International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 9; Issue 07(B); July 2020; Page No.22751-22762
DOI: http://dx.doi.org/10.24327/ijcar.2020.22762.4498

Research Article

ASSESSMENT OF FIRST AID KNOWLEDGE ABOUT TRANSPORTATION AND STORAGE OF AVULSED PERMANENT TOOTH OF A CHILD BEFORE RE-PLANTATION, AMONG THE PAEDIATRICIANS OF KARNAL CITY, HARYANA, INDIA, A SURVEY STUDY

Isha Bisla

MDS research work undertaken in the Department of Pedodontics and Preventive Dentistry, Swami Devi Dyal Hospital and Dental College, Pundit Bhagwat Dayal Sharma University of Health Sciences, Rohtak, Haryana, India, 132001

A R T I C L E I N F O

Article History:
Received 14th April, 2020
Received in revised form 29th May, 2020
Accepted 05th June, 2020
Published online 28th July, 2020

Key words:

The collected data was analyzed as a whole as well as in four different groups of pediatricians having experience as G1, < 10 years, G2, >10 to 20 years, G3, >20 to 30 years and G4,>30 years.

A B S T R A C T

The first aid knowledge about the transportation and storage of avulsed anterior permanent tooth of a child before re-plantation, of seventy pediatricians practicing in various Government and private hospitals in Karnal city Haryana, India, was assessed through four conceptual questions on a hypothetical clinical condition about anterior tooth avulsion and its re-plantation in 10 years old boy. The collected data was analyzed as a whole as well as in four different groups of pediatricians having experience as G1, < 10 years, G2, >10 to 20 years, G3, >20 to 30 years and G4,>30 years. The percentage of pediatricians having different options for three different questions were calculated and in addition to that knowledge-score of each pediatrician was calculated by assigning one and zero to right and wrong options of each question. Average knowledge about questions viz.Q1, 'If you come across a patient with avulsed tooth, what would you recommend?', rightly answered as, put the tooth back into the socket and refer to the dentist, by 28.57% pediatrician with knowledge score 0.28±0.043, and Q2, 'What would you recommend as the storage medium of choice for the transport of the avulsed tooth', answered correctly as (HBSS) by 21.42 % pediatrician with knowledge score 0.22±.094. Very poor knowledge about Q3, 'If a permanent tooth to be replanted has fallen on the ground and was covered with dirt, what would you recommend', answered correctly as, rinse with tap water by 8.57 percent of pediatricians with knowledge score 0.06±0.078. The study demonstrates a mild negative correlation between the first aid knowledge and length experience of pediatricians about the transportation and storage of avulsed anterior permanent tooth before re-plantation.

INTRODUCTION

Traumatic injuries to teeth during adolescence have become a serious public health problem due to increase of violence, traffic accidents and sports injuries in recent years. Dental trauma may vary from minor enamel chip to extensive maxillofacial damage, involving the supporting structures and displacement / avulsion of teeth (Abdellatif and Hegazy, 2011). [1] Ten percent of human population has experienced some kind of dental trauma, of which 0.5 to 16% were of permanent teeth avulsion (Mori *et al.,* 2007; Anderson and Anderson, 2012) [2,3] . Dental trauma accounts to about 17% of the total body injuries in those aged between 0-6 years as compared to an average of 5% across all ages (Zaleckiene *et al.,* 2014) [4] . Epidemiological data shows that about 50% of children have experienced dental trauma in their primary or permanent dentition throughout their school period (Qazi & Nasir, 2009).[5]

Corresponding author:* **Isha Bisla
MDS research work undertaken in the Department of Pedodontics and Preventive Dentistry, Swami Devi Dyal Hospital and Dental College, Pundit Bhagwat Dayal Sharma University of Health Sciences, Rohtak, Haryana, India, 132001

Dental injury never comes alone but damages surrounding soft tissue, periodontal tissues, which may results into luxation, tooth fracture, and tooth avulsion. Anterior teeth fracture can vary from simple enamel fracture, dentin fracture without pulp exposure, crown fracture with pulp exposure, root fracture, luxation and intrusion. The tooth luxation, avulsion and fracture of crown along with root and alveolar bone require immediate repositioning and stabilization with various degree of prognosis (Ferreira *et al.,* 2009). [6] The root fractures have poor prognosis because they involve a combination of damage to the periodontal ligament, cementum, dentin, and pulp (Francisco *et al*., 2015) [7] whereas, crown fractures involving enamel and dentin have a favorable prognosis because the possibility of irreversible pulp necrosis and obliteration of root canal is minimum. Traumatic injuries to teeth and surrounding structure can be life threatening by obstructing respiratory functions. Many a times such injuries have a negative impact on quality of life by affecting feeding, communication, social and psychological comfort (Natarajan and Gurunathan, 2013). [8] It is the prime responsibility of dental professionals to retain avulsed permanent anterior teeth so that the normal

physiological and psychological functions of a affected child can be retained.

