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Assessment of the knowledge and awareness of private practitioners (BDS/MDS) engaged in general dentistry for emergency management of avulsed teeth in children

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Abstract---Dental trauma are accidental injuries, that may occur in any stage of life, be it infancy, childhood, adolescence or adulthood. Most TDIs occur at home, followed by at school and in the street or other public places. Such injuries may have better prognosis if the general public were informed about basic first-aid measures and seek medical care promptly. As dental healthcare providers, it is our responsibility to identify and either provide the necessary care for

children with acute traumatic dental injuries or refer the case for optimal care depending on the complexity of the injury and the clinician's knowledge, and expertise. Dental traumatology requires more attention and profound discussion in paediatric dentistry as dental and oro-facial trauma is being encountered commonly, in children.

Keywords---knowledge, awareness, private practitioners, dentistry.

Introduction

Traumatic dental injuries (TDI) are wounds that occur per chance to the dento-alveolar structure at any time in life for an individual. It is more prevalent in case of children and adolescents as compared to adult population as a consequence of their activities¹. Studies indicate that 25% of all school-going kids and 33% of adolescents experience trauma to dental tissues, with the majority of the injuries occurring before the second decade of life.¹ In fact, around 40% of children first come in contact with a dental surgeon due to a traumatic injury.² The injuries to permanent teeth, most frequently, are seen to occur secondary to fall accidents at home or schools, followed by road traffic accidents, sports, violence and child abuse, whereas trauma to primary dentition is more frequent around the age of 2-3 years wherein the child's motor co-ordination is developing.³

Dental trauma may encompass minor tooth fracture, with injury to the enamel and dentine only, or substantial dento-alveolar damage that may affect the adjoining tissues, including tooth displacement or avulsion. Among these, the incidence of avulsion may vary from 0.5 to 16% in permanent dentition and 7 to 13% in primary dentition, among all the TDIs⁴⁻⁶. The term avulsion is used when there is complete unseating of the tooth from the alveolar socket and out of the oral cavity, secondary to direct frontal impact. There is disruption and damage to its periodontal ligament along with pulp tissue. Possible concomitant injuries affecting the bone, soft tissue and adjacent teeth may also occur.⁷

As damage to the periodontium and pulp is most severe in cases of avulsion and intrusion, compared to subluxation and luxation injuries, there is a need for an ideal management protocol to be followed to ensure better prognosis and optimise the success rate for these types of TDIs (Andreasen and Andreasen, 2007).⁷ The prognosis of an avulsed tooth depends on the chain of events taking place post trauma⁸⁻¹⁰. Improper storage, dehydration, disinfection or damage to the root surface all irreversibly compromise the viability of periodontal cells of the affected tooth (fibroblasts and cementoblasts)¹¹. Additionally, the sustenance of the affected pulp will also depend on the status of the apical foramen.¹²

Traumatic dental injury has a relatively high prevalence and a definite impact on individuals and society as a whole¹³⁻¹⁴. There will likely be an improvement in the prognosis of the injured tooth if the people involved with them are acquainted with preliminary first-aid measures and seek out professional help promptly. Management of such injuries may depend overtly on the severity of the injury

sustained and the clinical knowledge and expertise of the practitioner treating the case.³

Various surveys done internationally showed inadequate knowledge of dentists about emergency management of TDIs. However, the data in this regard in India is scarce. Hence, this questionnaire study was undertaken to assess the level of knowledge of private dental practitioners on emergency management of avulsed teeth in children.

Materials and Method

Sample Selection

This study is a questionnaire based cross-sectional study comprising of 206 dentists practising in the eastern part of India. All participants selected were registered dental practitioners under the state dental council of West Bengal and Odisha. The study was completed during the period from October 2021 to December 2021. Participants, who had completed their Bachelor or Master degree in dentistry and pursuing their practise, in their private clinics, were enrolled and only those who submitted their filled perform an online were included in the study.

Questionnaire Design

A newly prepared, pretested and validated open-ended questionnaire was sent to 300 dental practitioners via emails or social media applications and the responses were recorded. Confidentiality of the participants was strictly maintained. The questionnaire is divided into three parts. Part one comprised of demographic information such as age, type of practice (General/Specialist), years of experience and if the practitioner attended any workshop on TDI first aid. Part two comprised of questions related to knowledge on first aid management of avulsed teeth and Part three on definitive management of such cases.

Each correct response of parts 2 and 3 (except question 16) of the questionnaire set was awarded with one point and the total score obtained by the participant was calculated. Finally, knowledge score of below average (<7), average (7-9), good (10-12) or excellent (>12) was accorded to all the participants.

