

Assessment of knowledge and practice in management of tooth avulsion among dental clinicians: A cross-sectional study

Mohammed Mustafa

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Author Affiliation:

Department of Conservative Dental Sciences, College of Dentistry, Prince Sattam Bin Abdulaziz University, Al-Kharj 11942, Saudi Arabia; Email: ma.mustafa@psau.edu.sa

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ABSTRACT

Aim: Tooth avulsion (TA) is a common presentation of dental trauma and if treated on time saves money and psychological stress to the patient. Dental clinicians are expected to have sufficient knowledge to solace the patient and the parents/guardian as well as manage the avulsed tooth. Hence, this study was aim to assess the dental clinicians' knowledge and practice in the management of tooth avulsion. *Materials and Methods:* This questionnaire based cross-sectional study was conducted among the dental clinicians of Mumbai city of India, through online "Google Forms". The participants were selected through convenience sampling; a pre-tested and validated questionnaire was prepared. SPSS version22 was used for analysing data. The "Chi-square test" was applied to compare the responses, "Descriptive analysis" and "logistic regression analysis" was used while keeping the level of significance at <0.05 . *Results:* It was observed that among 434 participants, there was a significant difference between genders and years of experience ($p<0.001$). There was a significant variation in the knowledge levels as assessed from various responses when the "Chi-square test" was applied. On "logistic regression analysis", no significant difference was seen for gender and age, while the odds ratio for the number of years of experience was significant for the variables ($p<.00001$). *Conclusions:* The level of knowledge and practice in the management of tooth avulsions was moderate among dental clinicians. The success of endodontically treated avulsed teeth depends on various factors as stated in this study.

Keywords: Dental clinicians, Knowledge, Management, Practice, Tooth avulsion.

1. INTRODUCTION

Tooth avulsion is commonly reported among the patients attending the dental clinic with an incidence of approximately 2% of dental injuries. The etiology of the tooth avulsion is most commonly due to sports injuries and accidents, and



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the most frequently teeth involved are the permanent anterior. The most common age for tooth avulsion is the early teenage between twelve and fifteen years. The profile of the patient may also put at risk of dental injury, for example, the proclined incisors are more prone to be injured than a normal over-jet (Andersson et al., 2012; Al-Majed, 2001).

Many previous reports have stated a low level of awareness among the public regarding the transport of Avulsed Teeth. Dental clinicians face a challenge when attending to this kind of injury as the success of replantation of the avulsed teeth depends on many factors like the transport medium; the time lapsed outside; the amount of the loss of periodontal ligaments, etc. The treatment advised is the immediate replantation of the avulsed teeth. However, this may be practised only a few times. Along with the level of the knowledge of the patient and/or the guardian, the awareness of the dental clinicians is also of great significance in the success of the replantation of the avulsed tooth (Halawany et al., 2014; WMA Declaration, 2008). Though earlier research has been done to estimate the acquaintance of the dental clinicians concerning the managing of the TA, there is a paucity of such studies in Mumbai city of India. Hence, this study was aim to assess the dental clinicians' knowledge and practice in tooth avulsion management.

2. MATERIALS AND METHODS

This questionnaire based cross-sectional study was designed to assess the knowledge and practice in tooth avulsion management among the dental clinicians of Mumbai city of India. This study was conducted through an online questionnaire using "Google Forms". The institutional ethics clearance was obtained for the study and consent was taken from all the participating dental clinicians. The study was conducted for a total period of six (06) months from August 2020 to November 2020 to collect the responses and December 2020- January 2021 for the analysis of the data. The participants were selected by convenient random sampling from the dental clinicians of Mumbai, India who were registered with the state dental council. We considered both male and female dental clinicians with different levels of experience and specialities. The pre-tested questionnaire was designed based on a similar study conducted by (Westphalen et al., 2007), this questionnaire consists of 15 questions. The first two (02) was regarding gender and experience levels, and the remaining thirteen (13) was to assess the level of knowledge and practice in tooth avulsion management. This questionnaire was prepared and a pilot study was conducted by sending these questionnaires to 25 dental clinicians (which were not included in the study) and the data was analysed to determine the reliability by assessing Cronbach's coefficient alpha (0.830). The validity of the questionnaire was tested by sending it to experienced dental clinicians. After required modifications, the final version of the questionnaires was prepared in the Google Form and was emailed online to all the participants. Only one response was accepted from each participant. The responses were noted and were compared. Statistical Package Social Sciences (SPSS) version 22 was applied for the data analysis. The "Chi-square test" was applied to compare the responses, "Descriptive analysis" and "logistic regression analysis" was used while keeping the level of significance at <0.05.

