



## Knowledge, attitude, and perception of dental undergraduate students in different dental schools in Riyadh towards diagnosis and management of dental trauma – A cross sectional study

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### General Note

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## ABSTRACT

**Objective:** The aim of this study is to evaluate the knowledge and the attitude of dental students toward management of dental trauma cases and to assess the effect of dental education on that, in several dental colleges in Riyadh, Saudi Arabia. **Materials and Methods:** A cross sectional study was conducted on 364 participants. **Results:** The response rate was 80.8%. The association between the attendance of the educational programs and the responses of knowledge questions shows statistically significant association for the treatment of tooth intrusion and extrusion. No statistically significant association was found between the respondents attending educational programs and the responses of the management questions which was assessed with two clinical scenarios. Moreover, no statistically significant association was observed between participants' gender, academic year, university and responses of knowledge and management questions. **Conclusion:** This study demonstrated that the overall knowledge on the management of traumatic injuries was moderate with inadequacy in some specific aspects of dental traumatology among dental students and interns in Riyadh, Saudi Arabia.

**Key words:** Attitude, knowledge, dental trauma, Saudi Arabia.

## 1. INTRODUCTION

Dental trauma is considered the most common type of facial injury, and its consequences range from enamel fracture to tooth avulsion (Mohebbi et al., 2017). During the last decade, dental trauma has been reported to occur in an expressive part of the population around the world (4.5%–17.5%), even interfering with their quality of life (Aghdash et al., 2015, Lam et al., 2016; Rathi et al. 2020). Almajed et al. reported that the rate of dental trauma is 34% in Saudi Arabia, which is higher than the stated figure in other countries (Almajed et al., 2001). Traumatic dental injuries occur mainly due to falls and crashes that are associated with sport or leisure activities and traffic accidents (Epstein et al., 2010, Traebert et al., 2011). Specifically, the majority of falling accidents happen in school environments, and involve mostly the permanent upper teeth of children aged between 8 and 11 (Al-Malik et al., 2009, Bastone et al., 2000). Undesirable effects could result from the unintended dental trauma incidents, such as crown discoloration, pulp necrosis, root resorption, damage to the permanent successor's germ which may affect the prognosis of permanent teeth, and, in the worst circumstances, loss of the injured teeth (Lyer et al., 2017; Meshki et al., 2020). These consequences may have a negative psychosocial impact on the individual's daily life, causing aesthetic and functional deficiencies (Arhakis et al., 2017, Traebert et al., 2012). The dentists' knowledge correlates with the proper and immediate management of traumatic dental injuries (Mohebbi et al., 2017). Thus, better prognosis of the tooth can be achieved with early intervention, which can improve the regenerative capacity of traumatised teeth (Akhlaghi et al., 2014, Mohebbi et al., 2017). Several studies showed that knowledge of the management of dental trauma and avulsion among dentists in Saudi Arabia was moderate (Alhaj et al., 2020, Aljazairy et al., 2015, Riyahi et al., 2020). Such results may be caused by lack of comprehensive educational courses regarding dental trauma in the undergraduate years. A study which assessed the knowledge of dental students at Alfarabi College in Riyadh revealed that their knowledge of dental trauma management was inadequate (Alshamiri et al., 2015). Undergraduate students having proper background information regarding dental trauma may contribute to them gaining the adequate knowledge and proper preparation to act when such incidents occur during their professional life. This demonstrates the importance of theoretical knowledge and educational dental traumatology programmes in managing cases, as well as the value of seeking this knowledge periodically before or after graduation (Alzoubi et al., 2015, Fujita et al., 2014). There exist no studies which have assessed the traumatic dental injury (TDI) knowledge of undergraduate students at governmental and private colleges in Riyadh. The aim of the present study is to evaluate the knowledge and the attitude of dental students at several dental colleges in the region of Riyadh, Saudi Arabia, towards management of dental trauma cases, and to assess the effect of dental education on said knowledge and attitude.

