 6 years.

The pattern of mouthguard use is shown in Table 4. Only 50% (55) of the subjects reported wearing their mouthguard all the time during training; nearly half of these were senior players. Twenty-two percent of the players wear their mouthguards only sometimes and 16% rarely wear them.

The most commonly reported disadvantage of wearing a mouthguard was the effect on speech with 55% stating this as being a problem. Forty-one percent reported that their breathing was adversely affected and 26% found their mouthguard uncomfortable to wear. Other reported problems included expense, poor appearance and the belief that they were unnecessary.

Discussion

Prevalence of injuries

Elite level field hockey is highly competitive and can be played aggressively. This survey of elite players has confirmed that accidental injuries are common. Just more than two-thirds of the respondents had suffered damage to face, mouth and/or teeth at some time while playing hockey. Two-thirds of those injuries had required a visit to a doctor or dentist, which is slightly greater than that previously reported by Bolhuis et al. (1).

The figures may be an underestimate as players may have suffered knocks and bruises, which they considered to be insignificant or did not remember. More than 40% had suffered more than three injuries.

Although most injuries were soft tissue trauma or bruising, many had suffered fractures of facial bones and damage to teeth. The distribution of the dental injuries differs from that previously reported for rugby (3) and basketball (4). In those sports fractured teeth are relatively more common than avulsed teeth. The difference could be explained by the damage in hockey being due to stick or ball. It is also possible that the relatively high number of loosened teeth could be because of a mouthguard dissipating the traumatic force resulting in loosening of the teeth rather than fracture. It was not possible to determine accurately from the questionnaires whether or not a mouthguard was worn when dental damage occurred.

The predictability of oral and facial injuries makes it important that teams have personnel in attendance at training and matches who are skilled in the diagnosis and early emergency care of sports-related injuries. Personnel should also have knowledge of emergency medical and dental care facilities so as to be able to arrange appropriate further management.

Risk factors for sports injuries have been discussed by Tesini and Soporowski (5). Administrative bodies should consider whether there are actions that could be taken to reduce risks, perhaps by amending laws of the game or by more vigorous enforcement of the existing laws. The use of protective equipment such as mouthguards should be encouraged or made mandatory. Implementing mandatory use should not be difficult at this level as almost 70% believed that the use of the mouthguards should be compulsory.

Attitudes to mouthguard use

The recommendations of the international hockey organizations do state that players are advised to wear mouthguards at all times while participating in the sport. They do not distinguish between match play and training. As most players questioned had played hockey at international level at some point during their career it was expected that their awareness would be high. This was not found to be the case. This may be considered disappointing because international players have the greatest access to support and information from the governing bodies of the sport, and they should be the most knowledgeable.

While only 6% of the respondents believed mouthguards to be ineffective most players were prepared to play a match without one. The reason for this may be associated with the problems related to the use of mouthguards. Communication is important in hockey. Just more than half of the respondent players felt that their speech was affected, which might diminish compliance. Hockey is played at high intensity, so any effect on breathing is a major consideration and 41% complained

of effects on breathing. Sixty-nine percent of the players felt that the use of mouthguards should be compulsory. If the choice is there, then often not wearing one may be the more convenient option.

Mouthguard use

The fact that 88% of the players possessed a mouthguard compared with only 43% of those international players who took part in a previous study undertaken between 1984 and 1985 is encouraging. This increased use parallels that seen in international rugby players in the United Kingdom (6).

It is interesting that the majority of the subjects wore custom-made mouthguards. These are generally considered to provide greatest comfort and protection but are considerably more expensive than mouthguards bought from sports shops. Custom-made mouthguards are more readily available than they were previously with several dental companies specializing in the provision of mouthguards to schools and clubs. The subjects in the present study may have been well informed about the relative advantages of custom-made mouthguards and have had ready access to a provider.

Players tended to wear mouthguards more often during matches than training. This may be because of competitiveness and aggression seen during match play. It is a concern however, as training can also be of a very high intensity, especially if players are fighting for team positions. Players also tend to spend a much larger proportion of their time on the training field preparing for games, which increases their exposure time to possible injuries.

Further investigation

The present study has identified that elite female field hockey players have a high risk of oro-facial injuries. It is recognized that the risk for injury can increase with the level at which it is played because of both increased commitment and time spent playing and training. Inexperienced players however are less skilled and in the case of field hockey less adept at stick control. Further studies are therefore needed at all levels to assess risk of injury and arrangements in place for emergency medical and dental care. The need for the promotion of mouthguard wearing among field hockey players needs to be assessed.

Conclusions

There was a high prevalence of oro-facial injuries among the elite female hockey players. Eighty-eight percent of the players possessed a mouthguard. Mouthguards were worn regularly during matches by 69% of the respondents. Mouthguards were used less frequently during training than during match play. Attitudes to mouthguard wearing were generally positive. Six percent of the respondents believed that mouthguards were not effective.

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