3. RESULTS

It was observed that among 434 participants who responded, 106 were women and 328 were men, the difference was statistically significant ($p < .00001$) (Table 1 and Figure 1). The level of experience among the majority of the participants was between 1- 2 years. We observed a significant variance in the level of experience among the participants ($p < .00001$) (Table 2 and Figure 2). We observed a significant variation ($p < .00001$) among the participants for eleven (11) questions assessing the knowledge, while for two (02) questions there was no significant response ($p = 0.12475$). The majority of participants thought primary avulsed teeth should not be replanted. Most of the participants knew the "meaning of the avulsed tooth". The Hank balanced salt solution was the choice of the transport medium among the dental clinicians.

Table 1 Comparison based on genders.

Gender	(N=434)	The Chi ² value is 92.739, p-value is < .00001
Male	328	
Female	106	

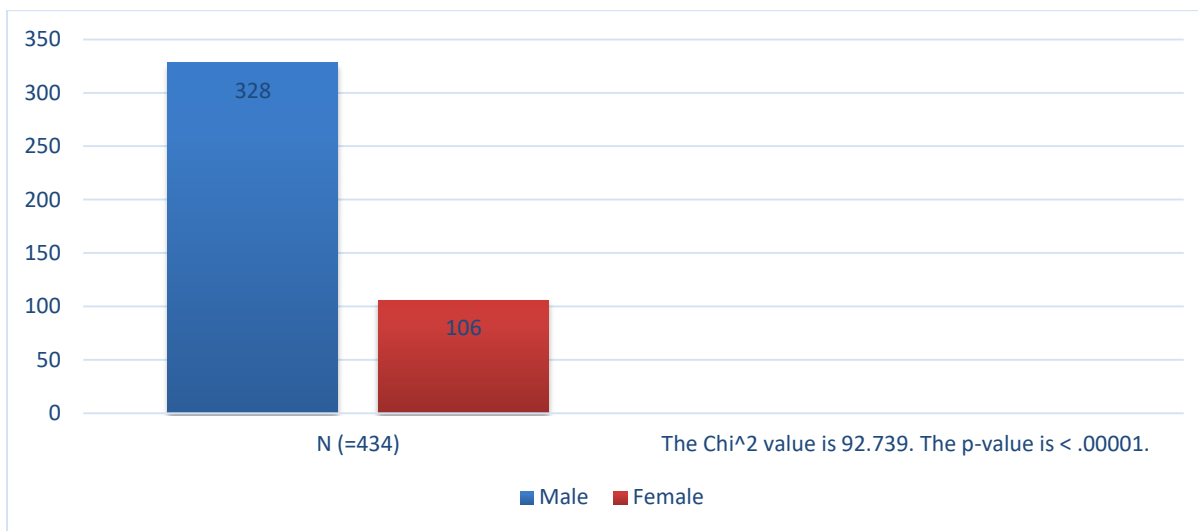


Figure 1 Responses of the participants (genders).

