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Dental Professionals Management of Avulsed Teeth and Implementation of COVID-19 Related Safety Precautions

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ABSTRACT

Aim: One of the most common dental problems is oral trauma, which is a great threat to the dental health of children and adolescents. This study aims to improve Saudi dentists' knowledge of the management of avulsed teeth and the safety precautions necessitated by the coronavirus disease 2019 (COVID-19) pandemic.

Materials and methods: A cross-sectional study was conducted. The 403 participants, who were from Saudi Arabia, were recruited through social media. The data were collected by a questionnaire that assessed their knowledge about managing avulsed teeth. Significance was set at p=0.05.

Results: The mean score for the correct answers to 22 questions to assess clinical knowledge about avulsed teeth was 15.26 (SD=3.48). According to the responses, 93.3% knew that an avulsed permanent tooth can be replanted, 72.2% indicated that an avulsed primary tooth can be replanted, 63.8% were aware of the best splinting materials, and 58.3% knew the optimal splinting duration. Only 29.8% indicated knowledge about the most recent (2020) International Association for Dental Traumatology guidelines for avulsed permanent teeth. The mean score for the correct answers to the four questions about the management of avulsed teeth during the COVID-19 pandemic was 3.27 (SD=1.02).

Conclusion: Saudi dental professionals were found to have moderate levels of knowledge about the management of tooth avulsion. The answers to the COVID-19-related questions revealed good knowledge about managing avulsed teeth during the pandemic. Health campaigns or online lectures would be helpful in improving dentists' knowledge about managing avulsed teeth.

Key words: Management, Avulsed teeth, Dentists, Saudi Arabia and COVID-19

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INTRODUCTION

One of the most common dental problems, oral trauma poses a great threat to the dental health of children and adolescents [1]. The avulsion of permanent teeth accounts for 0.5 to 3% of all dental injuries [2]. Avulsion (exarticulation) is the complete displacement of the tooth from its alveolus; thus, it is a complex injury that affects the tissues [3]. The maxillary central incisors are most prone to avulsion [4], and this can cause severe functional and psychological problems [5]. The important factors in the prognosis of avulsed teeth are extra-alveolar time and immediate treatment upon injury because of their role in the prevention of pulp necrosis and the degeneration of the periodontal ligament (PDL). These conditions result in inflammatory root resorption and even tooth ankylosis, which can subsequently lead to tooth loss [3,6].

The International Association of Dental Traumatology (IADT) published new guidelines for managing luxated and avulsed primary and permanent teeth [7-10]. According to the guidelines, the best approach is the immediate replantation of the avulsed permanent tooth. If this is not possible, the tooth should be transferred to a dentist as soon as possible, preferably within 30 to 60 minutes, in an appropriate storage medium. The best storage media are Hank's balanced salt solution, milk, normal saline, and the patient's saliva. If the tooth is visibly contaminated, the root surface should be rinsed gently with a saline stream. For

patients who have not been immunized within the previous 5 years, tetanus prophylaxis should be administered if the tooth has come into contact with dirt. Antibiotics are recommended to prevent infection and to decrease the possibility of inflammatory root resorption. The splinting time should be 2 weeks, depending on the stage of root development, and endodontic treatment should be performed within 2 weeks of replantation. Because of the possibility of pulp revascularization, root canal treatment in immature open-apex teeth should be delayed unless there is clinical or radiographic evidence of pulp necrosis or infection. The IADT advises against the replantation of primary teeth because of the high risk of harming the permanent tooth germs [7-10].

Public awareness of avulsed permanent teeth has been investigated. Studies have focused on teachers, parents, and children [11,12]. Similar studies have been conducted in Saudi Arabia [13-15]. Studies around the world have assessed dental professionals' knowledge of the management of avulsed teeth to determine their ability to provide optimal treatment and to raise community awareness. The countries include Japan [16], Malaysia [17], Brazil [18], Turkey [19], Pakistan [20], and Sudan [21].

Such studies were also conducted in Saudi Arabia in Riyadh [2,22], Jazan [23], and Qassim [24]. The questionnaires varied. One study focused on students.22 Others assessed dental graduates [2,23,24]. Most dental students (95.7%) were aware of the importance of dental avulsion [22] however, their knowledge about its management varied. For example, 77% were aware of the transportation media; however, only 26.9% were aware of suitable transportation methods, which include appropriate pre-reimplantation storage [22]. Dentists in Riyadh and Al-Qassim were found to have medium levels of awareness, given that the mean of the correct answers was approximately half of the number of questions [2,24]. However, they had low levels of knowledge about the best storage medium, follow-up duration [2], and critical time for replantation.22 Women,24 public dentists [2] and more experienced dentists, such as specialists [23,24], exhibited higher knowledge levels. However, such studies were not conducted in major cities, such as Jeddah and Makkah, which have the highest number of dentists in Saudi Arabia. External validity data were not available for the Saudi Arabian studies because of the differences in the questionnaires that were used.