Statistical Analysis

The analyses were processed using the SPSS software (Version 20, Chicago, IL, USA). Descriptive statistics were used to analyse the data. The Student's t-test and one-way ANOVA were used to compare the knowledge scores of participants about different aspects of management and treatment protocols for avulsion.

Results

Demographic analysis

Out of 300 private practitioners approached, 206 practitioners submitted the filled questionnaire, among which 64.1% (n= 132) were males and 35.9% (n= 74) were females (Table 1). The age of the respondents ranged from 22-57 years with a mean age of 31.49. About 74.3% of respondents had post graduate qualifications while the rest 25.7% were graduate dentists. Most of the participants of the survey (62.1%) had their clinical experience of less than 5 years, 27.7% between 5-10 years, 7.8% 10-20 years and only 2.4% of the people had clinical experience of above 20 years (Table 2). With regards to attending workshops, CDE programs on management of dental emergencies, only 59.7% of participants responded positively, compared to 40.3% who opted for no.

Table 1: Group statistics showing mean scores according to gender

Gender	N	Mean Score	Std. Deviation	P value
Male	132	9.38	2.854	0.284
Female	74	9.84	3.092	

Table 2: Group statistics showing mean scores according to years of experience

Experience	N	Mean Score	Std. Deviation	P value
5 yrs	128	8.46	2.541	0.001*
5-10 yrs	57	11.61	2.590	
10-20 yrs	16	11.25	2.769	
>20 yrs	5	8.20	1.924	
Total	206	9.54	2.943	

Table 3: Group statistics showing mean scores according to speciality

Qualification	N	Mean Score	Std. Deviation	P value
MDS	153	9.91	2.968	0.002*
BDS	53	8.49	2.621	

Percentage distributions of the responses to questions one through sixteen

The percentage distribution of answers for each question in part II of the questionnaire is given in table 4 and for Part III of the questionnaire is given in table 5. These questions were based on the appropriate management protocols to be followed when treating a case of avulsed tooth

Table 4: Percentage distribution of responses to questions in part II of a questionnaire

Sr no.	Questions:	Responses:	Freq:	Percentage:
Q1	Is re-implantation an appropriate treatment protocol in case of avulsed permanent tooth	-Yes* -No -Maybe	185 1 20	89.8 0.5 9.7
Q2	If yes, how successful will it be if done at the site of trauma?	-Successful* -Highly successful -Maybe successful -May not be successful	113 20 68 5	54.9 9.7 33 2.4
Q3	In case the avulsed tooth is dirty, what advice would you recommend to the patient (at the site of trauma/injury)?	-Discard tooth -Reposition the tooth in socket -Wash briefly (10sec) with milk/saline, then reposition in socket* -Don't know	1 4 199 2	0.5 1.9 96.6 1
Q4	If reimplantation is not done at the site of injury, then the success rate will depend on?	-Viability of PDL cells -Extra oral dry time -Transport media -All the above*	5 4 3 194	2.4 1.9 1.5 94.2
Q5	In the dental clinic, what protocol would you follow prior to re-implantation of an avulsed tooth covered in dirt?	-Rinse with a stream of tap water -Rinse with a stream of saline or osmolarity balanced media* -Rinse with chlorhexidine solution -Rinsing not required	12 177 14 3	5.8 85.9 6.8 1.5
Q6	In your opinion, the prognosis of an avulsed tooth would be better if extra-	<=15 min 15-30 mins*	107 88	51.9 42.7

	oral dry time is (no storage medium used):	>30 min	5	2.4
		Don't know	6	2.9
Q7	In which of the following conditions will the success rate of re-implantation be higher?	-Open apex*	110	53.4
		-Closed apex	60	29.1
		-Status of root apex has no significance	13	6.3
		-Don't know	23	11.2
Q8	Which of the following can be used to store/transport an avulsed tooth?	-Milk	10	4.9
		-Patient's own saliva	4	1.9
		-HBSS	8	3.9
		-Contact lens solution	-	-
		-All the above*	184	89.3
Q9	Which media according to you is the storage/transport medium of choice for avulsed teeth?	-Milk*	74	35.9
		-Coconut water	1	0.5
		-HBSS	88	42.7
		-Patient's saliva	43	20.9

Table 5: Percentage distribution of responses to questions in part II of questionnaire