Table 2 Comparison based on the years of experience

Years of experience	(N =434)	Frequency %	The Chi^2 value is 185.291, p-value is < .00001
1-2	265	61	
3-5	99	24	
6-10	34	8	
>10	30	7	

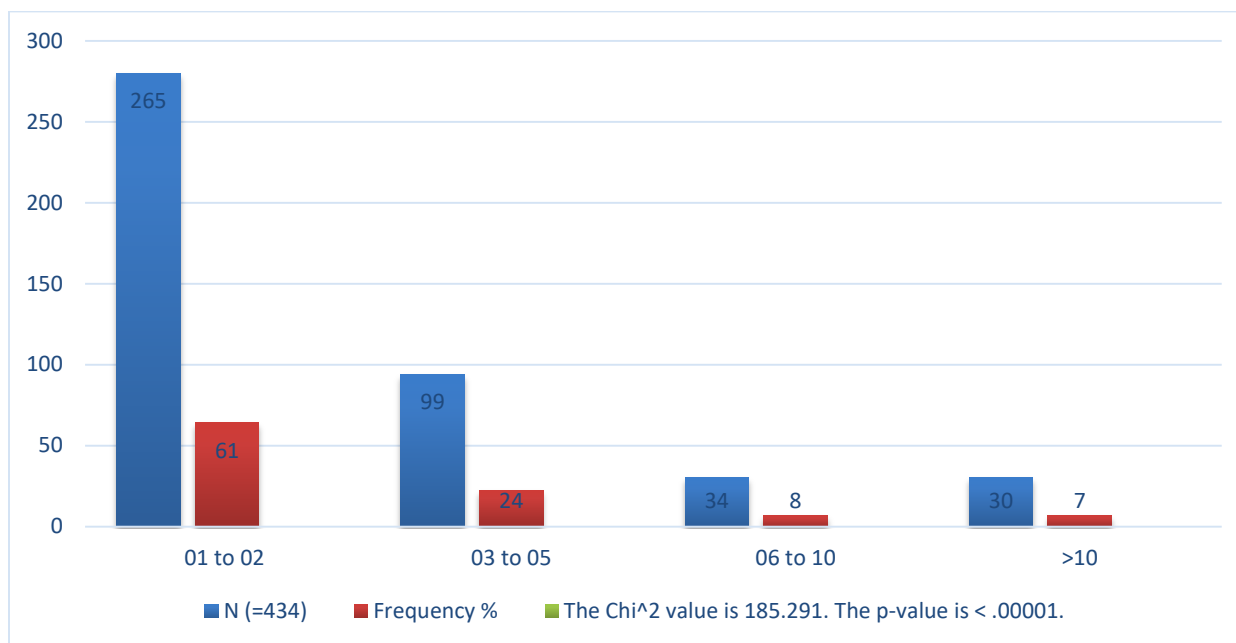


Figure 2 Responses of participants on the basis of years of experience.

The majority expressed that the critical time of the avulsed tooth for replantation was less than an hour, but actually, the “critical time is less than 30 minutes”. For the type of root surface treatment majority opted the Sodium fluoride. There were different views for the choice of radiography or imaging for the avulsed tooth using Intra-Oral-Peri-Apical (I.O.P.A) and Cone-Beam Computed Tomography (CBCT), but most of them preferred single peri-apical radiograph. Nearly 50% thought that the flexible splint for 2 weeks was the recommended method using composite and wire splints was the choice for most of the participants. Over 50% of the participants expressed no need for antibiotics. When asked for the preferred time to initiate root canal treatment, there was no statistical significance as similar distribution of the participant responses were seen for all the given options (p=0.12485), and also

for factors influencing the outcome of replantation, there was no statistical difference was seen ($p=0.12475$), as shown in Table 3, 4 and Figure 3, 4a and 4b. On “logistic regression analysis”, no significant difference was seen for gender and age, while the odds ratio for the number of years of experience was significant for the variables (Table 5).