## 2. METHODOLGY

The present study was confirmed and deemed exempt by the Institutional Review Board of Princess Nourah bint Abdulrahman University (IRB Log Number 17-0138). The study duration lasted for 6 months from November 2018 to April 2019. The study population consisted of a random sample of 364 dental undergraduate students in the following clinical years: 3rd year (level 7–8), 4th year (level 9–10), 5th year (level 11–12) and interns. A modified questionnaire was adapted from pretested questionnaires which had been previously developed by Re et al. and Akhlaghi et al. (Akhlaghi et al., 2014, Re et al., 2014). Before submitting the questionnaire, a pilot test of 25 questionnaires was performed against a checklist to determine content clarity, language

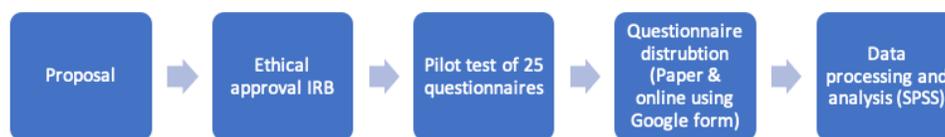
development, and validity. The questionnaire was paper and electronic based (Google form). The form was distributed among students and interns at dentistry colleges in Riyadh city, namely: The College of Dentistry at King Saud University (KSU), King Saud bin Abdulaziz University for Health Studies (KSAUHS), Princess Noura Bint Abdulrahman University (PNU), Riyadh colleges, Alfarabi colleges, and Dar Al-Uloom University. Non-completed surveys were excluded.

The questionnaire was divided into three sections:

- Sociodemographic data that consisted of gender, age range, nationality, university, and academic year.
- Assessment of the frequency of treating patients with traumatic dental injury, and the attendance of dental trauma courses.
- Assessment of the knowledge and the attitude of those students regarding the dental trauma, which contained questions and clinical scenarios to simulate real and everyday situations of trauma episodes.

### Statistical analysis

Data was analysed using SPSS 24.0 version (IBM Inc., Chicago USA) statistical software. Descriptive statistics were employed to describe the categorical variables. Pearson's Chi-square test was utilised to compare the distribution of responses and association between categorical variables. A p-value of  $\leq 0.05$  was used to confirm the statistical significance of the results (Figure 1).



**Figure 1:** Flow chart for methodology of the study.

## 3. RESULTS

Out of the 450 dental students who participated in the survey, 364 completed and returned questionnaires, yielding a response rate of 80.8%. Table 1 describes the sociodemographic data of the participants, the frequency of managing dental traumatic injury, and the attendance of educational programmes. Approximately 56.3% of the participants were female, with the majority rarely exposed to dental trauma cases, and almost half of them were attending educational courses (Table 1). An assessment of the knowledge and the attitude of the participant students regarding dental trauma and the effect of educational programmes can be found in Table 2 and Figure 2. The association between the respondents attending educational programmes and the responses to knowledge questions showed a statistically significant association for the two questions regarding "immediate treatment intrusion" and "management of tooth extrusion" ( $p=0.009$ ) ( $p=0.004$ ), respectively. However, there was no statistically significant association between the responses to the other knowledge questions and the attending of educational programmes. The distribution and comparison of responses related to the questions regarding management of dental trauma are presented in Table 3, Figures 3 and 4. No statistically significant association was found between the respondents attending educational programmes and the responses to the management questions, which were assessed in two clinical scenarios. Moreover, no statistically significant association was observed between participants' gender, academic year, university and responses of the knowledge and management questions.

