

# Knowledge regarding avulsion, reimplantation and mouthguards in high school children: Organised sports-related orodental injuries

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## ABSTRACT

**Purpose:** To assess knowledge, awareness and attitude of high school children involved in various sports activities regarding avulsion, reimplantation and mouthguard use. **Materials and Methods:** An interview-based study was conducted among high school children in the age group of 8–16 years ( $n = 1105$ ). A questionnaire was given to children and parents which included questions based on knowledge of children regarding avulsion, reimplantation, consequences of losing teeth, mouthguards and their usage and preferred media for tooth transportation. The research proposal was submitted to the ethics committee and the study design was approved. Data analysis included descriptive statistics and Statistical Package for the Social Sciences (SPSS) software. **Results:** Only 37.6% of the children knew that their teeth can be completely knocked out with injury and 20.1% knew that a knocked-out tooth can be replanted. The preferred media for tooth transportation were gauze/cotton (27.2%), handkerchief (17.5%), paper (14%), water (13.8%) and cellophane (1.3%), i.e. 81.3% of the children preferred dry transport media. Among the children playing contact sport, 53.8% did not know about mouthguards and the rest 46.2% knew about it, but most of them never used it. **Conclusion:** Considering the lack of awareness among children, as well as the people around them, there appears to be a crucial need for education of public and to determine dental manpower and dentists to increase awareness.

**Keywords:** Avulsion, mouthguard, reimplantation

## Introduction

Children are unique in their stages of development. The tender minds of children are subjected to amalgamation of different experience during the formative age. These dynamic changes in early years if hampered by traumatic injuries can leave indelible imprints on their whole life.

A significant number of oral and dental injuries in children result from participation in contact sports. The age range from 8–10 years also coincides with the period of development of the permanent incisors' roots.<sup>[1]</sup>

Among dental traumatic injuries, avulsion results in major functional and aesthetic disturbances for patients. The incomplete radicular formation of central incisors and lack of resilience of the periodontal ligament at these ages may explain the dislocation of the tooth from its alveolus even with light horizontal impacts.<sup>[2]</sup>

According to the International Academy for Sports Dentistry (ASD), the main goals of sports dentistry include

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prevention and treatment of sports-related dental/orofacial injuries, information collection, information dissemination and promotion of research on the preventive procedures related to injuries of such a specific aetiology (Ranalli, 2002; Kumamoto and Maeda, 2004).<sup>[3,4]</sup>

In a developing country like India, where economic constraints cannot be neglected, the need for knowledge of health economics is even more important as a basis for judging health gain in curative and preventive care. The best prevention of dental and oral injuries is by educating children, teenagers, their parents, school sports authorities and coaches on how to avoid injuries and manage them.

There is a plethora of literature reporting different occurrence rate of traumatic injuries to dentofacial structures during sports. Most of the literature is available from industrialised nations, whereas from developing country like India, the data are scarce. Hence, to add to the available literature, the present study was carried out in regions of north India, including Patiala, Chandigarh, Ambala and Kurukshetra, to know the knowledge, awareness and attitude of children about the different prevention and treatment modalities available in case of organised sports-related orodental injuries.

## Material and Methods

A total of 1105 high school children belonging to the age group of 8–16 years were selected for the study. The study was designed to be carried out in schools that generally participated in outdoor organised games, and it included those children that were actively participating in sports activities. The help of physical instructors was sought in selecting the children who were active participants of different sports.

A questionnaire was distributed among the children who voluntarily participated in the study. In case of any difficulty, help was provided to the children. Those who could not understand the questionnaire language, it was explained in the local language.

The questionnaire contained subjective and objective questions, referring to issues like whether the tooth was completely knocked out of the socket or not at the time of injury and knowledge of high school children regarding replantation, including whether they thought they can chew and smile in a similar way after placing the tooth back into the socket as they did before the injury, and consequences of losing their teeth.