Table 3 Comparison based on the level of knowledge and practice among the participants (YES or NO)

S. NO.	QUESTIONNAIRE	FREQUENCY	%	P (value)
1. Did you attend a course in dental traumatology following your graduation?				
	a. Yes.	72	17%	$P < .00001$
	b. No.	362	83%	
	Total	434	100%	
2. Have you ever experienced a patient with an accident involving avulsed teeth?				
	a. Yes.	73	18%	$P < .00001$
	b. No.	361	82%	
	Total	434	100%	
3. Should the primary teeth that are avulsed be replanted?				
	a. Yes.	75	19%	$P < .00001$
	b. No.	359	81%	
	Total	434	100%	

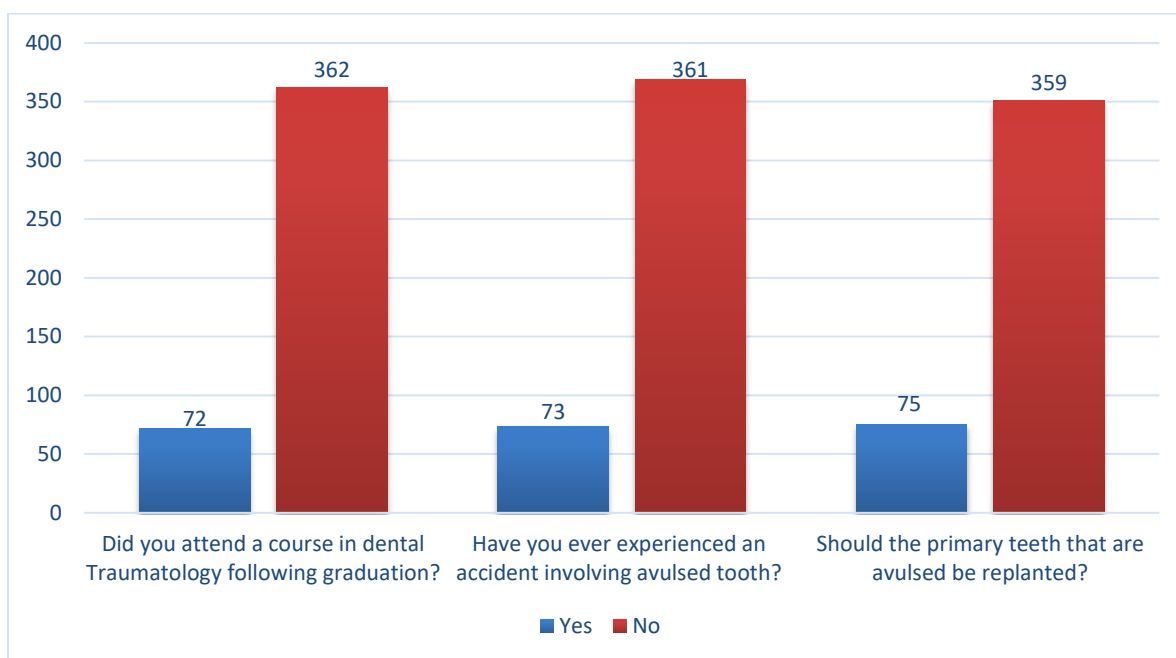


Figure 3 Responses of the participants (for questionnaires. 1, 2, and 3).

Table 4 Comparison based on the level of knowledge and practice among the participants for the various parameters (from questionnaire no. 4 to questionnaire no. 13).

S. NO.	QUESTIONNAIRE	FREQUENCY	%	P (value)
4. Avulsed tooth means?				
	a. Total dislodgement of intact tooth out of its socket.	398	91%	$P < .00001$
	b. Partial dislodgement of intact tooth out of its socket.	17	04%	
	c. Dislodgement of a fractured segment of an intact tooth.	11	03%	
	d. Don't Know.	08	02%	