Re-plantation of avulsed tooth presents a great challenge because of lack of awareness among common people as well as other professional physicians and surgeons with regard to its prompt and proper emergency management. The primary and principle challenge is to maintain the vitality of periodontal cells of avulsed tooth by keeping it in proper storage medium and after that search for proper treatment as a secondary challenge. Extra alveolar dry time and storage media used to transport the tooth, type of retention employed, time of endodontic intervention, oral hygiene status are among the critical factors for successful re-plantation and long term favorable outcomes (Hashim, 2012). [9] Immediate re-plantation of avulsed permanent tooth is generally accepted as treatment of choice, which may successfully restore the aesthetics and functional value of the tooth (Venkataramana *et al.,* 2015).[10] It has been reported that immediate re-plantation gives success rates of 85 % to 97% for healing of periodontal ligament depending on stage of root development.

The length of extra-alveolar time and type of storage are significant factors that can affect long term survival of avulsed tooth. If there is more extra oral time of avulsed tooth then desiccation of root surface begin with high risk of loss of vitality of the periodontal ligament cells (Addo *et al.,* 2007 and Bazmi *et al.,* 2013). [11, 12] Prompt and appropriate management is necessary to improve the prognosis of an avulsed tooth re-plantation. Unfortunately, fifty percent of dental avulsion patients, could not get prompt and appropriate first aid treatment and loose avulsed teeth due to lack of knowledge among attending people and physicians (Hashim, 2012 and Raoof *et al.,* 2013). [9, 13] Many patients after traumatic tooth avulsion have to approach medical doctors for treatment due to lack of awareness or unavailability of a dentist in rural India (Jyothi *et al.,* 2011). [14] Emergency medical personnel have faced difficulties with diagnosis, investigation, management and appropriate referral of dental emergencies due to inadequate training and insufficient knowledge (Samaei *et al;* 2015). [15] To ensure proper and appropriate management of the avulsed tooth, it is essential that medical professionals should have sufficient knowledge on the emergency management of the avulsed teeth. The survival of avulsed tooth primarily depends upon its immediate management by the people present at the trauma site and the manner of transportation of avulsed tooth and patient to the hospital, after that the knowledge, skill and aptitude of the physicians and para-clinical staff comes in the way. Re-plantation of the avulsed tooth may be a promising treatment modality and can be achieved at a lower cost with higher success rate, if the persons involved in the process have a sound knowledge about the various aspects of avulsed tooth re-plantation.

Pediatricians are the first hand clinicians to attend the children suffered from tooth avulsion. The pediatrician knowledge and attitude, prepare the base for the success of re-plantation procedure for referred dental experts (Hashim, 2012), [9] especially for the population having limited access to dental experts. The criticality of time and knowledge of pediatricians is very crucial in the success of dental trauma management (Chanchala *et al*., 2016) [16]. Pediatricians may be able to play an important role in improving the dental health of their patients by increasing their involvement in oral health management during well-child care visits. However, it is doubtful to what degree pediatricians are knowledgeable about preventive oral health and to what extent they may already be participating in prevention and assessment (Lewis *et al*., 2017) [17]. Additionally, previous study draws attention to the need of improving the knowledge base of general practitioners and pediatricians for the emergency management of traumatic teeth related injuries (Hatem *et al*., 2015). [18]

MATERIALS AND METHODS

The survey study was conducted by collecting the data through questionnaire from seventy actively practicing pediatricians in various Government and private hospitals in Karnal city zone, for their first aid knowledge about the transportation and storage of avulsed anterior permanent tooth of a child before re-plantation, by assigning them code no 1 to 70 in ascending order of experience to maintain the anonymity. The demographic information and their responses to three conceptual questions on a hypothetical clinical condition as "a 10 year old boy got injured resulting in avulsion of his upper anterior tooth and otherwise he is well oriented with time, place and space", were collected through a questionnaire having multiple answer options with one correct answer. Responses from all 70 pediatricians were collected and arranged with assigned code numbers of the subjects. The data was analyzed by calculating $\chi 2$, df and 'P' values using two ways ANOVA in SPSS, Version 20.0 (SPSS, Inc, USA). Results were analyzed and expressed in tabular and graphical form as follows.