The questionnaire also contained questions related to what children did immediately after seeing the knocked-out tooth—whether they clean it with water or antiseptic solution or they place it back into the mouth. The next question was related to the preferred media for tooth transportation—whether it was paper, handkerchief, gauze/cotton, water, disinfectant solution, patient's mouth, patient's hand, milk, fruit juice, saline or any other media.

Other questions referred to the issues like how much was the usage of mouthguards; reasons for not using mouthguards like breathing, communication, aesthetics or any other reasons; other precautions like helmet or facemask taken to prevent orodental injury and also when did the patients report to a dentist after injury—immediately, 1–2 days after injury or whether they never reported to the dentist.

To avoid interpersonal exchange, the questionnaire was explained and submitted to participants by the principal investigator and all the answers were kept confidential.

The research proposal was submitted to the Ethics Committee of the Maharishi Markandeshwar University (MMU) and the study design was approved (18.05.2006).

## Data transfer and statistical analysis

Data were coded and entered into a personal computer (PC). Descriptive statistical analysis (frequency distribution and cross-tabulation) for the data was done using Statistical Package for Social Sciences (SPSS) software.

## Results

Only 37.6% of the players knew teeth could be completely knocked out with injury and 20.1% of the players knew that the knocked-out teeth could be replanted [Tables 1 and 2, Graphs 1 and 2]. The difference is highly significant ( $P < 0.05$ ).

Of all the players, 39.3% of players knew the consequences of losing their anterior teeth [Table 3, Graph 3]. The difference is highly significant ( $P < .05$ ).

A majority (83.2%) of the study population cleaned their knocked out teeth with water or some antiseptic solution. Only 4.8% of the children placed the teeth back in their mouth [Table 4, Graph 4]. The difference is highly significant ( $P < .05$ ).

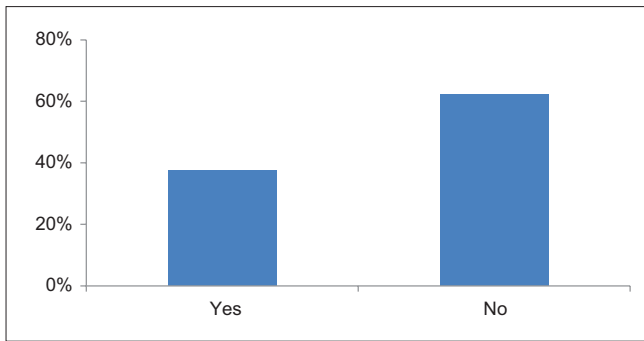
Of all the players, 73.8% of the players carried their tooth to the dentist. The preferred media of transport/carrying the tooth to the dentist was gauze/cotton by 36.9%, handkerchief

**Table 1: Players' knowledge regarding whether they know that their teeth can be completely knocked out with injury**

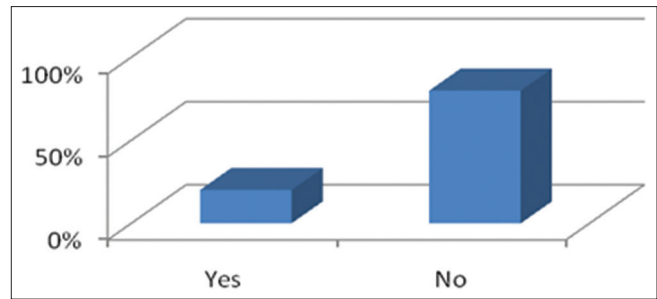
Response	No. of Players
Yes	416 (37.6%)
No	689 (62.4%)