**Table 1:** Distribution of socio-demographic characteristics frequency of managing dental traumatic injury and the attendance of educational programs of participants (n=364)

Characteristics	No (%)
<i>Gender</i>	
Male	159(43.7)
Female	205(56.3)
<i>Age</i>	
21-22	108(29.7)
23-24	213(58.5)
25 and above	43(11.8)
<i>Nationality</i>	
Saudi	351(96.4)

Non-Saudi	13(3.6)
<i>Academic year</i>	
3rd year	38(10.4)
4th year	131(36.0)
5th year	87(23.9)
Intern	108(29.7)
<i>Name of the university</i>	
King Saud University (KSU)	166(45.6)
King Saud bin Abdulaziz University for Health Studies (KSAUHS)	58(15.9)
Princess Noura University (PNU)	59(16.2)
Riyadh Elm University	59(16.2)
Alfarabi College	13(3.6)
Dar Al-Uloom University	9(2.5)
<i>Frequency of treating patients with traumatic dental injury</i>	
Very frequently	8(2.2)
Frequently	22(6.0)
Occasionally	84(23.1)
Rarely	150(41.2)
Never	100(27.5)
<i>Have you attended educational programs about traumatic dental injury?</i>	
Yes	176(48.4)
No	188(51.6)

**Table 2:** Distribution and comparison of questions related to knowledge toward diagnosis and management of dental trauma and its relation to the attendance of educational programs.

Knowledge items	No (%)	p-value	Attended educational program		p-value
			Yes	No	
<i>What would be the best solution selected to save the avulsed tooth in before getting the dental care?</i>					
Water	6(1.6)	<0.0001	4(66.7)	2(33.3)	0.129
Saline	32(8.8)		10(31.3)	22(68.8)	
Patients' saliva	125(34.3)		58(46.4)	67(53.6)	
Milk	201(55.2)		104(51.7)	97(48.3)	
<i>What is the optimum time for the re-implantation of an avulsed tooth?</i>					
15 minutes	180(49.5)	<0.0001	84(46.7)	96(53.5)	0.605
30 minutes	60(16.5)		27(45.0)	33(55.0)	
45 minutes	20(5.5)		12(60.0)	8(40.0)	
1 hour	104(28.6)		53(51.0)	51(49.0)	

<i>Should primary tooth be re-implanted?</i>					
Yes	28(7.7)		15(53.6)	13(46.4)	
No	311(85.4)	<0.0001	154(49.5)	157(50.5)	0.099
I don't know	25(6.9)		7(28.0)	18(72.0)	
<i>Immediate treatment in intrusion is:</i>					
Allow for spontaneous eruption of tooth and if no movement occurs during 3 weeks, rapid orthodontic extrusion.	261(71.7)		137(52.5)	124(47.5)	
Allow for spontaneous eruption of tooth and if no movement occurs during 3 weeks, surgical extrusion using forceps.	57(15.7)	<0.0001	26(45.6)	31(54.4)	0.009
I don't know.	46(12.6)		13(28.3)	33(71.7)	
<i>Management of tooth extrusion:</i>					
Immediate repositioning and splinting.	267(73.4)		132(49.4)	135(50.6)	
Grinding teeth off from occlusion and splinting.	44(12.1)	<0.0001	27(61.4)	17(38.6)	0.004
Allow for spontaneous repositioning.	22(6.0)		11(50.0)	11(50.0)	
I don't know.	31(8.5)		6(19.4)	25(80.6)	

**Table 3:** Distribution and comparison of responses related to questions of practice towards management of dental trauma.

Practice items related to the scenario	No (%)	p-value
<b>Case 1:</b> A 7-year-old boy who was hit in his face (1h before) with a softball came to your clinic for clinical and radiographic examination. A crown fracture involving enamel and dentin with pulp exposure in tooth no.11 and 21 was diagnosed; the stage of root formation was uncompleted (open apex).		
<i>The immediate treatment is</i>		
Pulpectomy.	51(14.0)	
Pulpotomy.	191(52.5)	<0.0001
Single visit RCT.	10(2.7)	
Revascularization.	112(30.8)	
<i>The irrigation protocol that should be followed in this case is:</i>		
6% sodium hypochlorite (NaOCl) alone.	74(20.3)	
1.5% NaOCl followed by 17% ethylene diamine tetra acetic acid (EDTA).	168(46.2)	<0.0001
Chlorohexidine.	77(21.2)	
17% EDTA alone.	45(12.4)	
<i>The medication that should be used to treat this case is:</i>		
Paramonochloroform.	17(4.7)	
MTA.	204(56.0)	<0.0001
Formalin.	8(2.2)	
Triple antibiotics/calcium hydroxide.	72(19.8)	
No medication is necessary.	63(17.3)	