	Total	434	100%	
5. The best storage medium?				
	a. Milk.	110	25%	<i>P</i> < .00001
	b. Saliva.	85	20%	
	c. Normal saline.	28	06%	
	d. Hanks balanced salt solution.	211	49%	
	Total	434	100%	
6. The critical period for replantation of an avulsed tooth?				
	a. Less than thirty (30) minutes.	100	23%	<i>P</i> < .00001
	b. Less than sixty (60) minutes.	234	54%	
	c. Less than ninety (90) minutes.	30	07%	
	d. More than ninety (90) minutes.	70	16%	
	Total	434	100%	
7. What type of root surface treatment would you choose?				
	a. Sodium fluoride.	231	53%	<i>P</i> < .00001
	b. Chlorhexidine.	41	10%	
	c. Doxycycline.	71	16%	
	d. No need for root surface treatment.	91	21%	
	Total	434	100%	
8. What type of imaging and/or radiographic assessment would you choose?				
	a. One periapical radiograph.	214	49%	<i>P</i> < .00001
	b. One CBCT scan.	31	07%	
	c. Two angled periapical radiographs.	113	26%	
	d. Periapical radiograph and CBCT scan.	76	18%	
	Total	434	100%	
9. What type of splinting is a standard recommendation?				
	a. Flexible splint for 14 days.	247	57%	<i>P</i> < .00001
	b. Flexible splint for 60 days.	74	17%	
	c. Rigid splinting for 30 days.	85	20%	
	d. No splint.	28	06%	
	Total	434	100%	
10. What type of splint would you prefer?				
	a. Fibre splints.	50	12%	<i>P</i> < .00001
	b. Composite and wire splints.	214	49%	
	c. Orthodontic wire and bracket splints.	75	17%	
	d. Titanium trauma splints.	95	22%	
	Total	434	100%	
11. What type of antibiotic would you choose?				

	a. Amoxicillin.	98	23%	<i>P</i> < .00001
	b. Doxycycline.	32	08%	
	c. Clindamycin.	71	16%	
	d. No need for antibiotics.	233	53%	
	Total	434	100%	
12. What would be the preferred time to initiate root canal treatment?				
	a. Immediately after replantation.	104	24%	<i>P</i> = 0.12485
	b. 7-10 days after replantation.	108	25%	
	c. Immediately before replantation.	112	26%	
	d. No root canal treatment is needed.	110	25%	
	Total	434	100%	
13. Factors influencing the outcome of replantation?				
	a. Storage medium.	98	22%	<i>P</i> = 0.12475
	b. Extra-alveolar time.	102	23%	
	c. Amount of periodontal ligament damaged.	114	27%	
	d. All of the above mentioned.	120	28%	
	Total	434	100%	