**Table 2: Player's knowledge regarding replantation**

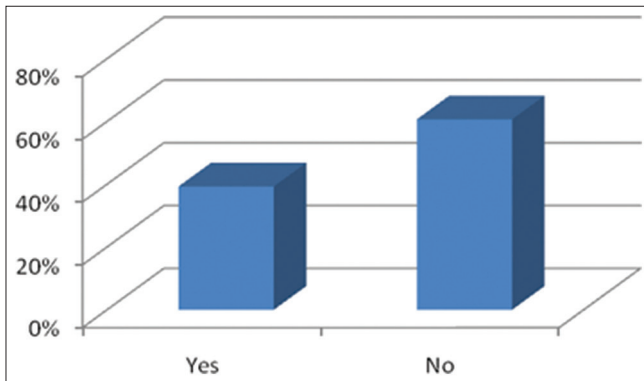
Response	No. of Players
yes	222 (20.1%)
no	883 (79.9%)



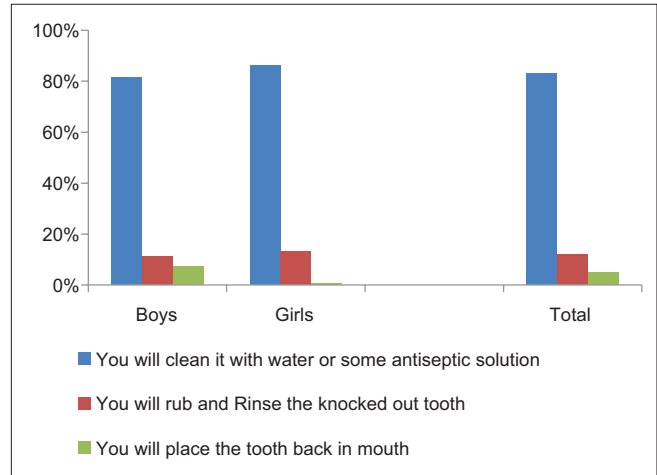
Graph 1: Graph showing knowledge regarding avulsion



Graph 2: Graph showing knowledge regarding replantation



Graph 3: Graph showing knowledge regarding consequences of losing their anterior teeth



Graph 4: Graph showing responses of children after losing their teeth

Table 3: Player's knowledge regarding consequences of losing their anterior teeth

Response	No. of Players
Yes	434 (39.3%)
No	671 (60.7%)

Table 4: What will players do after losing their teeth?

	Sex		Total
	M	F	
You will clean it with water or some antiseptic solution	576 (81.5%)	334 (86.3%)	910 (83.2%)
You will rub and rinse the knocked out tooth	80 (11.3%)	51 (13.2%)	131 (12.0%)
You will place the tooth back in your mouth	51 (7.2%)	2 (.5%)	53 (4.8%)
Total	707	387	1094

by 23.7%, paper by 19%, water by 18.8% and cellophane by 1.7% of the players, i.e., 81.3% of the children preferred a dry transport media [Table 5, Graph 5]. The difference is not significant ( $P > .05$ ).

In the study, 46.2% of the players knew about mouthguards [Table 6, Graph 6]. The difference is significant ( $P < .05$ ).

Only 4.6% of the sports players were using mouthguards [Table 7, Graph 7]. The difference is highly significant ( $P < .05$ ).

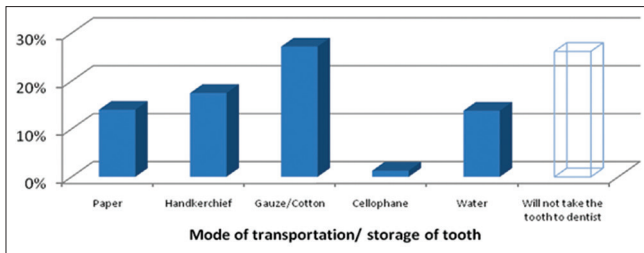
A total of 58.4% of the study population did not know about mouthguards. Among those who knew about it, reasons for not using mouthguards were that it was not necessary or not provided by the school authorities (28.4% and 9.3%, respectively) [Table 8, Graph 8]. The difference is highly significant ( $P < .05$ ).

On asking about the other measures taken by them to prevent these injuries, 4.3% of the children said they used a facemask and 34.8% said they used a helmet, whereas 60.9% of the children did not take any precautionary measures to prevent the orofacial injuries [Table 9, Graph 9]. The difference is highly significant ( $P < .05$ ).