Observations and results

Demographic observations: n=70

The demographic data having age, gender, number of years of experience, qualification and type of job, as in Government and private sector, of all 70 pediatricians were studied and observed as follows. A total of seventy pediatricians (58 male and 12 female) were assessed in this study. Majority of them (53 male and 10 female) were found working in private hospitals, where as seven (5 male and 2 female) in Govt. hospitals. Age-wise distribution of pediatricians was found as one pediatrician <30 years, 19 between >30 to 40 years of age, 21 between >40-50 years of age, 14 between >50 to 60 years of age and 15 with > 60 years of age. Experience wise distribution of 70 pediatricians was found as 20 (16 male and 4 female) pediatrician <10 years of experience, 25 (20 male and 5 female) between 10 to 20 years of experience, 11 (9 male and 2 female) between >20-30 years of experience, 14 (13 male and 1 female) with more than 30 years of experience.

Knowledge assessment observations

Question-wise and experience-wise knowledge assessment taking total number and percentage of right optioned pediatricians into consideration (n=70).

The question-wise knowledge was assessed by calculating the total number and percentage of paediatricians having right and different wrong options for each question once as a whole and

also in four different groups viz. <10 years, >10 to 20 years, >20 to 30 years and > 30 years of experiences. The data was analysed statistically and χ2, df and 'p' values of different questions were derived and shown in table 1 and 2. The graphic representations are shown in figures 1to 7.

Table 1 Pediatricians numbers and percentage (Option-wise) for Q1 to Q3

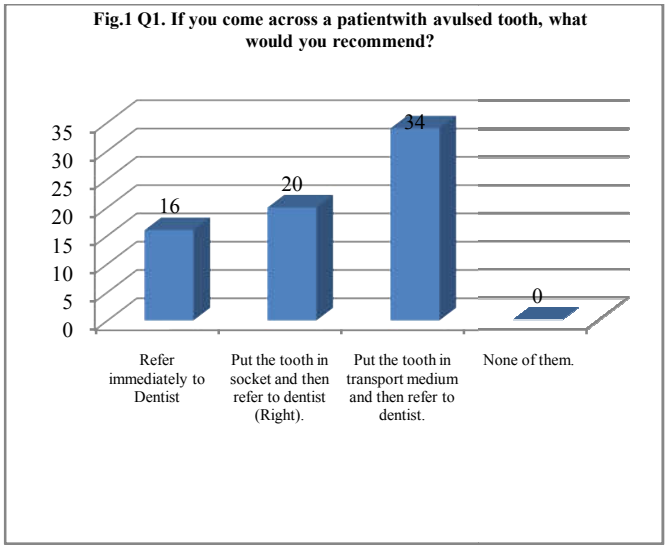
Total number and percentage of pediatricians with one right (Green color) and other wrong options.								
Questions	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Q1, n (%)	16(22.86)	20(28.57)	34(48.57)	0 (0)				
χ2, df, ' P'	1.873,3, 0.599	0.488, 3, 0.921	1.188,3, 0.596	0.0,0, 0.00	-	-	-	-
Q2 n (%)	6 (8.57)	2 (2.86)	34 (48.57)	1(1.43)	9 (12.86)	2 (2.86)	1(1.43)	15 (21.42)
χ2, df, ' P'	3.773,3 0.287	3.706,3 0.295	3.019,3 0.389	2.536,3 0.469	1.474,3 0.688	3.706,3 0.295	2.536,3 0.469	1.936,3 0.586
Q3, n (%)	3(4.29)	6(8.57)	54(77.14)	7(10)				
χ2, df, ' P	5.05,3 0.168	3.773,3, 0.287	2.492,3, 0.477	2.501,3, 0.475	-	-	-	-

