Original Research

Evaluation of Knowledge Regarding Emergency Management of Avulsed Traumatic Dental Injuries in Children among General Dental Practitioners in India

Abstract

Context: Traumatic dental injuries (TDIs) leading to dental avulsion occur very frequently in society. Management of avulsion is critical for the dentist, as it requires appropriate knowledge. **Aim:** The study was conducted to evaluate the knowledge of the general dental practitioners (GDPs) regarding the emergency management of TDI leading to avulsion in children. **Setting and Design:** Questionnaire-based cross-sectional survey design was utilized to assess the knowledge. **Subjects and Methods:** Data for this cross-sectional survey were collected through questionnaires from July to September 2014. A total of 278 GDP were contacted and requested to fill a pretested questionnaire to assess the knowledge regarding tooth avulsion. The GDPs were grouped on the basis of their educational qualification and years of clinical experience. Statistical Analysis Used: Chi-square test was used for intra- and inter-group comparison. **Results:** A total of 224 (80.57%) GDPs consented to participate in the survey. Markedly low knowledge levels were noted in the sample irrespective of educational qualification and years of experience with respect to replantation of the avulsed primary tooth, holding the root instead of the crown, choice of appropriate storage medium for transportation of avulsed teeth, use of medications, and splinting type and time. Clinical experience and higher educational qualification of GDPs revealed statistical significant difference in the methods of management for TDI leading to avulsion. **Conclusion:** Higher professional education and added clinical experience were associated with better knowledge in the management of TDI leading to avulsion. The finding warrants the need for informative educational programs to update and boost the knowledge of practicing dentists regarding emergency management of avulsed teeth.

Keywords: *Avulsion, general dental practitioner, traumatic dental injuries*

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Introduction

Traumatic dental injury (TDI) is a serious community health threat due to the increased incidence of road traffic accidents, violence, and increased participation of children in sports in recent years. It is anticipated that TDIs would probably outpace dental caries and periodontal disease as the most significant risk to oral health in the near future.[1] TDI leading to avulsion (exarticulation) is complete displacement of a tooth from its alveolus and represents a complex and dramatic injury that may affect multiple tissues. TDIs are complex in nature which affect enamel, dentin, pulp, periodontium, alveolar bone, and cementum. Kostopoulou and Duggal, Andersson, Govindarajan *et al.*, and Ankola *et al*. have reported the prevalence of TDIs leading to avulsion ranging from 1% to 16%.[1-4] Ankola *et al.* found that boys were three times more at risk for TDIs than girls.[4]

A number of factors determine the success of reimplantation of avulsed tooth such as extra-alveolar time period, choice of storage media, and contamination of the avulsed tooth which sequentially is related to the knowledge of dentist to an extent.[5] The dentist's knowledge regarding TDIs leading to avulsion is critical for the prognosis of traumatized teeth.[6] Management of traumatic injuries leading to avulsion may be a challenge to the general dental practitioners (GDPs), as it occurs when the dentists are least prepared.[7] Thus, a prompt and standard management of TDIs can improve the case prognosis as well as reduce stress and anxiety in patients, their parents, and the dentist concerned.[8]

There is an exponential growth in Indian dental care services with an increase in

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the number of dental graduates and postgraduates passing every year.[9] Literature search exhibited scarcity of evidence assessing the knowledge of GDP on TDIs leading to avulsion across the world and even more in India. Hence, this study was conducted with an aim to explore the knowledge of GDPs in Vadodara city about the emergency management of TDI leading to avulsion in a child.

Subjects and Methods

A cross-sectional questionnaire survey was conducted in Vadodara city to assess GDP's knowledge regarding emergency management of TDI leading to avulsion. Ethical approval was obtained from Institutional Review Board and University Ethics Committee (SVIEC/ON/Dent/RP/1509)**.** The study lasted for a period of 2 months which started in July 2014. All GDPs of private and governmental hospitals, clinics, polyclinics of Vadodara city, registered in Indian Dental Association (IDA), Vadodara branch, Gujarat, constituted the sampling frame. The list of 278 registered GDPs comprising their clinic address, telephone number, and E-mail were obtained from local IDA branch in the city. Total enumeration method was followed for collection of data.