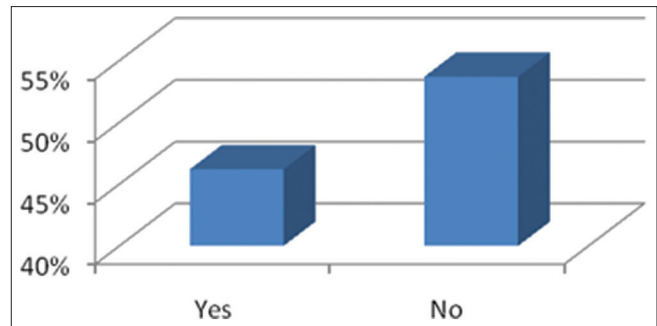
Most (64.5%) of the players responded that they would report their dental injury immediately to the dentist, 31.4% would report after 1–2 days and 4.1% would not report their injury to a dentist at all [Table 10, Graph 10]. The difference is highly significant ( $P < .05$ ).

## Discussion

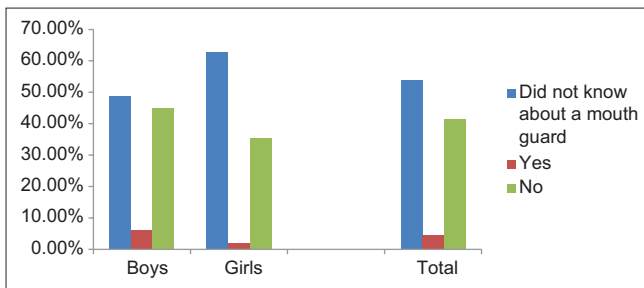
It is a well-documented fact that traumatic injuries to dental tissues can create havoc in our life. The overall pooled prevalence of dentofacial injuries among combat sports participants worldwide is approximately 30%.<sup>[5]</sup> The face is the index of our mind. Facial aesthetics play an important role in self-identification, self-image, self-presentation and interpersonal confidence. Further, they affect social behaviour.



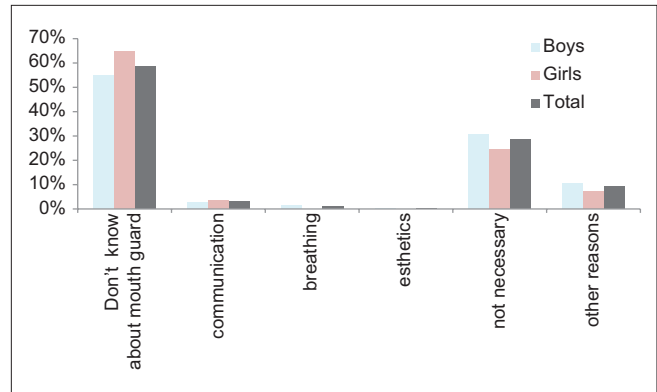
**Graph 5:** Graph showing preferred media of tooth transportation/storage of children



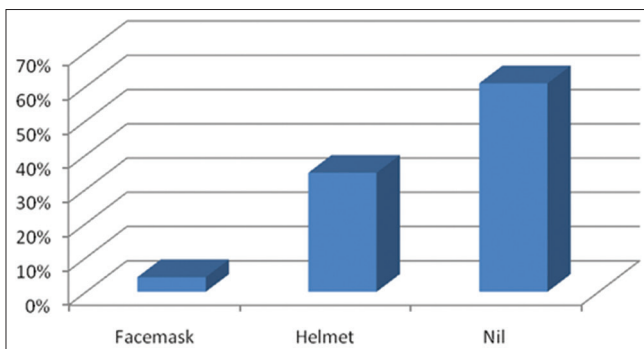
**Graph 6:** Graph showing knowledge regarding mouthguards