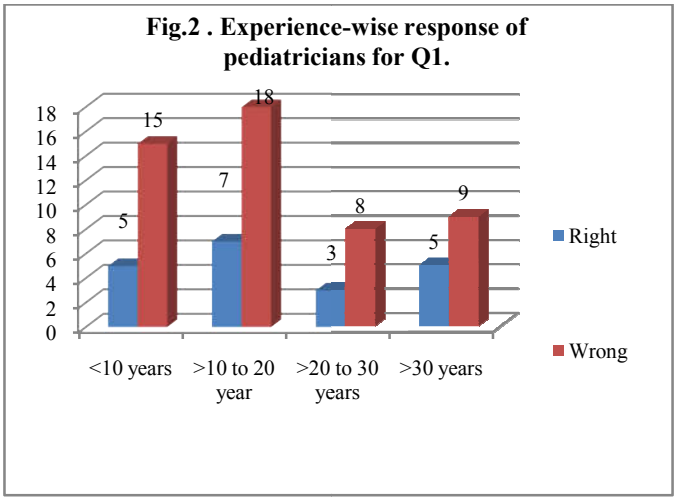
Table 2 Total Number and percentage of pediatricians (Experience-wise) having right knowledge for Q1 to Q3 along with χ2, df and 'P' values.

Experience (in Years)	**Q1**	**Q2**	**Q3**
G1< 10 years (n=20)	5 /20 (25%)	4/20(20%)	3 /20(15%)
G2>10-20 years (n=25)	7/25(28%)	5/25(20%)	3/25(12%)
G3>20-30 years (n=11)	3/11(27.27%)	4/11(36.36%)	0/11(0%)
G4>30 years (n=14)	5/14(35.71%)	2/14(14.28%)	0/14(0%)
Total Right No (%)	20/70(28.57%)	15/70(21.42%)	6/70(8.57%)
χ2, df, P value	**0.488, 3, P=0.921**	**1.936,3, P=0.586**	**3.773, 3, P=0.287**

Q1. If you come across a patient with avulsed tooth, what would you recommend? The multiple choices of answers are as follows.

A, Refer immediately to the dentist, B, Put the tooth in socket and then refer to dentist (Right), C, Put the tooth in transport medium and then refer to dentist, D, None of them.





Twenty pediatricians (28.57%) have answered rightly as 'put the tooth back in the socket and refer immediately to the dentist, where as 16 (22.86%) as 'refer to the dentist immediately' and 34 (48.57%) as 'put the tooth in transport media and refer to the dentist' is shown in Figure 1. Highly unacceptable significant variation between the number of right and wrong options pediatricians were observed. A total of 25 (28.57%) out of 70 pediatricians have right knowledge of Q1 which include 5 out of 20 (20%) from G1, 7 out of 25 (28%) from G2, 3 out of 11(27.27%) from G3 and 5 out of 14 (35.71 %) from G4. However, non significant variations were observed in the number of pediatricians having right option between different groups with χ2, df, p values as 0.488, 3, 0.921 (Table 2.) and similar non significant variations were also observed between pediatricians of different groups having other wrong options (Table 1) at 5% level of significance.

Q2. What would you recommend as the storage medium of choice for the transport of the avulsed tooth? The multiple choices of answers are as follows.

A, Ice water, B, Tap water, C, Normal saline, D, Cotton pad, E, Child's Mouth, F, Milk, G, Betadine solution, H, HBSS (Hank's Balance Salt Solution, Right)

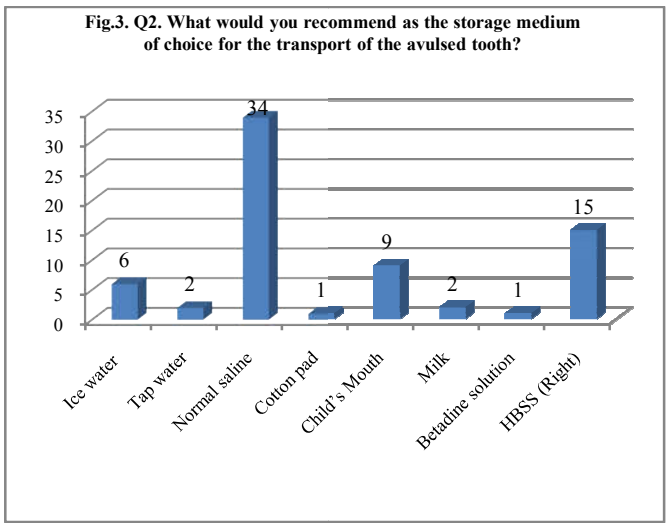
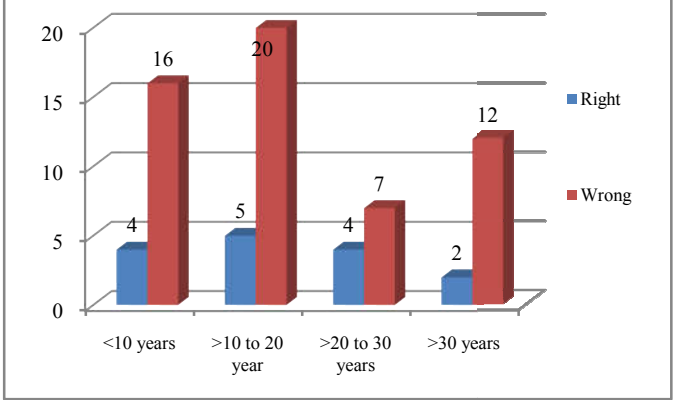