All the GDPs consenting to participate were included. Dental Practitioners specialized in pediatric dentistry and those who could not be contacted before visit were excluded from the study. Prior appointment was obtained from the GDPs either by phone or through E-mails and schedule for the study was drafted. After the dentists' consented to participate, one of the investigators met them personally and asked them to fill the questionnaire. Total of 224 GDPs willing to participate in the study and who fulfilled the selection criteria were included.

A 14-item close-ended self-administered questionnaire was prepared that included questions relating to demographic information and emergency management of TDIs resulting in avulsion. No personal information was sought from the dentists like the name or registration number. The questionnaire was pretested on 15 pediatric dental specialists for content validity.

A total of 221 completely filled questionnaires were analyzed. Three incompletely filled questionnaires were excluded from analysis. Statistical analysis (Chi-square test) was done using SPSS version 18.0. (SPSS Inc., IBM, Chicago) The confidence interval was set at 95%.

Results

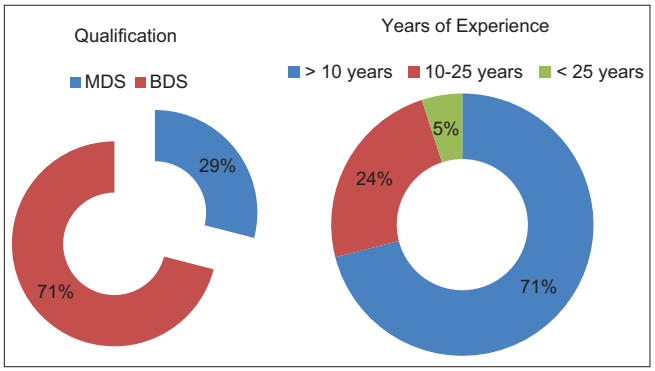
Total of 221 (79.5%) out of 278 GDPs consented to participate. Completed questionnaires with the data that were suitable for statistical analysis were included in the study (104 [47%] males and 117 [53%] females). A high response rate of 79.5% was observed in the survey (221 out of 278). There were 156 (70.6%) graduates (BDS), and 65 (29.4%) of them had postgraduates degree in different branches of dentistry (MDS) except pedodontics and preventive dentistry [Graph 1]. Observations of the survey revealed that certain GDPs had undergone special training and experience of dental avulsion management in practice [Table 1].

The percentage distribution of the responses to the questions regarding emergency management of TDIs leading to avulsion is summarized in Table 2.

There was significant difference in the level of knowledge observed when stratified by educational qualification with respect to management of TDIs leading to avulsion. Strategic factors of management in relation to inquiry on tetanus vaccine status, avulsed primary tooth management with respect to need for reimplantation, avulsed permanent tooth management with respect to need for reimplantation, tooth holding position for reimplantation and ideal storage media, need for splinting, and medication revealed statistically significant differences. The postgraduates/ specialists had significantly better knowledge than the practising dental graduates. When comparing by the duration of experience, those with higher years of experience had better overall knowledge though significant differences were observed only for need of splint and need for tetanus vaccine posttrauma.

Discussion

Dental trauma is injury to the mouth, including teeth, lips, gums, tongue, and jawbones. Traumatic dental injury



Graph 1: Demographic data of the participating general dental practitioners in the study. BDS = Bachelor of dental sciences; MDS = Master of dental sciences

Table 1: Distribution of knowledge and experience regarding avulsed teeth among the participating general dental practitioners in the study

	n (%)
First aid training for the management of avulsed teeth	
Yes	91 (41)
No	130 (59)
Experienced case of avulsion in their practice	
Yes	93 (42)
No	128 (58)

Table 2: Knowledge about the management of traumatic dental injuries resulting in avulsion