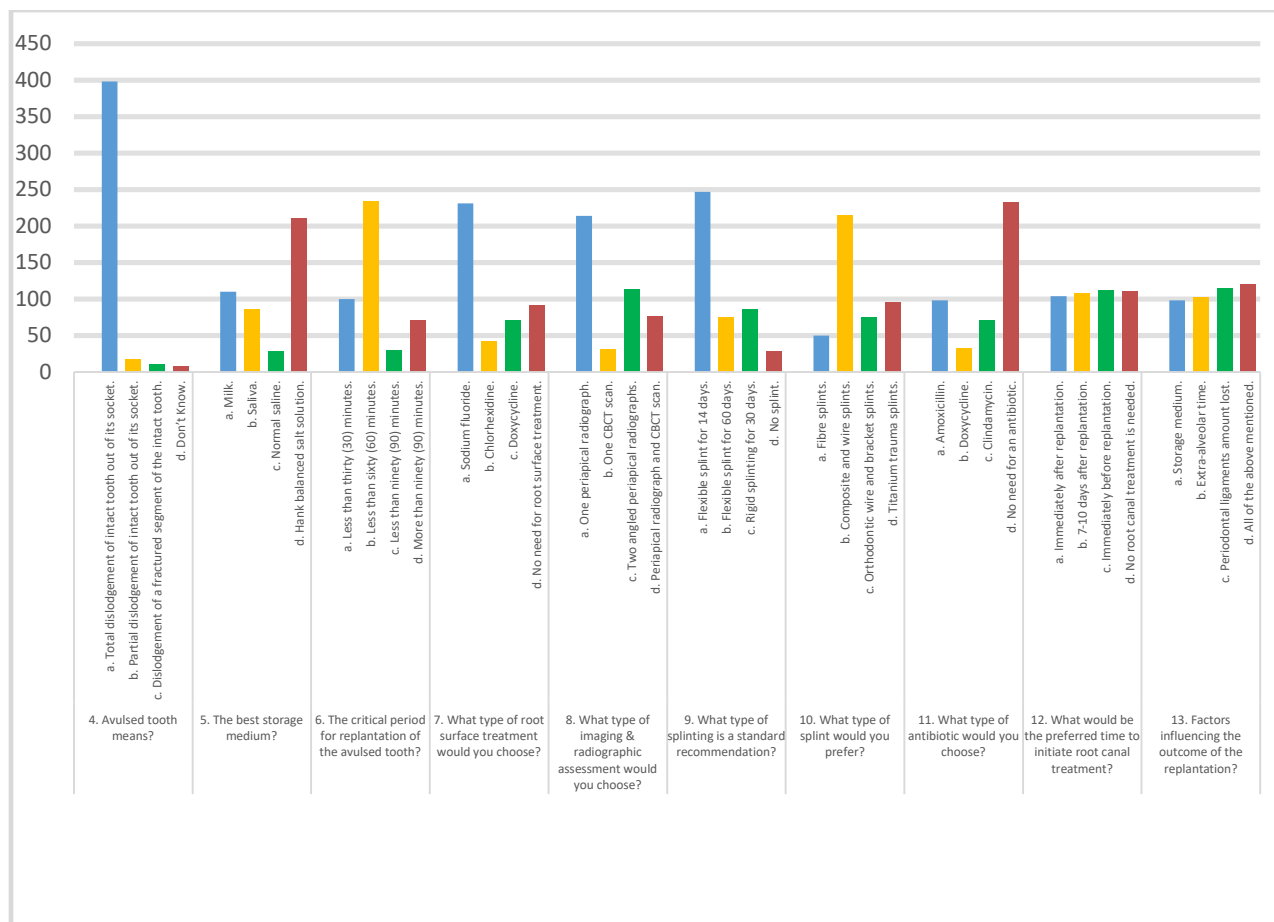


Figure 4A Comparison of responses based on the level of knowledge and practice among the participants for the various parameters (from questionnaires no. 4 to no. 13) in terms of frequency.

