

Effectiveness of An Educational Workshop in Improving Knowledge on Dental Trauma among Rugby Players

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Abstract

A pilot study was carried out to evaluate the effectiveness of an educational workshop in improving the knowledge of dental trauma among national rugby players at the National Sports Institute. Consented participants were required to complete a self-administered questionnaire before and after an educational workshop. The workshop consisted of a lecture with a supplementary booklet. The questionnaire inquired about the prevention, types, and management of dental trauma. Data from 42 participants were analyzed, consisting of 92.9% (n = 39) males and 7.1% (n = 3) females with a mean age of 29 years old. The correct responses in the section on prevention of dental trauma increased for 7 out of 24 questions (P < 0.05). In the section on types and management of dental trauma, the correct response rate increased for 13 out of 22 questions (P < 0.05). Thirty-seven participants (88.1%) scored significantly higher in the postintervention questionnaire compared to their preintervention questionnaire (P = 0.001). The mean total score for the questionnaire also increased from 20.9 to 28.7. The players responded that the educational workshop was interesting and understandable. Overall, the players rated the educational workshop as good/very good. In conclusion, limited knowledge and training on the prevention and management of traumatic dental injuries among professional rugby players necessitate the appropriate intervention. Within the limit of this pilot study, educational workshops seem well-received and effective in improving knowledge of dental trauma. We recommend extending the tested method to a larger and more representative sample.

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Introduction

Dental trauma remains a public health problem worldwide. It is the second most common oral disease after dental caries, with a worldwide prevalence estimated at 15.2% for permanent dentition.¹ The most common etiological factors are falls followed by sports activities.^{2, 3} The prevalence and severity of sports-related dental injuries vary and are likely to be under-reported.⁴ The types of injury range from uncomplicated enamel fractures to tooth avulsion, usually with functional and aesthetic sequelae.⁵ The experience could negatively

impact the casualty's quality of life,⁶ often necessitating long-term and costly care.⁷⁻¹⁰

Immediate and appropriate management at the time of injury is crucial for a favorable prognosis.^{11, 12} Unfortunately, the casualties, bystanders, and even health-care professionals are reportedly ill-prepared for such emergencies.¹³ This could partly be explained by the lack of access to appropriate information.¹⁴ This knowledge gap calls for various innovation in the educational intervention. Traditional media such as lectures,¹⁵⁻¹⁸ seminars,¹⁹ posters,^{16,20} pamphlets,¹⁷ leaflets,²¹ and educational films²² were developed for laypeople and professionals. In recent years, smartphone applications allow the public quick and easy access to information on the emergency management of dental trauma.^{20,23-24}

It is plausible that mobile technology is a more cost-effective means to disseminate health information than the lecture-based approach.²⁴ However, the population strategy could lead to

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the “prevention paradox,” which, despite benefiting the population as a whole, confers a limited advantage to individuals.²⁵ For high-risk groups such as sports participants, emphasis should also be placed on primary prevention, that is, education on the use of mouthguards.²⁶

The prevalence of orofacial trauma in rugby was recorded between 6.7% and 71.9%, depending on the population studied.²⁷ Thus, familiarity with the emergency procedure for dental trauma was essential for improving the condition of the affected tooth. Hence, it is important to familiarize with the emergency procedure during dental trauma to improve the condition of the affected tooth. To date, the knowledge of dental trauma prevention and management were generally insufficient, suggesting the need to educate and train the players.²⁸ Therefore, by offering an educational workshop on dental trauma management for the rugby players, we believe it may be beneficial for the rugby players in preparing them for the emergency procedure when dental trauma happens among them.

Due to the lack of health promotion efforts specifically targeting sports participants for the prevention of traumatic dental injuries, this study aims to evaluate the effectiveness of an educational workshop in improving knowledge on dental trauma among national rugby players. The specific objectives were (1) to compare the knowledge of rugby players on prevention, types, and management of dental trauma before and after an educational workshop and (2) to assess the acceptability and relevance of the educational workshop.