These studies are important, however, because of the 34% prevalence of dental trauma in young Saudis [25]. The coronavirus disease 2019 (COVID-19) pandemic, which started in September 2019 [26], necessitated many changes and the adoption of new safety precautions in the healthcare system [27]. These changes have affected clinical dental care [28], and dental emergency treatment around the world [29]. The effects on the management of avulsed teeth during the lockdown and social distancing periods in Saudi Arabia have not been addressed. Thus, the aim of this study was to assess Saudi dentists' knowledge about the management of avulsed teeth and the safety precautions necessitated by the COVID-19 pandemic.

Aim

The aim of this study was to increase Saudi dentists' knowledge of the management of avulsed teeth and the safety precautions necessitated by the COVID-19 pandemic.

METHODS

This cross-sectional study used a questionnaire to assess Saudi dentists' and dental students' knowledge about the management of avulsed teeth and the necessary safety precautions during the COVID-19 pandemic. The participants were recruited nationwide on social media platforms (Instagram, Twitter, Snapchat, WhatsApp, ResearchGate, and Facebook) through convenience sampling because of the implementation of social distancing during the data collection period. The inclusion criteria were dentists or dental students currently living and working in Saudi Arabia. Failure to provide written consent resulted in exclusion from the study. Data collection occurred in October and November 2020.

The questionnaire was adapted from two previous studies.2,19 It consisted of 30 items in four main sections. The first section comprised nine sociodemographic questions (age, nationality, current hospital, education level, region of residence, number of dental avulsion

cases encountered per year, participation in continuing dental education in the management of tooth avulsion, and familiarity with the most recent IADT guidelines for avulsed permanent teeth [7-10]. The second section contained seven multiple-choice questions on the management of avulsed teeth in the pre-clinical phase: the possibility of primary and permanent tooth replantation, correct handling of a tooth, best cleaning method for a dirty tooth, storage medium for a permanent tooth, critical time frame for determining the treatment procedures, and ideal extra-alveolar period for a permanent tooth. The third section comprised nine multiple-choice questions on clinical management. The fourth section consisted of five multiple-choice questions on the procedures for managing avulsed permanent central incisors during the COVID-19 pandemic. The questions addressed patient consultations, treatment and infection control precautions, management of waste from COVID-19-infected patients, and dentists' anxiety about treating avulsed teeth during the pandemic.

The questionnaire was validated by a pilot study of 20 dentists. The data were collected, tabulated, and subsequently analyzed in IBM SPSS Statistics, Version 23.0 (IBM Corp., Armonk, NY, USA). The mean, standard deviation, frequency, and percentages were determined through descriptive analysis. The significance level was 0.05. Chi-square tests and t-tests facilitated the comparisons of the participants' responses. The data were anonymized and stored in a private computer accessible to only the research team at Umm Al-Qura University. The study received ethical approval from the Umm Al-Qura University institutional review board.

RESULTS

Data were collected from 403 respondents to 600 invitations (response rate, 67.16%). The mean age was 30.27 (SD=7.18). Table 1 presents the participants' demographic data. The participants were asked about the number of dental avulsion cases treated annually. The mean number was 17.61 (SD=35.07).

The participants were asked 22 questions about their clinical knowledge about avulsed teeth. Table 2 summarizes the answers. The mean score was 15.26 (score range, 0–22, SD=3.48). The Cronbach's alpha was 0.732.

The participants were asked four questions about their management of avulsed teeth during the COVID-19 pandemic (Table 3). The mean of the correct answers was 3.27 (SD=1.02, score range, 0–4). Analysis of variance (Tukey's post hoc tests) and t-tests were used to assess the scores for the management of avulsed teeth during the pandemic by demographics (Table 4).

The linear regression results indicated a direct relationship between age and the scores for the management of avulsed teeth during the

Table 1: Participant demographics (N=403).