<b>Case 2:</b> A mother called the dentist office explaining that her daughter had “knocked-out” her permanent tooth at that exact moment.		
<i>The mother and her child come to the dental office. What is the next step to be done?</i>		
RCT	37(10.2)	
Radiographic examination, splint, and hygiene and diet control.	298(81.9)	<0.0001
I don't know.	29(8.0)	
<i>Would you prescribe some medicaments?</i>		
Yes, Antibiotic of narrow spectrum, NSAIDs, analgesic.	130(35.7)	
Yes, NSAIDs, analgesic.	175(48.1)	<0.0001
Yes, antibiotic of extended spectrum, NSAIDs, analgesic.	59(16.2)	
<i>What is the ideal time of carrying out the RCT?</i>		
At emergency first visit.	35(9.6)	
7-10 days after re-plantation and before removal of splint.	243(66.8)	<0.0001
After removal of splint until necrosis was found.	6(23.6)	

#### 4. DISCUSSION

Appropriate and immediate emergency management has a great impact on the success of both the short- and long-term prognosis of traumatic dental injuries (Alshamiri et al., 2015, Gupta et al., 2020). It is important that the published guidelines regarding dental trauma treatment are emphasised during educational courses so that the dental students and dentists can provide proper and immediate post-traumatic management (Andersson et al., 2012, DiAngelis et al., 2012). Several studies which assessed the knowledge of dental trauma among dental students and interns showed insufficient to average knowledge regarding management of TDI (Alshamiri et al., 2015, Gupta et al., 2020, Limbus et al., 2014). These results highlight the importance of assessing the awareness among dental students and interns in Riyadh, Saudi Arabia, as well as how vital it is to keep said students up to date about dental trauma. This cross-sectional study was conducted with dental students and interns in Riyadh to investigate their knowledge of, and attitude towards, TDI management, as well as to evaluate the effect of educational courses on said knowledge and attitude. The results obtained showed that no statistically significant association was observed between participant's gender, academic year, university and responses to knowledge and management questions. This could be attributed to the fact that they follow the same guidelines. Regarding the assessment of the participants' knowledge, the overall response was average to good. For the first question, which addressed the “best solution selected to save the avulsed tooth before getting the dental care”, half of the participants chose milk. This result was similar to that produced by Alshamiri et al. and Limbus et al. (Alshamiri et al., 2015, Limbus et al., 2014). Milk has the advantage of ease of accessibility, low cost, and its ability to maintain the viability of PDL cells (Holan et al., 2003). Most of the dental students (85.4%) answered correctly, stating that the primary avulsed tooth should not be re-planted. The International Association for Dental Traumatology (IADT) guidelines recommend not to re-implant primary teeth because of the potential for subsequent damage to the developing permanent tooth germs (Andersson et al., 2012). Concerning the ideal time for replantation, only half of the participants (49.5%) exhibited a favourable response, which was consistent with the result of a previous study and the suggestion made by the International Association for Dental Traumatology (IADT) (Andersson et al., 2012, Limbus et al., 2014). The tooth should be re-planted immediately to avoid damage to periodontal ligament cells. This is the most critical factor influencing the future prognosis of a re-planted tooth (Andersson et al., 2012). The present study revealed that 71.7% of the participants responded correctly in terms of how to manage the intruded tooth. They chose to wait for spontaneous eruption of the tooth, and if no movement occurs for 3 weeks, rapid orthodontic extrusion would be performed. This option is in accordance with previous studies conducted among specialists and general dental practitioners and it's approved by the International Association of Dental Traumatology (Alhaj et al., 2020, Akhlgghi et al., 2014, DiAngelis et al., 2012). Additionally, the majority of the respondents (73.4%) chose immediate repositioning and splinting as tooth extrusion management, which is in agreement with the published guidelines (DiAngelis et al., 2012). This result is comparable to that of a previously mentioned study (Akhlgghi et al., 2014, DiAngelis et al., 2012). Revascularisation is a restoration of the pulp blood supply. It is an approach for the treatment of immature necrotic teeth which has been introduced in recent years in Endodontics (Banchs and Trope 2004., Nygaard Östby et al., 1971). In the present study, during the first clinical scenario three questions were assessed regarding the management of crown fractures. Complicated crown fractures involving the enamel, dentin and pulp constitute a common dental injury (Almalik et al., 2009). Time between the