Fig. 4. Experience-wise response of pediatricians for Q2.



The fifteen pediatricians (21.42%) have answered rightly for Q2 as "HBSS" whereas 6 (8.57%) as "ice water", 2 (2.86%) as "tap water", 34(48.57%) as "normal saline", one (1.43%) as "cotton pad", 9 (12.86%) as "child's mouth", 2 (2.86%) as "milk" and one (1.43%) as "Betadine solution" as shown in fig.6. Highly unacceptable significant variation between the number of right and wrong options pediatricians were observed A total of 15 (21.42%) out of 70 pediatricians have right knowledge of Q2 which include 4 out of 20 (20%) from G1, 5 out of 25 (20%) from G2, 4 out of 11(36.36%) from G3 and 2 out of 14 (14.28 %) from G4. However, non significant variations were observed in the number of pediatricians having right option between different groups with $\chi 2$, df, p values as 1.936,3, 0.586 (Table 2.) and similar non significant variations were also observed between pediatricians of different groups having other wrong options (Table 1) at 5% level of significance.

Q3. If a permanent tooth to be replanted has fallen on the ground and was covered with dirt, what would you recommend? The multiple choices of answers are as follows.

A, Scrub the tooth to remove the dirt, B, Rinse with tap water (Right), C, Wash with normal saline, D, Don't know

Fig.5. Q3. If a permanent tooth to be replanted has fallen on the ground and was covered with dirt, what would you recommend?

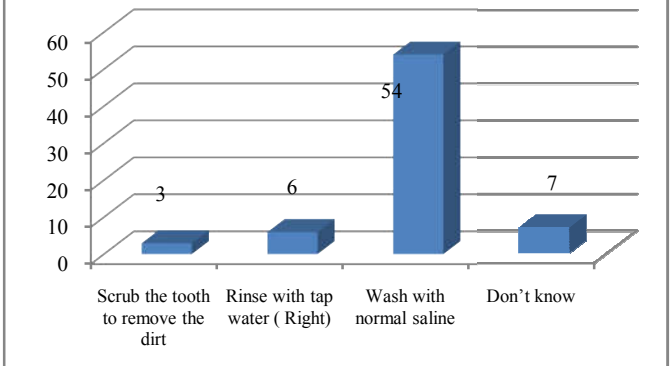
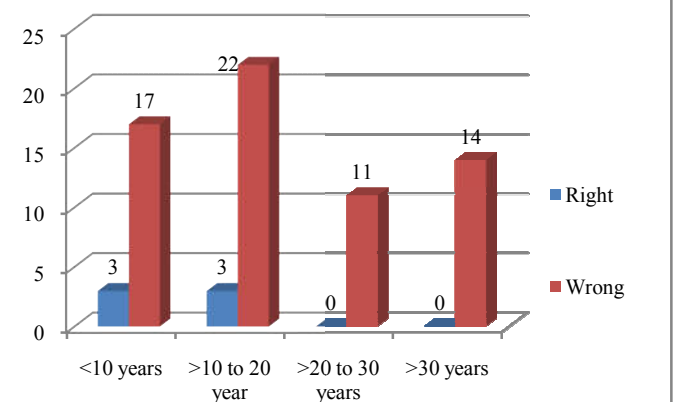


Fig.6. Experience-wise response of pediatricians for Q3.