Item		n	%
Gender	Male	109	27
	Female	294	73
Nationality	Saudi	366	90.8
	Non-Saudi	37	9.2
Region	Central	58	14.1
	West	253	62.8
	East	45	11.2
	South	25	6.2
	North	22	5.5
Current hospital	Private clinic	85	21.1
	Governmental hospital	229	56.8
	Not employed	89	22.1
Education level	Dental intern	54	13.4
	General dental practitioner	190	47.1
	Postgraduate student	72	17.9
	Specialist/consultant	87	21.6
Participation in continuing dental education in the management of tooth avulsion	Yes	197	48.9
	No	206	51.1
Knowledge of the most recent (2020) International Association for Dental Traumatology guidelines for avulsed permanent teeth	Yes	120	29.8
	No	183	70.2

Table 2: Clinical knowledge about avulsed teeth.

Question	Correct answer	n	%
Can an avulsed permanent tooth be replanted?	Yes	376	93.3
Can an avulsed primary tooth be replanted?	No	291	72.2
The correct part of an avulsed permanent tooth to be held	Crown	344	85.4
The best cleaning method for a dirty avulsed tooth (before the end of the critical timeframe)	Saline or osmolality-balanced media	342	84.9
Appropriate transportation medium			
Sponge, cotton wool, or napkin	No	395	98
Ice	No	385	95.5
Normal saline	Yes	199	49.4
Patient's mouth or saliva	Yes	307	76.2
Cold milk	Yes	327	81.1
Any aseptic solution	No	386	95.8
Hank's solution	Yes	264	65.5
The critical time for determining dental avulsion treatment	First 30–60 minutes	328	81.4
The ideal extra-alveolar period for an avulsed permanent tooth	Less than 30 minutes	220	54.6
Does an open or a closed apex affect treatment?	Yes	360	89.3
If the tooth has been out of the socket for less than 60 minutes, what would be the best procedure?	Continue treatment and avoid touching the root surface	332	82.4
If the tooth has been out of the socket for more than 60 minutes, what would be the best procedure?	Remove PDLs from the root surface before continuing treatment	219	54.3
Does the critical period affect the splinting time?	No	103	25.6
Optimal splinting materials	Flexible splints	257	63.8
Optimal splinting duration	2 weeks	235	58.3
Should antibiotic prophylaxis be provided?	Yes	198	49.1
Should tetanus prophylaxis be provided?	Yes	188	46.7
How long would you follow up with clinical and radiographic examinations?	5 years	96	23.8

Table 3: Management of avulsed teeth during the COVID-19 pandemic.

Question	Correct answer	n	%
If a patient consulted you for an avulsed permanent tooth during the COVID-19 pandemic, what would you do?	Ask them to come to the clinic immediately and provide the appropriate instructions.	325	80.6
Before treating a patient with an avulsed permanent tooth during COVID-19, what would you do?	Ask whether the patient has COVID- or has been exposed to it so that the necessary safety precautions can be taken.	325	80.6
If a patient came to the clinic with an avulsed permanent tooth during COVID-19, what type of infection control precautions would you take?	Take additional precautions.	326	80.9
How would you manage the waste from a COVID-19-infected patient who presented with an avulsed tooth?	Dispose as biomedical waste in a yellow bag.	343	85.1
How do you rate your anxiety about treating a patient with an avulsed tooth during the COVID-19 pandemic?	High	130	32.3
	Moderate	183	45.4
	Low	47	11.7
	No anxiety at all	43	10.7

COVID-19 pandemic (p=0.009, R2=0.017). There was an inverse relationship with the number of avulsed teeth treated per year (p=0.001, R2=0.027).

DISCUSSION

The aim of this study was to assess Saudi dentists' knowledge about the management of avulsed teeth and the safety precautions necessitated by the COVID-19 pandemic. Knowledge of avulsion and its management as a dental emergency is very important in reducing stress and anxiety for the doctor and the patient [30]. The immediate post-traumatic management protocols have been found to improve the prognosis for avulsed teeth [31].

The participants had moderate knowledge levels (M=15.26, SD=3.48). The responses to the COVID-19-related questions indicated good knowledge levels about the management of avulsed teeth during the pandemic. Only about 30% of the participants indicated knowledge about the most recent IADT guidelines for managing avulsed permanent teeth, thus the moderate knowledge levels [7-10].

The knowledge levels in this study were similar to those in a Turkish study [19]. The results

Table 4: Total and COVID-19-related knowledge scores by demographics.