Question/condition	Appropriate treatment option	Overall	Qualification			Years of experience in years			
			BDS	MDS	*P*	<10	10-25	>25	*P*
Necessity to inquire about tetanus vaccine before treatment	Yes	121 (54.8)	71 (45.5)	50 (76.9)	<0.001*	78 (49.3)	33 (62.2)	10 (100)	0.003*
Avulsed primary tooth management	No reimplantation	66 (29.9)	52 (33.3)	14 (21.5)	0.03*	41 (25.94)	22 (41.5)	3 (30)	0.131
Avulsed permanent tooth management	Reimplantation	199 (90)	136 (87.1)	63 (96.9)	0.02*	114 (89.2)	48 (90.5)	10 (100)	0.539
Tooth holding position for reimplantation	By crown	173 (78.3)	112 (71.7)	61 (93.8)	0.001*	124 (78.4)	41 (77.3)	8 (80)	0.357
Ideal storage media for avulsed tooth	HBSS	75 (33.9)	41 (26.2)	34 (52.3)	0.003*	52 (32.2)	19 (35.8)	5 (50)	0.814
Ideal extraoral time for successful outcome of reimplantation	<30 min in appropriate storage media	130 (58.8)	93 (59.6)	37 (56.9)	0.374	87 (55.0)	33 (62.2)	10 (100)	0.03*
Splinting requirement after reimplantation	Yes	190 (86)	126 (80.7)	64 (98.4)	<0.001*	131 (82.9)	49 (92.4)	10 (100)	0.09
Type of splint	Semirigid for 4 weeks	123 (55.7)	82 (52.5)	41 (63.1)	0.267	87 (55.1)	32 (60.3)	4 (40)	0.68
Medication necessary after reimplantation	Yes	208 (94.1)	143 (91.6)	65 (100)	0.01*	149 (94.3)	49 (92.4)	10 (100)	0.63
Type of medication	Broad-spectrum antibiotic	125 (56.6)	90 (57.6)	35 (53.8)	0.59	87 (55.0)	34 (64.1)	4 (40)	0.28

*Significant $P<0.05$. *n*=Refers to number of participants, HBSS=Hanks Balanced Salt Solution, BDS=Bachelor of Dental Sciences, MDS=Master of Dental Sciences

may include knocked-out teeth (dental avulsion), cracked or craze (fractured), displaced teeth (dental luxation, lateral displacement, or extrusion), pushed up into the jawbone (dental intrusion), or loosened teeth (subluxation or dental concussion). TDIs leading to avulsion can be defined as complete displacement of tooth out of socket.[10] Among all the types of TDIs, avulsion is the most complicated, and hence, we decided to check the knowledge of management of avulsion among the dentists.

Hu *et al*., Westphalen *et al*., and Kostopoulou and Duggal conducted studies on knowledge regarding dental avulsion in Sao Paulo, city of Curitiba, West/North Yorkshire and Humberside, UK, respectively, on GDPs; they observed that GDPs had inadequate knowledge in its management.[1,6,7] The literature till 2016 warranted the need to improve the level of knowledge of GDPs in the management of avulsed teeth. However, the area of improvement of knowledge differed from one study to another [Table 3]. Probable cause for such an observation could be attributed to the type of professional training acquired by the GDPs in their respective areas.[1,6,7,11-20] Literature search on the evaluation of knowledge regarding emergency management of avulsed TDIs in children among GDPs in India revealed no evidence. Hence, an attempt was made to discern the level of knowledge regarding emergency management of avulsed TDIs in children among GDPs.

When the training for first aid management of avulsed tooth among GDPs was analyzed, majority of the GDPs had not undergone any training [Table 1]. Probable cause of such an observation could be attributed to the level of awareness in terms of first aid care provided for the GDPs in their professional training.

The GDPs were also analyzed for experience in the management of avulsed teeth in their practice. It was observed that majority of the GDPs had not encountered such a clinical situation. This observation could probably be explained by the fact that such case would have been reported to the child specialists/pediatrician first for the general management of the injured child.