Materials and methods

Study Design

A pilot study was conducted at the National Sports Institute (NSI), in collaboration with the national rugby union. This study adopted a one-group pre- and postintervention assessment design to evaluate the effectiveness of an educational workshop on knowledge regarding dental trauma.

Recruitment

The participants were national rugby players undergoing active training. Rugby players who were eligible and willing to participate were invited to attend the educational workshop. The workshop was held after the players finished their

morning training session. All participants who had given written consent attended the educational workshop and completed the questionnaires were included in the study.

The inclusion criteria were as follows: (a) active players age 16 and above, (b) currently playing for the national rugby team, (c) competent in verbal and written communication in the national language, and (d) attended the educational workshop. Retired players and players who have not played rugby for the national team within the last six months from the recruitment date were excluded from the study.

Questionnaire

A set of pre- and postintervention questionnaires were developed. The preintervention questionnaire consisted of Parts A, B, and C while the postintervention questionnaire consisted of identical Parts A, B, and C with an additional Part D. Part A consisted of demographic information such as gender, age, and experience in playing rugby. Part B contained questions related to prevention and types of dental trauma, while questions in Part C were related to a case scenario of managing dental trauma. Questions in Part B and C were formatted as True, False, Don't Know (TFD) questions. Both Part B and Part C were quizzes developed in accordance with the content of the workshop and booklet. Lastly, Part D assessed the rugby players' perception of the educational workshop and booklet given.

Both questionnaires were pretested on 20 dental students and patients, who also took part in cognitive interviews. They completed the questionnaires and commented on the questions for face validity. These responses were discussed and necessary amendments made accordingly. The data was not included in the analysis.

Educational Workshop

The educational workshop consisted of a lecture and a complementary booklet. The content was prepared to include information about the prevention, types, and management of dental trauma in accordance with the guidelines provided by the International Association of Dental Traumatology (IADT). It was prepared in a way that is easy to understand, using layman's terms. The workshop was delivered through a didactic lecture, and the booklet served as an aid for participants' understanding.

The workshop started with the distribution of the information sheet and consent form to the participants, who were then briefed on the objectives of the study and asked to complete the preintervention questionnaires. Researchers collected the preintervention questionnaires. Next, the lecture and booklet on dental trauma were given. After the lecture, the postintervention questionnaires were distributed to the participants. They were prohibited from communicating with each other or with the speaker. The contents of the workshop, booklet, and questionnaire were in the national language.

Statistical Analysis

The completed questionnaires were coded and entered using SPSS 23.0 for Windows® (IBM Corporation, Armonk, NY, USA). Descriptive analysis was carried out for the demographic information (Part A) and for rugby players' perceptions of the educational workshop and the booklet provided (Part D).

For knowledge on dental trauma (Parts B and C), reverse coding was done before score calculation where necessary. The TFD responses were recoded as "correct" and "incorrect/not sure." The missing responses were counted as "not sure." Each correct answer was given one point, and incorrect/not sure counted as zero. Thus, the maximum possible score was 46, while the minimum possible score was zero. Total marks for each participant were calculated. As the variables of total marks before and after the educational workshop were of nonparametric distributions, the Wilcoxon signed ranks test was employed to compare the difference of the scores before and after the educational workshop. For each question, McNemar's test was used to compare the frequency of the correct responses before and after the educational workshop. The level of significance was set at 0.05.

Ethical Considerations

This study was approved by the Research Ethics Committee (UKM/PPI/111/8/JEP-2017-488). All the national rugby players who agreed to attend the educational workshop were required to read and sign an informed consent form. Participation was voluntary, and all the responses were anonymous.

Results

A total of 42 national rugby players participated in this study and attended the dental

trauma seminar. The majority of the players were male (92.9%), and the mean age was 29 years old. The demographic distribution is summarized in Table 1. Thirty-one percent of the players claimed to have attended formal emergency training, but only 23.1% noted that the formal emergency training included a dental trauma component.