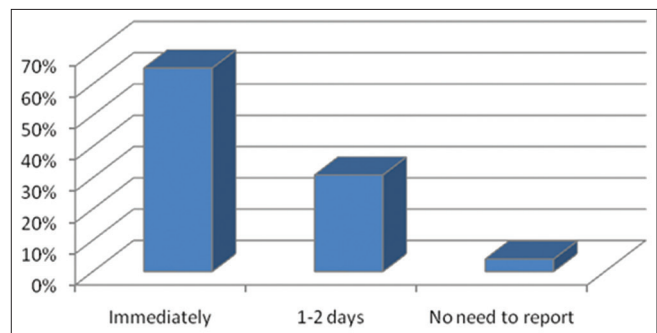
**Graph 7:** Graph showing usage of mouthguards



**Graph 8:** Graph showing reasons for not using mouthguards



**Graph 9:** Graph showing other precautions taken to prevent orofacial injuries



**Graph 10:** Graph showing the duration of reporting to the dentist after injury

**Table 5: Preferred media of tooth transportation/storage**

Mode of transportation/storage of tooth	No. of Players	Percent (%)
Paper	155	14.0
Handkerchief	193	17.5
Gauze/Cotton	301	27.2
Cellophane	14	1.3
Water	153	13.8
Total	816	73.8
Will not take the tooth to a dentist	289	26.2
Total	1105	100.0

A total of 1105 children from various sports academies and high schools participated in the present study.

Only 37.6% of the children knew that their teeth can be completely knocked out with an injury and 20.1% of the children knew that their knocked-out teeth can be replanted. The present results show that the current level of knowledge about tooth

avulsion and replantation, as well as what steps to take in an emergency, is low in high school children. The results are in accordance with the study conducted by Shashikiran *et al.* among 2000 parents (rural and urban) in Davangere, India.<sup>[6]</sup>

In the present study, only 39.3% of the children knew about the consequences of losing their anterior teeth. This lack of knowledge probably means that an avulsed tooth will not be replanted at all, or if the tooth is replanted, a poor prognosis is more likely for the avulsed/replanted tooth. This is regrettable because with simple measures the prognosis for replantation of avulsed teeth is very good.

The preferred media of transport/carrying the tooth to the dentist was gauze/cotton by 27.2%. In a study by Shashikiran *et al.*

**Table 6: Knowledge about mouthguards**

		No. of Players	Percent (%)
Do you know about mouthguard?	Yes	511	46.2
	No	594	53.7
Total		1105	100.0

**Table 7: Usage of mouthguards**

		Gender		Total
		M	F	
Do you use a mouthguard?	Did not know about a mouth guard	349 (48.9%)	245 (62.7%)	594 (53.8%)
	Yes	43 (6.0%)	8 (2.0%)	51 (4.6%)
	No	322 (45.1%)	138 (35.3%)	460 (41.6%)
Total		714	391	1105

**Table 8: Reasons for not using mouthguards**

		Gender		Total
		M	F	
Reasons for not using a mouthguard	Don't know about a mouthguard	392 (54.9%)	253 (64.7%)	645 (58.4%)
	Communication	18 (2.5%)	14 (3.6%)	32 (2.9%)
	Breathing	10 (1.4%)	0 (0.0%)	10 (0.9%)
	Aesthetics	1 (0.1%)	0 (0.0%)	1 (0.1%)
	Unnecessary	219 (30.6%)	95 (24.3%)	314 (28.3%)
	Total		714	391

**Table 9: Other precautions taken by players to prevent orofacial injury**

		No. of Players	Percent (%)
Other precautions taken to prevent orofacial injuries	Facemask	47	4.3
	Helmet	385	34.8
	Nil	673	60.9
	Total	1105	100
Total		1105	100.0