Six pediatricians (8.57%) have answered rightly as "rinse with tap water", where as 54 (77.14%) answered as "wash with normal saline" and three (4.29%) as "scrub the tooth to remove the dirt" and 7 (10%) as "don't know" for Q3 as shown in Fig.8. Highly unacceptable significant variation between the number of right and wrong options pediatricians were observed. A total of 6 (8.57%) out of 70 pediatricians have right knowledge of Q3 which include 3 out of 20 (15%) from G1 and 3 out of 20 (12%) from G2. However, non significant variations were observed in the number of pediatricians having right option between different groups with $\chi 2$, df, p values as 3.773, 3, 0.287 (Table 2.) and similar non significant variations were also observed between pediatricians of different groups having other wrong options (Table 1) at 5% level of significance.

Question-wise and experience-wise knowledge assessment taking knowledge score into consideration (n=70).

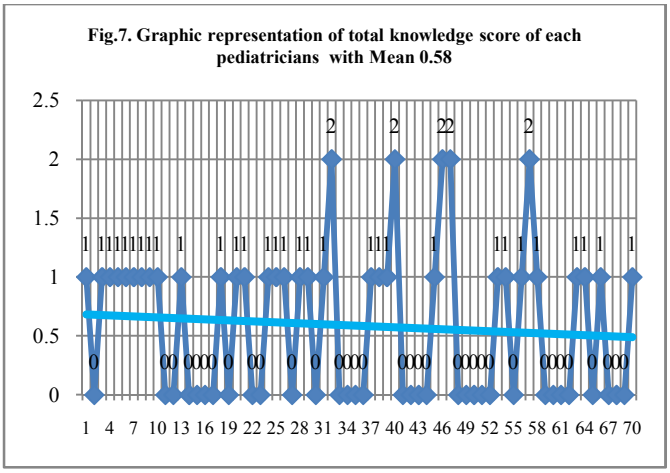
The knowledge score of each paediatrician was assessed by calculating the total right options for all four questions. The score vary from 0 to 2, depending upon the number of questions rightly answered by the subject. For each rightly answered question, mark one is added and for wrongly answered question mark 0 is added in the knowledge-score of the subject.

Table 3 Question-wise and Experiences-wise analysis taking knowledge scores into consideration (Means ± SD of knowledge score with $\chi 2$, df and p value using two ways ANOVA)

Group	Q1 Mean	Q2 Mean	Q3 Mean	Experience-wise Mean ± SD
A, n=20	0.25	0.15	0.20	0.2±0.04
B, n=25	0.28	0.12	0.20	0.2±0.06
C, n=11	0.27	0.00	0.36	0.2±0.15
D, n=14	0.35	0.00	0.14	0.16±0.14
Quest-wise Mean ± SD	0.28^b ± .04	0.07^c ± .08	0.22^b ± 0.09	Average Mean ± SD
$\chi 2$, df, p value	0.488, 3 P=0.921	3.773, 3 p=.287	1.936,3 p=.586	0.192±0.04 Total mean for all 3 questions 0.58

Average Mean ± SD of knowledge score was found as 0.192 ± 0.04 and total mean of three questions was found as 0.58. The question-wise Mean and SD were found as for Q1 (0.29 ± 0.04),) Q2 (0.07 ± .0.08), and Q3 (0.22 ± 0.09) and Experience-wise total Mean ± SD as 0.2 ± 0.04 in< 10 years, 0.2 ± 0.06 in >10-20 years, 0.2 ± 0.15 in >20-30 years and 0.16 ± 0.14 in

>30 years of experienced paediatricians (Table3). The question-wise means and standard deviations along with $\chi 2$, df and 'P' values were found as shown in table 3. The values with different superscripts (Table 3) differs significantly ($p \leq 0.05$) among respondents to various questions.



The total knowledge score for all four questions from 70 pediatricians significant vary from 0 to 2 with mean 0.58 where as Mean ± SD for one question was found as (0.192±0.04). Score zero was observed from 13, score one from 26, score two from 27 and score three from 4 subjects were observed respectively.