Variable	n	%
Sex		
Male	39	92.9
Female	3	7.1
Duration in becoming a rugby player		
<2 years	3	7.1
2-5 years	7	16.7
>5 years	32	76.2
Highest level of competition		
National	16	38.1
International	25	59.5
Missing	1	2.4
Number of tournaments joined in a year		
1	5	11.9
2	1	2.4
3	3	7.1
4	16	38.1
>4	17	40.5
Experience of using mouthguards		
Yes	27	64.3
No	15	35.7
Attended formal emergency training		
Yes	13	31.0
No	29	69.0
Formal emergency training included dental trauma component		
Yes	3	23.1
No	10	76.9

Table 1. Demographic characteristics of the surveyed national rugby players (N = 42)

The correct responses in the section on prevention of dental trauma (Table 2) increased for 7 out of 24 questions (McNemar's test, $P < 0.05$). In the section on types and management of dental trauma (Table 3), the correct response rate increased for 13 out of 22 questions (McNemar's test, $P < 0.05$).

The total score for dental trauma knowledge was calculated by adding the participants' correct answers in Parts B and C. The preintervention and postintervention marks for each participant were compared. Thirty-seven participants (88.1%) significantly scored higher in the postintervention questionnaire than in their preintervention questionnaire (Wilcoxon signed ranks test, $P = 0.001$). The mean total score for the questionnaire also increased from 20.9 to 28.7.

The players' perceptions of the workshop are presented in Tables 4 and 5.

Discussion

Contact sports exposes the participants to an increased risk of dental trauma. To date, knowledge of dental trauma is generally insufficient among sports participants, suggesting the need for further education and training.^{14,29,30} Previous studies in this population revealed insufficient compliance to mouthguard use and knowledge on the emergency management of traumatic dental injuries.^{28,31} To the authors' knowledge, this is the first study assessing educational intervention on dental trauma for professional athletes.

Mouthguard use is recommended as a protective device to reduce the incidence of injuries to dentoalveolar tissues during sports activities.²⁶ The result from this study indicated that the national rugby players were generally aware of the mouthguard's purpose, as more than half of them had been using it during training and competition. This may be because half the players in this study participated at the international level, where it was customary to wear mouthguards.

Interestingly, it was noted that when mouthguards were given freely without appropriate guidance and motivation from health-care professionals, compliance and awareness were far from ideal.³² We concurred that adequate education will likely result in better compliance. Despite the lack of evidence supporting the protective effects of a mouthguard,³³ it was hoped that the improvement in perception on the function of the mouthguard following the workshop would increase compliance in their use. In this study, specific knowledge on the use of and care for mouthguards improved substantially following the campaign.

Most of the players in this study were not formally taught on dental trauma. The minority who did attend formal emergency training was not exposed to dental trauma management. This finding concurred with an earlier study which reported that most first-aid textbooks and manuals do not contain information about dental trauma.³⁴ This finding is alarming because they may not be able to handle emergency cases, which may affect the prognosis of an injured tooth if it happens during the training session or competition. Therefore, training on the management of dental trauma should be

emphasized.

Knowledge in dental trauma management, particularly on handling an avulsed tooth and the storage medium for transporting one, improved after the workshop. Past studies indicate that root resorption after avulsed teeth replantation depends on various factors including extra-oral time, storage media, clinical manipulation of the root surface, and the alveolar socket during replantation.³⁵ Despite that, common misconceptions such as discarding the avulsed tooth or keeping it in iced or tap water remain prevalent.²⁸ The workshop offered an opportunity to correct these misconceptions and explained the right course of action.

However, the sense of urgency to see a dentist and obtain immediate treatment for avulsed tooth did not improve significantly despite the training. This may be because national players usually have their coaches and on-site medical team who will manage any injuries suffered during training or competition. Hence, the players may not take this matter seriously. Unfortunately, previous studies among coaches showed that they too are lacking in knowledge and skills in managing dental trauma.³⁶ Moreover, many paramedics and medical doctors are neither competent nor confident in providing emergency care for dental trauma.^{34,37-39} Another reason could be the limited access to dental care during the competition, especially those held abroad.