The preference of systemic administration of tetanus was also evaluated. Majority of the GDPs preferred giving tetanus vaccine [Table 2]. However, the postgraduate GDPs gave higher preference in comparison to graduate GDPs. The observations of the present study were in accordance to the guidelines prescribed by International Association of Dental Traumatology (IADT).[21]

The knowledge of the practitioners was appraised in relation to reimplantation of both avulsed primary and permanent teeth. Majority of GDPs suggested reimplantation of both primary and permanent avulsed teeth. This observation was in correlation to IADT guidelines for reimplantation of permanent teeth.[21] However, the results of the study revealed a contrasting opinion about reimplantation of avulsed primary teeth in relation to IADT guidelines. Majority of GDPs suggested reimplantation of avulsed primary teeth. The opinion of reimplantation of avulsed primary teeth did not vary with acquisition of postgraduate degree and experienced GDPs. Kinoshita, Weiger, and Pefaur have reported cases with reimplantation of avulsed primary teeth.[22-24] Zamon assessed the risk-benefit outcomes of reimplantation of avulsed primary teeth and

Table 3: Studies on knowledge regarding emergency management of traumatic dental injuries leading to avulsion among worldwide dentists

Year	Citations	Group studied	Sample size	Survey area	Knowledge of dental trauma
1997	Hamilton *et al*.[11]	GDP	229	UK	Inadequate knowledge to treat dental trauma Dentists with postgraduation courses had a higher knowledge scores
2005	Kostopoulou and Duggal[1]	GDP and CDO	693	UK	Inadequate knowledge of dentists for emergency treatment of dentoalveolar trauma in children Dentists who attended courses like continuing dental education had a more thorough knowledge
2006	Hu *et al*.[6]	GDP and Endodontists	98 GDP 44 Endodontist	Brazil	Overall poor knowledge of managing dental trauma among the surveyed dentists Dentists who attended postgraduate dental trauma courses showed improved knowledge
2006	Cohenca *et al*.[12]	GDP	167	California	The knowledge found to be inadequate and it needs to be reinforced
2007	Westphalen *et al*.[7]	GDP	250	Brazil	Adequate knowledge on the management of dental avulsion of the general dental practitioners
2009	de vasconcellos *et al*.[13]	GDP	264	Brazil	Appropriate knowledge of dental avulsion management and its prevention among the surveyed dentists
2009	Zadik *et al*.[14]	GDP	54	Israel	Adequate knowledge among the dentists regarding the management of avulsed teeth The knowledge regarding medication and splinting should be reinforced
2013	Cinar *et al*.[15]	GDP and specialists	154	Turkey	Both specialists and GDPs had insufficient knowledge of appropriate emergency treatment of TDIs
2014	Akhlaghi *et al*.[16]	GDP	241	Iran	The overall knowledge of GDPs about the emergency management of TDI was found to be moderate
2014	Re *et al*.[17]	GDP	500	Italy	Mixed level of knowledge on the management of traumatic injuries to the teeth Lack of knowledge was identified in type and duration of splinting in the management of avulsed tooth
2015	Hatem and Taher *et al*.[18]	GDP	144	Libya	Deficiencies in the knowledge regarding emergency management of dental trauma leading to avulsion in general dental practitioners
2015	AlJazairy *et al*.[19]	GDP	470	Riyadh, Saudi Arabia	Moderate knowledge regarding avulsion and its management A relative low knowledge was observed regarding the duration of follow-up after reimplantation
2016	Abdullah *et al*.[20]	GDP	182	Malaysia	The knowledge level on the management of avulsed tooth among general dental practitioners in Malaysia needs to be improved