**Table 10: When do players report to dentist after an injury**

		No. of Players	Percent (%)
When will you report your injury?	Immediately	720	65.1
	1-2 days	341	30.9
	No need to report	44	4.0
	Total	1105	100
Total		1105	100.0

carried out among 2000 parents (rural and urban) in Davangere, India most of the rural parents (63.4%) opted for dry storage media.<sup>[6]</sup> The concept of 'dry storage' indicates that there is a lack of knowledge in children on how avulsed teeth should be handled after an accident. Dry storage of the tooth will result in an irreversible injury to the periodontal membrane, with the result that replanted tooth will be lost over time.<sup>[7]</sup>

The participants had only minor knowledge of how to act in a situation involving an avulsed tooth. Of all the participants, 83.2% of the children cleaned their tooth with water or some antiseptic solution. Only 4.8% of the children placed the tooth back in their mouth. Considering that dental injuries are frequently occurring in this society, it is remarkable that they are not included in the general first-aid information. This is not special for this study but has been reported in studies of teachers and parents in literature.<sup>[8]</sup>

Only 4.6% of the children in this study wore a mouthguard while playing, rest 95.4% of the children agreed that they did not use mouthguards to prevent injuries to the orofacial region [Table 6]. The reason for not using mouthguards was that 53.8% of the children playing contact sports did not know about a mouthguard and the rest 46.2% knew about it but most of them never used it [Table 7]. Among those who knew about it, reasons for not using mouthguards were that it was not necessary or not provided by the school/sports authorities (28.4% and 9.3%, respectively), followed by lack of communication as a reason (2.9%) [Table 8]. The reason for non-usage of mouthguard varied and was largely identical with the data from other studies. Also, tooth eruption and jaw growth in mixed dentition can mean that the fit of mouthguards is impermanent and tends to be worn less often by young athletes.<sup>[9]</sup> 4.3% of the players used facemask and 34.8% used helmet as other precautions to prevent orofacial injury [Table 9]. During sports activities where there is a risk of fall or being hit by an object, wearing a mouthguard or faceguard still seems to be the only way to prevent or at least significantly reduce the seriousness of dental injuries because nearly one-third of the dental injuries among children older than 7 years of age are associated with playground equipment.<sup>[10]</sup>

All children should also be made aware of correct first aid when an injury does occur. Things like replanting avulsed teeth immediately, storing them in milk, looking for all fragments of broken tooth crown before running home or after and taking help should be discussed with them in clear, simple language. Posters are likely to gain the attention of young individuals and if widely displayed they will also reinforce their knowledge.

Attitudes of coaches, officials, parents and children towards wearing mouthguards influence usage. Coaches are perceived as individuals with the maximum impact on whether or not children wear mouthguards.<sup>[11]</sup> A study reported by Lehl on the perception of Chandigarh coaches regarding orofacial injuries and their prevention observed that most (68%) of the coaches considered mouthguards mandatory in sports like boxing to prevent orofacial injuries.<sup>[12]</sup>

Pupils and teachers in schools can be educated through posters or videos, while general public can be made more aware using television programmes or different campaigns. To plan for how education programmes should be designed and directed to the public it is not only important to assess the present level of knowledge among children and parents but also the knowledge level of adults in places where trauma occurs (e.g., teachers,

sports leaders and coaches). Furthermore, it would be worthwhile to assess the level of knowledge of different categories of professionals who may be consulted directly or by telephone immediately after the trauma (e.g. nurses, receptionists in emergency centres and physicians) Special education programmes may be necessary for a broad audience of health care professionals who treat trauma victims. By assessing the knowledge level before intervention, evaluation of the outcome of the intervention can be performed by comparing pre- and post-intervention knowledge levels.

Children playing contact sports are at the risk of more severe orofacial injuries. Josell and Abrams<sup>[13]</sup> reported that mouthguards may help prevent concussion, cerebral haemorrhage and possibly death by separating the jaws and preventing the mandibular condyles from being displaced upwards and backward against the wall of the glenoid fossa. Children and coaches must be made aware of the high risk of oral injury in sports, such as wrestling, boxing, soccer and basketball, which do not have mandatory mouthguard rules.