Sr No.	Questions:	Correct Response:	Freq:	Percentage:
Q10	For an avulsed tooth kept in a suitable storage medium with extra-oral dry time <60 mins, the PDL cells will be:	-Most likely viable	54	26.2
		-Maybe viable but compromised*	138	67
		- Non-viable	6	2.9
		-Don't know	8	3.9
Q11	Prior to reimplantation of an avulsed tooth with open apex, extra oral dry time <60mins and stored in biological medium, pre-treatment protocol should include?	-Soak in citric acid for 3min followed by 2% SnF for 5 min	52	25.2
		-Soak in 2% SnF for 5min	20	9.5
		-Soak in 0.005% doxy-cycline for 5 min*	93	45.1
		-Don't know	41	19.9
Q12	Following re-implantation, splinting should be done using	- Rigid splint for 2 weeks	50	24.3
		-Rigid splint	32	15.5

		for 4 weeks -Flexible splint for 2 weeks*	102	49.5
		-Flexible splint for 4 weeks	22	10.7
Q13	Root canal treatment is indicated 7-10days post re-implantation in which of the following cases?	-Closed apex*	130	63.1
		-Open apex	30	14.6
		-Both	42	20.4
		-None	4	1.9
Q14	Which among the following is/are the complications of re-implantation?	Inflammatory resorption	14	6.8
		Replacement resorption	13	6.3
		Ankylosis	21	10.2
		Ankylosis with infraposition of tooth	12	5.8
		All the above*	99	70.9
Q15	As per your knowledge, upto how long should the re-implanted tooth be followed up/ periodically evaluated (clinically and radiographically)	-3 months	29	14.1
		-6 months	46	22.3
		-1 year	70	34
		-5years*	61	29.6
Q16	Are you aware of the IADT Tooth SOS mobile app	- Yes	65	31.6
		- No	126	61.2
		- Maybe	15	7.3

Discussion

This study aimed to provide an insight into the level of knowledge and elucidate the awareness about emergency management and palliative care of avulsed tooth among private dental practitioners. As revealed from the assessment, a significant percentage of dental practitioners are well versed with the current management protocols, in accordance with the recent IADT guidelines (2020)¹⁵.

As per the analysis, out of total knowledge score of 15 (Excluding question no.16), the participants secured a mean score of 9.54 which was appreciable. The qualifications (Table 3) and years of experience (Table 2) displayed a significant difference in the knowledge score, however, gender-wise difference was not appreciable (Table 1). The mean knowledge score of specialists (irrespective of their specialty) about emergency management of avulsed tooth was significantly better than that of general practitioners (9.91vs 8.49, $p<0.01$). Similarly, there was a significant difference in the mean knowledge scores of practitioners with 5-20 yrs experience group as compared to less than 5 yrs and more than 20 yrs of experience group ($p<0.01$). This disparity may be attributed to the lack of exposure/interest or the inability to keep up with the changing guidelines and contemporary protocols for management of TDIs.

Among the study group, a significantly high percentage (89.8%) of participants were aware that re-implantation is the appropriate treatment option for an avulsed permanent tooth and getting it done at the site of injury is the most appropriate course of action for better prognosis (96.6%). This finding is in accordance with the results reported by studies done in Nepal (96.1%)¹⁶, Pakistan (98%)¹⁷, and Malaysia (85.5%)¹⁸. In contrast, studies conducted in Saudi Arabia (69%)¹⁹, U.A.E (19.2%) and in Nigeria (18.5%)¹⁷ reported a very low level of knowledge and awareness on immediate re-implantation of avulsed tooth.

In cases where an avulsed tooth gets soiled, appropriate management protocol as per IADT guidelines (2020), warrants cleansing of the tooth before re-implantation. At the site of injury, it maybe rinsed gently in milk, saline or patient's own saliva prior to repositioning it in the socket¹⁵. In the present study about 96.6% of participants responded correctly, which is in accordance to studies done in Malaysia (84%)¹⁸ and Pakistan (93%)¹⁷.

If immediate reimplantation is not possible the tooth maybe preserved in an appropriate storage media available on-site. Osmolarity balanced solutions like Hank's balanced salt solution (HBSS), Eagle's medium and ViaSpan are found to be favourable as they maintain the viability of the PDL cells. However, factors like high cost and lack of availability, provides the impetus to look for better alternatives. Milk on the other hand is considered the most feasible, cost-effective alternative which has the capacity to maintain PDL cells viability with ease of availability making it the storage medium of choice for avulsed teeth²⁰. IADT guidelines suggest the order of preference for storage medium at the site of injury: milk, HBSS, saliva (dispensed in a closed container)¹⁵. About 89% of the participants in our study, opted for preserving the avulsed tooth in any of the above solutions and either HBSS or milk was considered as the preferred storage medium. Tap water may be considered if the above-mentioned media are unavailable, however it is a poor medium¹⁵.