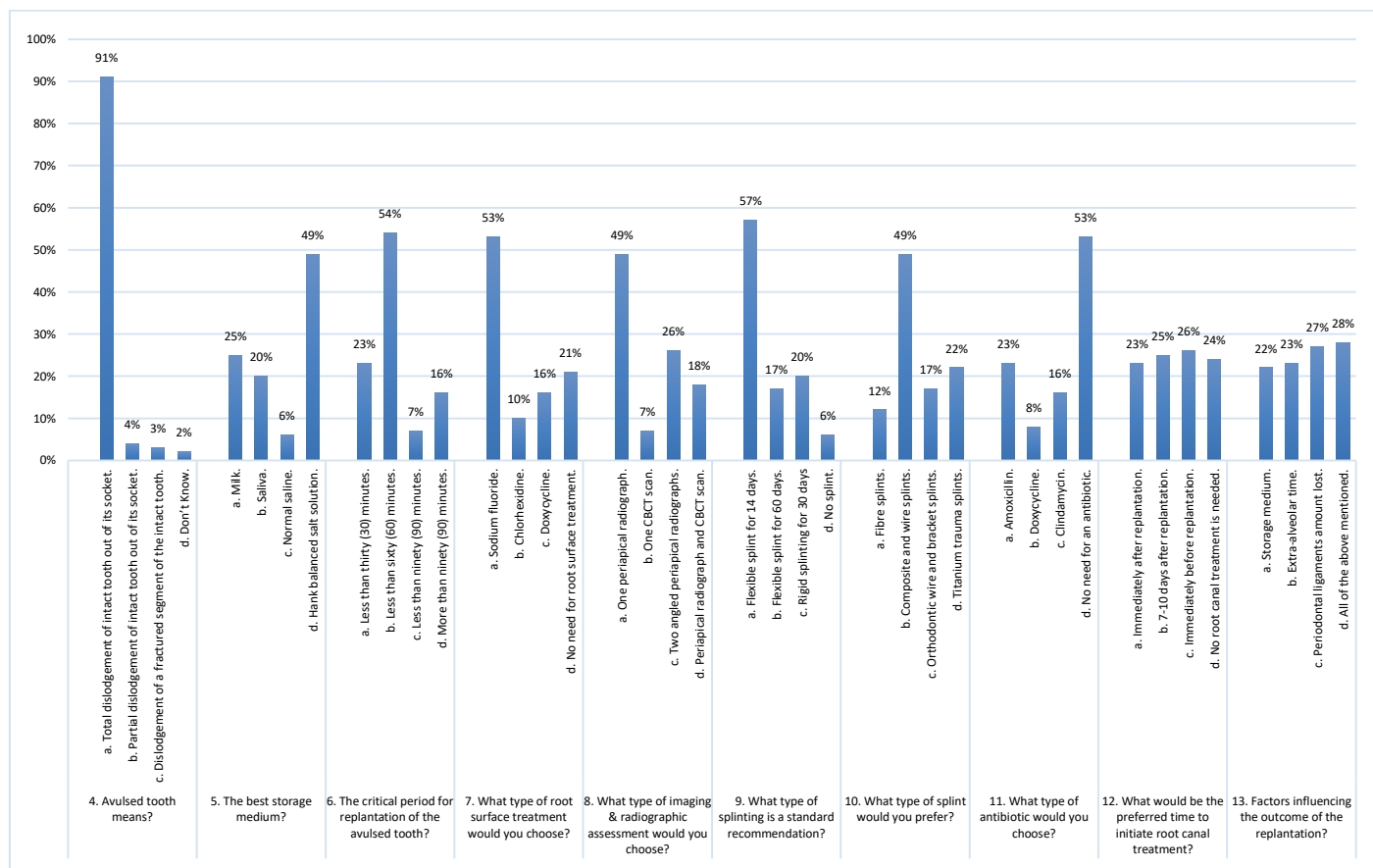


Figure 4B Responses of the participants for the various parameters (from questionnaires no. 4 to no. 13) in terms of percentage

Table 5 Application of the “Logistic Regression co-efficient, Wald test and Odds Ratio for each of the predictors”

Variables	“B”	“Wald”	“P”	“Odds ratio”
Sex	-.261	.492	.481	.763
Age	-.094	2.005	.155	.906
Experience	1.287	11.38	.001*	3.619
*Statistically significant				

4. DISCUSSION

The knowledge of the dentist regarding the various protocols for the management of the TA is vital to the successful outcome of the implanted tooth. A greater level of knowledge is associated to lower stress levels among the dentists and better handling of the already stressed patient (Westphalen et al., 2007; Robertson and Norén, 2001; Flores et al., 2001). Accurate management of the avulsed tooth may increase the outcome many folds. In addition, this will be beneficial to the patient by lowering the economy of the replacement and beneficial psychologically as the natural tooth is retained (Hu et al., 2006; Shamarao et al., 2014; Mohandas and Chandan, 2009).