occurrence of the trauma and the seeking of dental care is critical. It is well known that an untreated complicated crown fracture will lead to necrosis of the pulp (Wang et al., 2014). The first question asked the participants to choose the best immediate treatment procedure for this case. Only 30.8% declared that "revascularisation" would be their method of choice. The vast majority chose the traditional method, which could be attributed to the fact that, at that point, they had still not been informed about the regenerative modalities recently introduced to the field. With regard to the second question, approximately 46.2% responded correctly with "1.5% NaOCI followed by 17% ethylene diamine tetra acetic acid (EDTA)". As proposed by Martin et al. and Trevino et al. stated that irrigants are the most effective irrigation protocols, while they are also less harmful to the stem cells (Martin et al., 2014, Trevino et al., 2011). Conversely, for the third question in this scenario, which read "the medication that should be used to treat this case is", only 19.8% of the participants responded appropriately with "triple antibiotics/calcium hydroxide". Studies have revealed the effectiveness of the application of triple antibiotic (ciprofloxacin, metronidazole, and minocycline) in fighting the endodontic microbes (Hoshino et al., 1996).

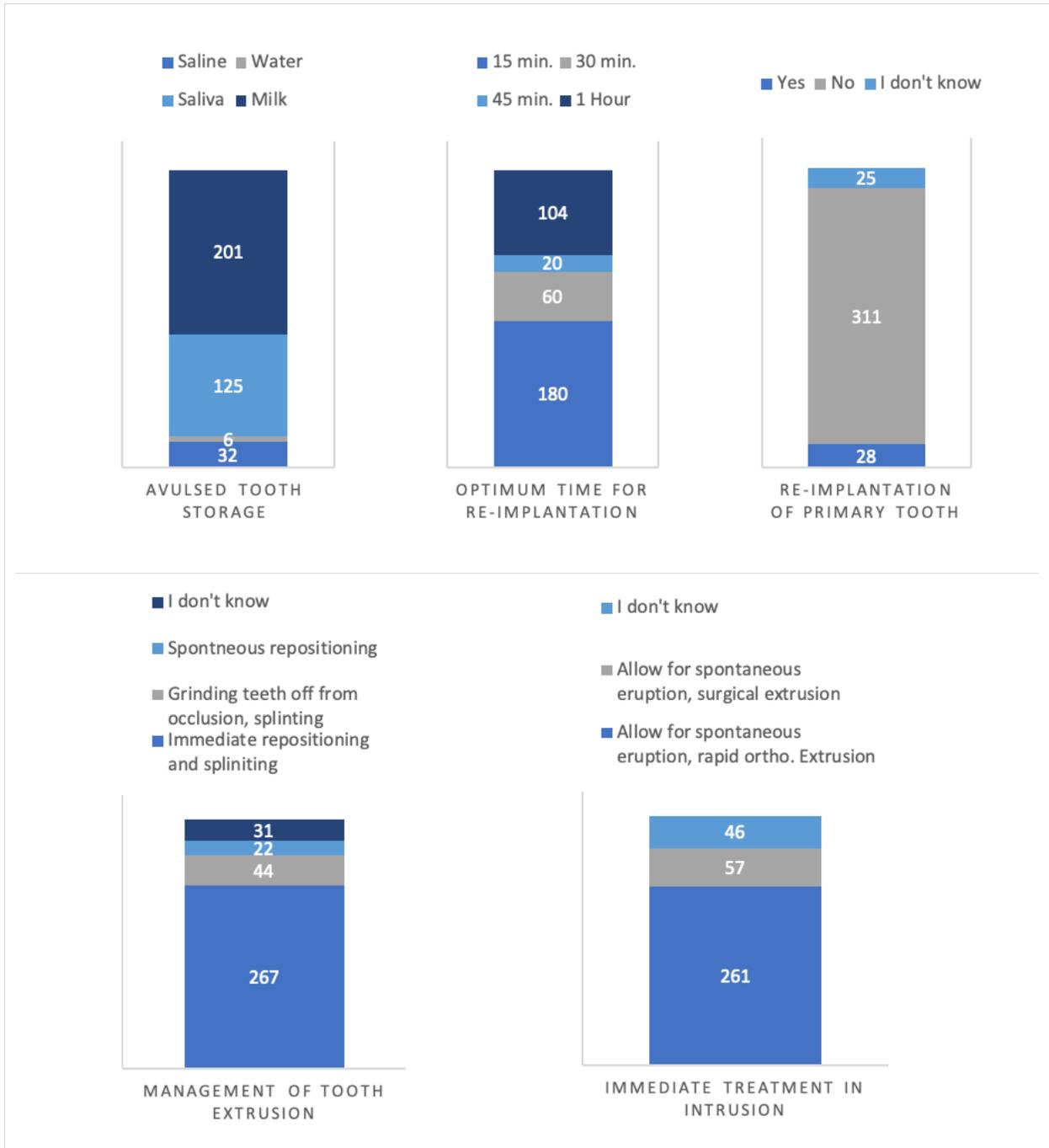
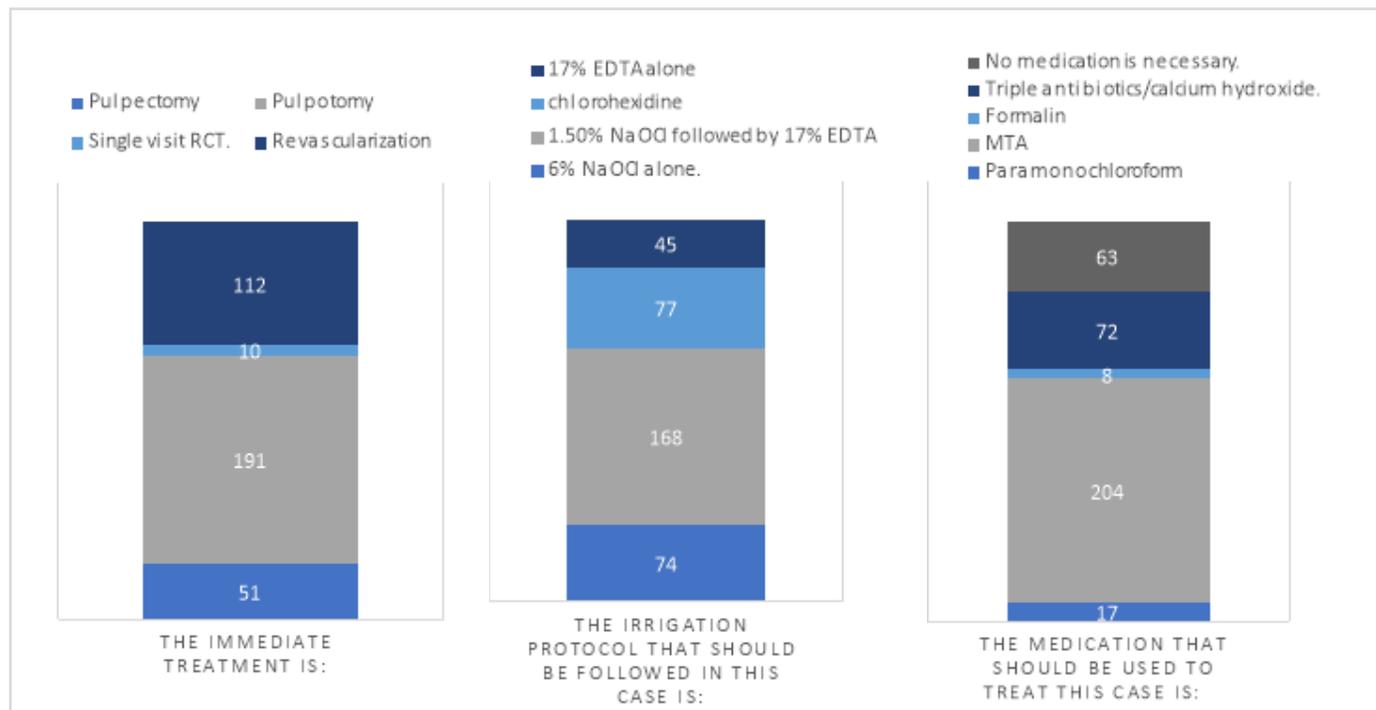
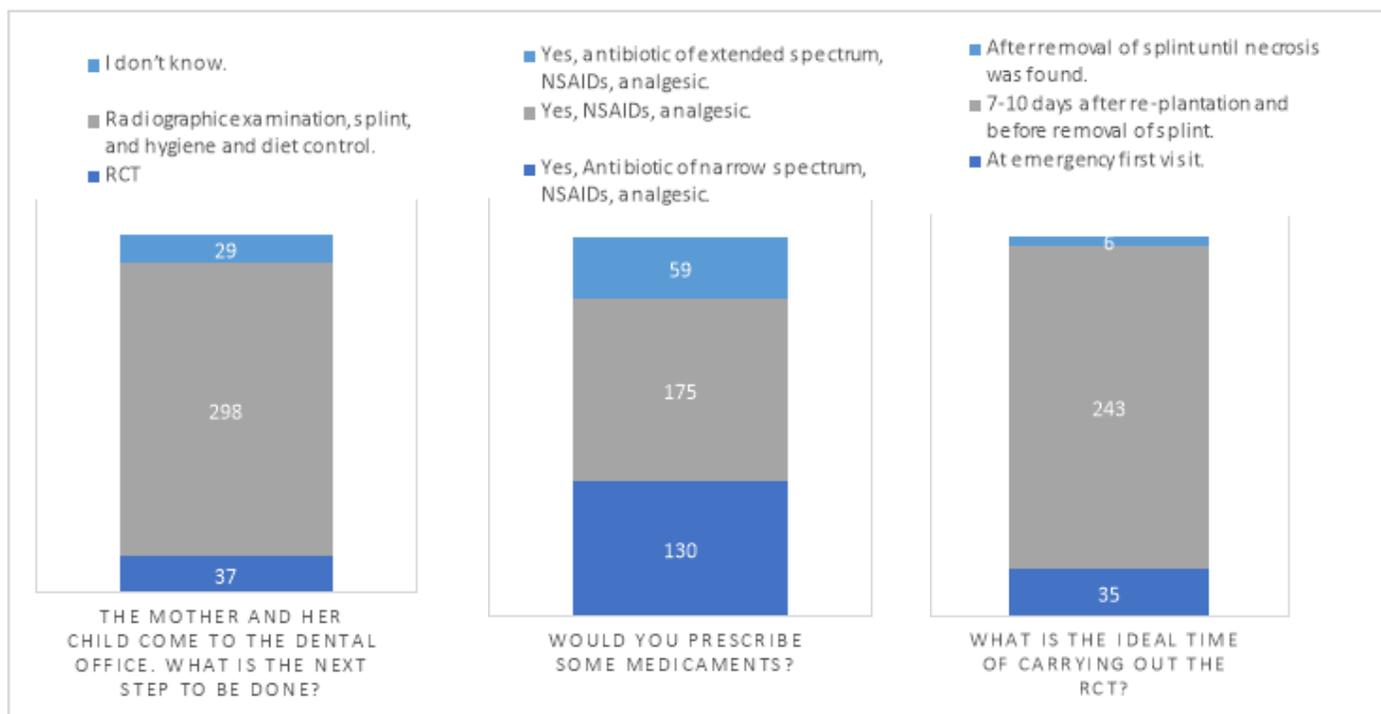