For the optimum prognosis of an avulsed permanent tooth, the clinicians must keep few factors in mind while planning the treatment. The decision is governed by factors like the root status (open or closed apex) and the status of the periodontal ligament cells which in turn is dependent on the extra-oral dry time and the transport media used. If the tooth has been re-implanted instantly or within 15 minutes of trauma, the PDL cells are probably viable ensuring a better prognosis for the traumatized tooth. If the total extra-oral dry time has been <60 minutes, the PDL cells may be viable but compromised¹⁵. In the present study, 51.9% people chose <=15 mins of extra oral dry time as correct response before re-implantation. This was comparable to the results reported by Enabulele and Omo²¹ with 61.9% correct responses. This response rate was relatively higher when compared to studies reported by Amjad et al. in Pakistan (28%)¹⁷ and Abdullah in Malaysia (16%)¹⁸.

Regarding pre-treatment of tooth prior to re-implantation, less than half (45.1%) of the participants could answer correctly i.e., to soak the tooth in Doxycycline 0.005% solution for 5 minutes. Studies reveal that pulp revascularization is significantly enhanced by 40% to 60% of doxycycline treated cases compared to non-treated cases.²²

Following replantation, the tooth must then be stabilized with a flexible splint passively for 14 days by means of a wire (diameter up to 0.016" or 0.4 mm) or a nylon fishing line (0.13-0.25 mm) using composite to bond it to the adjacent teeth. The semi rigid splint allows physiologic mobility of the traumatized tooth which in turn facilitates optimal periodontal ligament healing^{15,23}. Approximately half of the clinicians in the present survey seemed to have the same concept and chose the correct answer. In a study reported by Vasconcellos et al., 82.2% of the participants although recommended the use of flexible splint to stabilize avulsed teeth, only 39.8% specified the duration of splinting as 7-14 days²⁴. Contrary to the above finding, studies conducted in Pakistan¹⁷ and Malaysia¹⁸, 44% and 52% of the dentists preferred to give rigid splint using stainless steel wires for a period of 15 days.

Endodontic treatment for a tooth with closed apex should be initiated within 2 weeks post-replantation, where-ever indicated. It is recommended to use calcium hydroxide as an intracanal medicament for up to 1 month followed by root canal filling. The possibility for spontaneous pulp space revascularization in case of teeth with open apices is high. Thus, root canal treatment is not indicated unless there is clinical or radiographic evidence of pulp necrosis and infected canal system on follow-up examinations¹⁵.

Finally, replanted teeth should be monitored both clinically and radiographically regularly, for a period of up to 5 yrs to confirm its success or failure both in cases with open or closed apices¹⁵. In our study, only a small percentage of participants (29.9%) had the correct concept as per the IADT guidelines. Approximately, 71% of the participants in our study revealed that the sequelae of avulsed tooth could be either ankylosis or inflammatory/replacement resorption. However, as per the available literature, the most commonly encountered complications are ankylosis (64%), inflammatory resorption (30%), replacement resorption (5%)²³.

Conclusion

This study reflects a rather disproportionate pattern of knowledge of the private practitioners in eastern region of India on the emergency management protocol for an avulsed tooth. With the increasing advances in technology, information regarding management of TDIs are readily available and easily accessible on the internet e.g. revised guidelines for emergency management of traumatic dental injuries issued by the International Association of Dental (www.iadt-dentaltrauma.org). Furthermore, clinicians can use an interactive website as well where the dentist can provide data from the individual case and receive guidance for the same (Dental Trauma Guide, www.dentaltraumaguide.org). Sources of information such as these have the added advantage of being more accessible worldwide compared to printed books and manuals in case of emergencies. The Tooth SOS mobile phone application, launched in April 2018, is another effective tool initiated by the IADT to educate the general population about TDIs and its first aid measures to be followed²⁵. It should be noted that majority of the private practitioners were unaware of this (61.2%). Thus, the results of this study stressed upon the importance of periodic update with the current treatment protocols and contemporary management strategies for the management of patients with traumatic dental injuries.

Limitations

Since the present survey was conducted online using appropriate applications, the honesty of the participants while answering the questionnaire cannot be ascertained. Similarly, the difference in knowledge score among the speciality practitioners could not be obtained due to variable sample size of individual specialities.

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