Through the intervention of an educational workshop, rugby players' knowledge of emergency management of dental trauma improved. Previous studies which use various approaches on laypeople at a group setting also reported similarly favorable trends. For instance, after going through a seminar, physical education teachers demonstrated better knowledge.¹⁹ Also, when exposed to dental trauma education in lecture and print format, the knowledge of elementary school staff members and health teachers improved significantly.^{16,17}

The educational workshop and the complementary booklet were received positively. In particular, regular gatherings for training and the availability of training centers provide opportunities for workshop-type educational interventions for athletes. Additionally, the portability of a printed booklet, without the need for application design and Internet access, is appropriate for on-site training.

Nevertheless, it is unclear whether other types of educational interventions would be of interest to rugby players and would result in a greater improvement in knowledge of dental trauma prevention and management. Previous comparative studies among laypeople showed conflicting results. When schoolteachers were exposed to a lecture, a mobile application, or both, it was found that postintervention knowledge was higher among mobile application users, presumably because it is more interactive and engaging.²⁴ In contrast, parents of pediatric patients did not show a difference in knowledge when the information was presented in mobile application and poster forms.¹⁹

It could be argued that prevention strategies focusing solely on sports participants have less impact than those focusing on the whole population because most cases of traumatic dental injuries occur at schools or homes, not only because of sports participation, but more so as a result of falls.² However, educational strategies that affect whole populations, such as national broadcasts or campaigns, often require collaboration beyond the health-care sector and are less feasible because of financial constraints. Hence, focusing on high-risk groups such as sportsmen may be advantageous, as the behavioral change will likely benefit them most. Sports authorities should promote the use of mouthguards in contact sports.⁴⁰ Although mandatory mouthguard use during competition could increase compliance among athletes, carrying out educational workshops is often welcomed to increase the acceptance of health behavior. Furthermore, an educational workshop provides breadth and depth of information on dental trauma to better prepare the participants in preventing and managing dental trauma. Findings from this study can be used to encourage future collaborations between dental professionals and sports organizations to provide athletes knowledge regarding dental trauma.

Nevertheless, this study was subjected to several limitations. Because this was a pilot study, the sample size for this study was small and hence may be underpowered in detecting differences for certain responses. Further study is required to validate the content of the workshop and questionnaire. Long-term evaluation is necessary to observe the true behavioral change.

Conclusions

Limited knowledge and training on the prevention and management of traumatic dental injuries among professional rugby players necessitate appropriate intervention. Within the limit of this pilot study, educational workshops seem well-received and effective in improving knowledge of dental trauma. We recommend extending the tested method to a larger and more representative sample.

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Conflict of interest

The authors confirm that they have no conflict of interest.

Statement	Correct responses				P-value
	Before n (%)		After n (%)		
General knowledge of dental trauma					
Signs and symptoms of a traumatized tooth include cracks, color changes, mobility, fracture, and shifting of the tooth from the original position	33	78.6	29	69.0	0.454
Inactive teenage girls have high risk for dental trauma (RC)	10	23.8	12	28.6	0.804
Infection will not occur on traumatized tooth (RC)	38	90.5	35	83.3	0.508
Change of color in a traumatized tooth is a consequence of trauma to the tooth	24	57.1	25	59.5	1.000
Loss of front teeth will affect the appearance	32	76.2	37	88.1	0.125
Trauma that involves the crown only will affect the pulp (RC)	2	4.8	22	52.4	0.001*
Trauma can cause intrusion to the tooth	19	45.2	23	54.8	0.424
Trauma can be prevented by wearing a mouthguard	41	97.6	40	95.2	1.000
No need to consult the dentist if no bleeding occurs during dental trauma (RC)	28	66.7	30	71.4	0.727
Mouthguard					
The mouthguard is used to prevent trauma to teeth and mouth during sport	41	97.6	41	97.6	1.000
A mouthguard is a special tool that can only be done by dentists (RC)	15	35.7	19	45.2	0.424
A good mouthguard has to cover all upper teeth	32	76.2	30	71.4	0.754
A good mouthguard has to cover all lower teeth (RC)	20	47.6	30	71.4	0.021*
Function of mouthguard					
Prevent injury to lips	33	78.6	39	92.9	0.070
Prevent injury to tongue	35	83.3	38	90.5	0.453
Prevent injury to gum	33	78.6	41	97.6	0.008*
Prevent tooth fracture	40	95.2	42	100.0	-
Prevent luxation of tooth	36	85.7	40	95.2	0.219
Prevent fracture of the mandible	18	42.9	29	69.0	0.007*
Ways to use and care of mouthguard					
Mouthguard has to be worn 15 minutes before sports (RC)	11	26.2	21	50.0	0.021*
Mouthguard has to be taken out 15 minutes after sports	2	4.8	4	9.5	0.500
Mouthguard has to be cleaned with hot water to kill bacteria (RC)	4	9.5	19	45.2	0.001*
The life span of mouthguard is only one year (RC)	3	7.1	4	9.5	1.000
The denture has to be removed before wearing a mouthguard	14	33.3	21	50.0	0.039*