GDP=General dental practitioners; CDO=Community dental officers; TDI=Traumatic dental injuries

suggested that this procedure had more possibility of complications.[25] Andersson and Zamon suggested that the problems encountered in reimplantation of primary teeth were trauma to developing permanent tooth bud, discoloration, malformation, and ankylosis of reimplanted primary teeth leading to unerupted or deflected eruption path of underlying permanent incisors.[21,25]

Majority of GDPs recommended holding of tooth by crown during the reimplantation procedure (78.3%). This observation of handling the tooth was in accordance with IADT guidelines and Ram and Cohenca.[26]

Poi *et al*. advocated that the solutions specifically prepared for the purpose of storing the avulsed teeth provided the advantage of maintaining the vitality, and the well-known solutions for such purpose were HBSS and Viaspam.[27] About 33.9% of GDPs in our study preferred HBSS as a storage media for storing the avulsed teeth. Specialist GDPs included in the study preferred HBSS as storage media more over the graduate GDPs [Table 2]. Probable cause for such an observation may be that majority of GDPs included in the study would prefer saline or milk as a storage media for the preservation of avulsed tooth and lack of easy availability of HBSS. Our observations were in correlation to the observations made by AlJazairy.[19]

The knowledge on duration of extraoral time before reimplantation was also analyzed among all the GDPs**.** About 56.8% GDPs suggested reimplantation as soon as possible, no longer than 30 min of avulsion of tooth. All GDPs irrespective of education and experience had

the similar opinion of reimplantation time duration. Our observations were similar to the observations made by Trope.[28]

When the need of splinting was analyzed for the management of avulsed teeth, 86% of GDPs preferred splinting of teeth for the duration of 4 weeks. The observation of this study was in accordance with the observation of Westphalen *et al*.[7] and IADT guidelines.[21] However, Trope advocated the usage of physiologic splint for a shorter period of 7–10 days.[28] Only 55.7% (123 GDPs) preferred flexible splint for reimplantation of avulsed teeth for 4 weeks.[21] However, we could not find any literature that compared the prognosis of 2 and 4 week duration of splinting in relation to avulsed teeth.

Almost all the GDPs included in the study, 94.1% favored prescribing antibiotic therapy after replantation. Both graduate and postgraduate GDPs preferred prescribing broad-spectrum antibiotics. Our observations were in correlation to the observations made by Andreasen.[10] The American Association of Endodontists[29] and the IADT[21] have also recommended systemic antibiotics, such as penicillin V four times a day or doxycycline two times a day for 7 days, at doses depending on the patient's age and weight. Furthermore, experimental animal studies have also verified a reduction in root resorption with the use of systemic antibiotics following reimplantation of teeth.[13,30-32] There is no evidence on preferred antibiotic and dosage after replantation of avulsed teeth. Hence, further studies are recommended to determine the choice of drug for reimplantation of avulsed teeth.

The present survey showed that few dentists, in general, had the knowledge regarding emergency management and quality treatment necessary to improve the prognosis of traumatized teeth. Hence, there is a compelling reason to emphasize the dentists' awareness regarding their important role in managing TDIs leading to avulsion. Lectures, seminars, continuing education courses, workshops, development, and use of a formal protocol of treatment for TDIs are some possible ways to attain this goal.

One of the limitations of the study can possibly be the smaller sample size of the study. Second, the responses could have been analyzed by the speciality to check for any confounding effect that it might have.

Recommendations

- Continual upgrade of professional training curriculum with incorporation of latest guidelines in the clinical practice of GDPs should be made compulsory by the council
- Pediatricians should be educated regarding the diagnosis of TDI and prompt referral to dentists
- General public and parents awareness are also very important and should be undertaken taking the help of media.

Conclusion

Within the limitations of this study, the GDP's knowledge regarding avulsion and its emergency management was found to be inadequate. Very little but significant number of respondents answered the questions correctly according to the current IADT guidelines. GDPs with higher qualification and experience revealed better knowledge. The situation warrants introspection on need and ways to keep a dental professional updated with emerging advancements and trends in practicing dentistry.

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Conflicts of interest

There are no conflicts of interest.

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