Item		Total knowledge scores	COVID-19-related knowledge scores
		M (SD)	M (SD)
1. Gender	Male	14.73 (3.91)	3.23 (1.05)
	Female	15.46 (3.3)	3.29 (1.01)
2. Nationality	Saudi	15.34 (3.47)	3.29 (1.05)
	Non-Saudi	14.49 (3.59)	3.11 (0.74)
3- Region	Central	15.24 (3.8)	3.17 (1.05)
	West	15.82 (3.18)	3.41 (0.91)
	East	14.84 (2.55)	3.29 (0.92)
	South	11.96 (4.73)	2.68 (1.41)
	North	13.59 (3.65)†	2.64 (1.43)‡
4 Current hospital	Private clinic	14.96 (3.22)	3.12 (0.99)
	Governmental hospital	15.37 (3.68)	3.38 (0.99)
	Not employed	15.29 (3.25)	3.15 (1.11)
5. Education	Dental intern	15.74 (2.73)	3.22 (0.84)
	General dental practitioner	15.03 (3.17)	3.36 (0.93)
	Postgraduate student	15.32 (3.91)	3.26 (1.07)
	Specialist/ consultant	15.45 (4.15)	3.13 (1.25)
6. Did you participate in continuing dental education in the management of tooth avulsion?	Yes	15.82 (3.52)	3.25 (1.02)
	No	14.74 (3.38)*	3.3 (1.02)
7. Do you know about the newest (2020) International Association for Dental Traumatology guidelines for managing avulsed permanent teeth?	Yes	16.05 (3.97)	3.07 (1.1)
	No	14.93 (3.21)*	3.36 (0.98)*

*p < 0.05

†The analysis of variance (ANOVA) and Tukey's post hoc test results indicated that participants from the southern region had significantly lower knowledge levels than those in the central, western, and eastern regions. Participants in the northern region had significantly lower knowledge levels than those in the western region.

‡The ANOVA and Tukey's post hoc test results indicated that participants in the Western region had significantly higher knowledge levels than those in the Southern and Northern regions.

indicated that 51.1% of the respondents had not participated in continuing dental education in the management of tooth avulsion. These results were similar to those of a Riyadh study in which 58.3% of the results had not participated.2 Most of the participants in the present study were aware that an avulsed permanent tooth could be replanted. This was much higher than the percentage (35.37%) reported by Alharbi et al. [15]. The reason might be differences in the public's and dentists' knowledge. The participants in the present study (72.2%) indicated that a primary tooth cannot be replanted. This was similar to the results of previous studies [32,33].

In the present study, 85.4% of the participants indicated correctly that an avulsed permanent tooth should be held by the crown. This is a lower percentage than that (97.3%) reported in a study conducted in Turkey19 but higher than that (71%) in a study in Riyadh [2]. Most of the participants in the present study indicated that sponges, cotton wool, or aseptic solutions were not good storage media for an avulsed tooth. They indicated that normal saline (49.4%), the patient's mouth or saliva (76.2), cold milk (81.1%), and Hank's solution (65.5) were appropriate, and that percentage is considered moderate. In contrast, a previous study18 found lower percentages, the reason might be that the participants were general dentists.

The most recent IADT guidelines recommend the use of a flexible splint for up to 14 days [3]. Approximately 63.8% of the dentists in the present study used flexible splinting materials after the replantation of an avulsed tooth. This was slightly higher than the results of a previous study2 in which almost half of the dentists used flexible splinting materials. Slightly more than half of the respondents in the present study indicated a 2-week splinting duration. Approximately 23.8% stated that they would conduct five years of clinical and radiographic follow-up, as recommended in the most recent IADT guidelines [7-10]. The knowledge levels about avulsed permanent teeth indicated

the need for dentists' and dental students' participation in continuing education to create awareness of the most recent IADT guidelines.

Almost 80% of the dentists gave the correct answers about the management of tooth avulsion during the COVID-19 pandemic. This reflects acceptable knowledge levels. However, when asked to rate their anxiety about treating patients during the pandemic, 32 to 45.4% indicated moderate to high anxiety levels, and 10 to 11.7% indicated low anxiety levels.

This study of dentists' awareness of the management of dental avulsion is different from previous studies because it was conducted during the COVID-19 pandemic. The study has strengths, such as the investigation of dentists in multiple Saudi Arabian regions. Previous studies have tended to focus on one region. However, the use of a self-report online questionnaire requires the consideration of self-reporting bias.

CONCLUSION

Saudi dental professionals were found to have moderate levels of knowledge about the management of tooth avulsion. The answers to the COVID-19-related questions revealed good knowledge about managing avulsed teeth during the pandemic. Health campaigns or online lectures would be helpful in improving dentists' knowledge about managing avulsed teeth.

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