Table 2. Percentage of correct responses regarding prevention and types of dental trauma.

* indicates statistically significant McNemar's test ($P < 0.05$). RC indicates reverse coded items.

Statement	Correct responses				P-value
	Before n (%)		After n (%)		
Handling of an avulsed tooth					
The tooth has to be held on its root (RC)	7	16.7	30	71.4	0.001*
The tooth has to be held on its crown	6	14.3	32	76.2	0.001*
If the tooth is dirty, it can be washed with running tap water	25	59.5	34	81.0	0.012*
The tooth can be cleaned with antiseptic solution (RC)	2	4.8	19	45.2	0.001*
The tooth cannot be repositioned into its original position without dentist supervision (RC)	10	23.8	25	59.5	0.008*
The tooth can be saved if it is repositioned to its original position even after two hours of injury	4	9.5	13	31.0	0.022*
Transport medium					
Fresh milk	5	11.9	33	78.6	0.001*
Condensed milk (RC)	20	47.6	29	69.0	0.012*
Formula milk (RC)	15	35.7	25	59.5	0.031*
Tap water (RC)	10	23.8	15	35.7	0.267
Normal saline	17	40.5	34	81.0	0.001*
Patient's saliva	3	7.1	22	52.4	0.001*
Damp tissue (RC)	7	16.7	19	45.2	0.004*
Empty container (RC)	2	4.8	17	40.5	0.001*
The urgency to see a dentist after tooth avulsion					
Immediately	34	81.0	36	85.7	0.754
Two hours after training (RC)	24	57.1	27	64.3	0.629
The next day (RC)	30	71.4	24	57.1	0.180
Wound management					
Bleeding can be stopped by putting pressure with clean gauze or cloth	32	76.2	35	83.3	0.453
Blood cannot be swallowed (RC)	6	14.3	6	14.3	1.000
Blood clots can be removed by gargling (RC)	3	7.1	9	21.4	0.109
The large wound has to be cleaned and sutured by a dentist	35	83.3	39	92.9	0.289
Teeth cannot be brushed to ensure faster healing of the wound (RC)	15	35.7	12	28.6	0.581

Table 3. Percentage of correct responses in management of dental trauma.

* indicates statistically significant McNemar's test ($P < 0.05$)

RC indicates reverse coded items.

	Yes		No		Missing	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Lecture						
Interesting	40	95.2	0	0	2	4.8
Easy to understand	40	95.2	0	0	2	4.8
Appropriate	40	95.2	0	0	2	4.8
Important	40	95.2	0	0	2	4.8
Confident to carry out emergency care for dental trauma after the lecture	39	92.9	1	2.4	2	4.8
Booklet						
Interesting	38	90.5	1	2.4	3	7.1
Easy to understand	38	90.5	1	2.4	3	7.1
Would recommend to other players	39	92.9	0	0	3	7.1
Important	39	92.9	0	0	3	7.1

Table 4. Players' perception of the content of the workshop.

	Lecture		Booklet	
	<i>n</i>	%	<i>n</i>	%
Very good	26	61.9	30	71.4
Good	13	31	8	19
Satisfactory	1	2.4	1	2.4
Unsatisfactory	0	0	0	0
Missing	2	4.8	3	7.1

Table 5. Players' ratings on the content of the workshop.

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