Previous studies have stated a lower knowledge among dental practitioners (Hamilton et al., 1997; Hu et al., 2006; Kostopoulou and Duggal, 2005), these studies were however conducted in developed counties. Hence we conducted our study to assess the knowledge in the city of Mumbai, India. It was observed that men were significantly higher than women and the majority had an experience of lower than 3 years. A significant variation was observed among the participants for Eleven (11) questions assessing the knowledge. The majority thought avulsed primary tooth should not be replanted (Shashikiran et al., 2006). This opinion may have been based on the fact that many dentists thought the avulsed teeth are associated with soft tissue trauma (Abdullah et al.,

2016; Stewart and Mackie; 2004; Jackson et al., 2005). Moreover, established on the “International Association of Dental Traumatology (IADT) guidelines.” the replantation has to be avoided in certain conditions (Baginska and Wilczynska-Borawska, 2013; Zhao and Gong, 2010; Cohenca et al., 2006, De Vasconcellos et al., 2009).

The majority knew the meaning of the avulsed tooth in our study. The Hank balanced salt solution was the choice of the transport medium among the dentists, this is in agreement with observations made by (Westphalen et al., 2007) and it is recommended by the “International association of dental traumatology” (Baginska and Wilczynska-Borawska, 2013). Though many studies have shown it as the best storage medium, it is expensive and not widely available. To date, there is no medium that fulfils all the requirements of the ideal storage medium. The majority expressed that the critical time for replantation was less than 60 minutes; this is contrary to the studies of (Hamilton et al., 1997; Zhao and Gong, 2010). For the type of root surface treatment majority of them in our study opted for Sodium fluoride.

The root canal treatment is suggested when the tooth is not implanted within an hour. RCT is at all times designated in teeth with closed apices. After replantation, a week to ten days is seen as an ideal time for the RCT. However, it should be evaded, and only if pulp necrosis is seen clinically and radiographically root canal treatment can be done immediately (Hu et al., 2006). Nearly 50% of the participants expressed that they would initiate root canal treatment between 7-10 days after replantation which is consistent with the observations made by (Krastrl et al., 2009), in their study they observed that over 60% of the participants also expressed the same opinion.

Flexible splint for 2 weeks was the choice for the majority of the participants and it is also a recommended method for the management of tooth avulsions (Andersson et al., 2012; Al-Majed, 2001). This study is consistent with the observations made in the study by (Hu et al., 2006). There were different views for the choice of imaging for the avulsed tooth choosing IOPA & CBCT. Over 50% of the participants expressed no need for antibiotics. Systemic antibiotics are suggested if the avulsed tooth was soiled (Westphalen et al., 2007), observation in this study is contrary to the study by (De Vasconcellos et al., 2009). There was an almost equal distribution of opinions for the preferred time to initiate root canal treatment.

Observations in this study were conducted with few dissimilar questions and participants were teachers and others are non-dental professionals (Shamarao et al., 2014; Mohandas and Chandan, 2009; Shashikiran et al., 2006; Abdullah et al., 2016). Most of the participants were not updated about the information in the management of tooth avulsions in regard to splinting, which is similar to the observations by (Zhao et al., 2010; Westphalen et al., 2007), and in their studies, they have stated that the majority of the participants favoured splinting for over 2 weeks (Zhao et al., 2010) stated that the majority rigid splint was favoured over the flexible splint.

This study was not without limitations. There was significant variation in the gender and the level of experience that may have impacted the study. Only dental clinicians of Mumbai city of India were considered who were registered at the state dental council, this may not represent the other state registered dentists practising in Mumbai. The level of education like the undergraduate and the postgraduate levels were not compared. This study had no control group to compare the observations. Further studies are suggested to alleviate the above limitations.

5. CONCLUSION

From this study we conclude that the level of knowledge and practice was moderate among the dental clinicians, the significant number of participants showed inconsistent awareness in the management of tooth avulsion. The success of endodontically treated avulsed tooth depends on the various factors stated in this study. It is recommended that CDE (Continuous Dental Education) programs be organized to ensure that dental clinicians have updated knowledge in the management of tooth avulsions.

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Ethical approval

The study was approved by the Institutional Review Board of Prince Sattam Bin Abdulaziz University (ethical approval code: IRB number REC-HSD-015-2020).

Informed consent

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

Funding

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Conflict of Interest

The author declares that there are no conflicts of interests.

Data and materials availability

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

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