Figure 2: Knowledge questions toward diagnosis and management of dental trauma.



**Figure 3:** Case 1. A 7-year-old boy who was hit in his face (1h before) with a softball came to your clinic for clinical and radiographic examination. A crown fracture involving enamel and dentin with pulp exposure in tooth no.11 and 21 was diagnosed, the stage of root formation was uncompleted (open apex).



**Figure 4:** Case 2. A mother called the dentist office explaining that her daughter had “knocked-out” her permanent tooth at that exact moment.

Concerning the 2nd case scenario, a positive response (81.9%) (66.8%) to questions 1 and 3, respectively, was obtained. The same findings were reported by Akhghi et al. and recommended by the published guidelines (Akhghi et al., 2014, Andersson et al., 2012). However, nearly more than half of the participants did not answer correctly concerning the need for extended antibiotics after the replantation of the avulsed tooth, which was in contrast with a recent study conducted among specialists and general

dental practitioners (GPs) (Alhaj et al., 2020). As stated by IADT, in most situations, antibiotic is recommended after replantation of the teeth, while the patient's medical condition and other associated injuries should also be taken into consideration (Andersson et al., 2012). Tetracycline is the first choice as a systemic antibiotic and should not be given to children under 12 years of age, due to the risk of discoloration (Andersson et al., 2012). Penicillin or amoxicillin can be given as an alternative to tetracycline (Andersson et al., 2012). The association between attendance of educational programmes and response of the participants showed no statistical significance, except in the immediate treatment of intrusion and management of tooth extrusion. This may indicate the easily grasping of these concepts when prompting them in the educational courses. Additionally, most of the students are rarely (41.2%) to never (27.5%) exposed to treating traumatic dental injury in their daily practice, and so they do not have adequate experience. This may be the reason behind the moderate level of knowledge in general. Accordingly, the present study showed overall moderate knowledge of the dental students and interns towards management of dental trauma in Riyadh. However, some aspects, such as medications prescription and regenerative subjects, need to be reinforced via, for example, seminars and different methods, as part of the curriculum on undergraduate courses, so as to enhance the knowledge. It is important to state the limitations of this study, as the use of a random sample may not sufficiently represent the whole population of dental students and interns in Riyadh. In addition, it was perhaps that the case which included "revascularisation" in its choices was not clear to the participants. They might have become confused regarding the status of the pulp, which could have resulted in a high number of participants choosing pulpotomy. Despite these limitations, the study gives valuable information about students' knowledge of dental trauma in Riyadh and could serve as a basis for further assessment in locations other than the region of Riyadh.

## 5. CONCLUSION

The study concluded that the overall knowledge of the management of traumatic injuries was moderate, with inadequacy in some specific aspects of dental traumatology among dental students and interns in Riyadh, Saudi Arabia. This emphasizes the need to reinforce the curriculum of undergraduate courses concerning this topic to further enhance the knowledge and consequently lead to better clinical management of dental traumatic injuries.

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### Authors' contributions:

Asma Al-tamimi, Fatemah Al-rwais, Reem Al-meaiter:- Study design, data collection, and manuscript writing and revising it critically.  
Reem Al-hefdhi, Sarah Al-zahrani:- Study design and assist in manuscript writing.

### Funding

This study has not received any external funding.

### Conflict of interest

The authors declare that there are no conflicts of interests.

### Informed consent

Written informed consent was obtained from all individual participants included in the study.

### Ethical approval

The study was approved by the Research Ethics Committee of Princess Nourah bint Abdulrahman University (Ethical approval code: 17-0138).

### Data availability

All data associated with this study are present in the paper.

### Peer-review

External peer-review was done through double-blind method.

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