Providing knowledge about the important steps to follow after an accident, increases the success rate for the avulsed and replanted permanent tooth. It would be advantageous for every sports medical team to include a sports dentist who would be responsible for raising awareness about dental trauma prevention and implementation of adequate emergency procedures when dental trauma occurs.<sup>[14]</sup>

Thus, the present study provides baseline information for the development and evaluation of targeted strategies designed to reduce the occurrence of sports-related injuries in children of India.

## Conclusion

From the present survey, it appears that there is a crucial need to educate the physical training instructors/coaches, parents and school teachers and determine the dental manpower and dentists required to increase the awareness. Although contact sports are quite common in this region and preferred by most of the children, mouthguards are hardly used during such sporting activities. So, educational programmes would be necessary to improve public awareness of the preventive and treatment strategies for the traumatised teeth.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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## Questionnaire

**INTERVIEW FORM**

**DATE:** \_\_\_\_\_ **CLASS:** \_\_\_\_\_

1. NAME :
2. FATHER'S NAME :
3. DATE OF BIRTH :
4. AGE/SEX :
5. TELEPHONE NO. \_\_\_\_\_ RESIDENCE: \_\_\_\_\_  
MOBILE : \_\_\_\_\_
6. ADDRESS :
7. CITY, STATE :
8. POSTAL PIN CODE :
9. DO YOU THINK YOUR TEETH CAN BE COMPLETELY KNOCKED WITH INJURY ?  
a. YES b. NO
10. DO YOU THINK, THIS KNOCKED OUT TOOTH CAN BE PUT BACK SO THAT YOU CAN CHEW AND SMILE WITH IT JUST LIKE DID BEFORE THE ACCIDENT?  
a. YES b. NO
11. DO YOU KNOW ABOUT THE CONSEQUENCES OF LOOSING AN ANTERIOR TOOTH?  
a. YES b. NO
12. WHAT IMMEDIATE ACTIONS WOULD YOU PERFORM IF YOURS/YOUR FRIEND'S TOOTH HAS BEEN KNOCKED OUT AND FALLEN ON GROUND?  
(TICK THE RIGHT ANSWER)
  - a. YOU WILL CLEAN I&T WITH WATER OR SOME ANTISEPTIC SOLUTION
  - b. YOU WILL RUB OR RINSE THE KNOCKED OUT TOOTH
  - c. YOU WILL PLACE THE TOOTH BACK IN MOUTH
13. HOW WILL YOU CARRY YOUR TOOTH TO THE DENTIST /HOW WILL YOU STORE THE TOOTH?  
<http://www.dentistry.com>  

a. PAPER	YES/NO
b. HANDKERCHIEF	
c. GAUZE/COTTON	
d. CELLOPHANE	
e. WATER	
f. DISINFECTANT SOLUTION	
g. ICE WATER	
h. PATIENT'S MOUTH	
i. PATIENT'S HAND	
j. MILK	
k. FRUIT JUICE	
l. SALINE	
m. ANY OTHER MEDIA	
14. DO YOU KNOW ABOUT MOUTH GUARD?  
a. YES b. NO
15. DO YOU USE A MOUTH GUARD?  
a. YES b. NO  
IF NO, WHY? (TICK THE RIGHT ANSWER)
  - a. COMMUNICATION
  - b. BREATHING
  - c. ESTHETICS
  - d. NOT NECESSARY
  - e. OTHER REASONS
16. WHAT OTHER PRECAUTIONS DO YOU TAKE WHILE PLAYING YOUR SPORT TO PREVENT DENTAL INJURIES?  
(TICK THE RIGHT ANSWER)
  - a. FACEMASK
  - b. HELMET
  - c. ANY OTHER d. nll
17. WHEN SHOULD YOU REPORT YOUR DENTAL INJURY TO A DENTIST? (TICK THE RIGHT ANSWER)
  - a. IMMEDIATELY
  - b. 1-2 DAYS
  - c. NO NEED TO REPORT