DISCUSSION

The oral region comprises one percent of total body area, yet to account for 5 percent of all body injuries. Oral trauma often leads to life threatening emergencies and challenges for medical profession. In pre-school children oral injuries make up as much as 17 percent of all bodily injuries. The incidence of traumatic dental injuries is 1 to 3 percent, where prevalence varies between countries, ranging from 4.1 to 58.6 percent for the permanent dentition and 9.4 to 36 percent for primary dentition. Tooth avulsion implies total displacement of an intact tooth out of its socket. Avulsion of permanent teeth is seen in 0.5 to 3 percent of all dental injuries. Luxation injuries are considered most common type of traumatic dental injury (TDI) in primary dentition, while crown fracture occurs more commonly in permanent dentition. In 93.3 percent of the TDI's, the central incisors are affected and comprise 73 percent of all injuries. The prevalence of dental traumatic injuries is two times higher in boys as compared to girls (Dua and Sharma, 2012; Al-Majed, 2001 and Andersson, 2013) [19, 20, 21] because the boys participate more in outdoor activities and sports. (Brien, 1993, Andreasen *et al.,* 1995a; Andreasen *et al.,* 1995b) [22, 23, 24] It has also been suggested that the avulsion of tooth is briefly favored by the malleability of the alveolar bone and thin structured PDL (Ravn, 1974). [25]

The survival of avulsed tooth primarily depends upon its immediate management by the people present at the trauma site and afterward the knowledge, skill and aptitude of the physicians, who attend the patient at the first instance. The prognosis of an avulsed tooth is essentially dependent on its extra-alveolar time, transfer media and the procedures performed at the time of re-implantation. In cases where these factors are unfavorable, pulp necrosis and degeneration of periodontal ligament (PDL) cells may ensue, resulting in inflammatory/replacement root resorption or ankylosis of the tooth, eventually leading to tooth loss (Andersson and Andreasen, 2012; Soares *et al.,* 2008). [3, 26] Immediate replantation is the treatment of choice for an avulsed permanent tooth, although it is not always possible to perform this treatment. Replantation success depends on the maintenance of PDL cell vitality (Pileggi *et al.,* 2002).[27] Re-plantation of the avulsed tooth may be a promising treatment modality and can be achieved at a lower cost with higher success rate, if the people involved in the process have a sound knowledge about the various aspects of avulsed tooth re-implantation.

Fracture/avulsions leading to disfigurement can result in psychological disturbances in children. Timely and emergency intervention during injuries of facial and dental origin can give a good prognosis and help in restoring the smile of an injured child. International Association of Dental Traumatology (2012),[28] published guidelines for the management of avulsed teeth and highlights the evidence-based approach to emergency care and is of great help for dentists, health-care professionals, and parents in decision-making (Andersson *et al.,* 2012).[3] In case of an emergency involving avulsed tooth, parents of the affected child are the first people to attend and make decisions. Awareness and knowledge of parents in the handling of these emergency traumatic injuries involving avulsion of a tooth greatly influences the prognosis.

Traumatic dento-alveolar injuries are frequent in children, affecting teeth, their supporting structures, and adjacent soft tissues along with multiple life threatening injuries in head and neck regions. The pediatricians and surgeons in trauma centers are the first people to manage the emergency traumatic condition of head, neck and oral region. Usually pediatricians while stabilizing the head injury in children omit or pay little attention to the dental injury except, bleeding control from avulsed tooth site. It is equally important to save avulsed tooth along with managing head injury for total recovery from the trauma. A patient cannot be categorized as totally recovered, if he/she has lost one or other tooth in a traumatic accident. In such condition's avulsed tooth can only be saved, if helper layman at the site of injury or parents, school teacher and sports tutor who attend the patient at the first instance as well as pediatricians and ICU Para-clinical staff and dentists who attend the patient in hospital have a sound knowledge about the scientific concepts involved in the management and treatment of avulsed tooth. It is equally important to discuss the existing knowledge about following concepts among professional and non professional people to draw some conclusion from this study. The various concepts discussed and evaluated in this study are as follows:

1. Why the re-plantation of permanent incisor tooth in children is essential.
2. Knowledge about the feasibility of re-plantation process in primary / permanent teeth.

3. The knowledge about critical extra-alveolar time of the avulsed tooth among physicians and paediatricians.
4. Knowledge of proper handling of avulsed tooth by non-professional and professional people.
5. The knowledge about proper cleaning technique of a contaminated avulsed tooth before re-implantation.
6. The knowledge about optimal storage methods and media for avulsed tooth to be re-implanted after longer duration.

The avulsed incisor tooth re-plantation was found to be very essential for the maintenance of optimal oral health, aesthetic look and self confidence in children when they are among peers in teaching, dramatic, music and sports classes in school and elsewhere. Cortes *et al*. (2002) [29] reported that dental trauma in children affected the child's ability to smile and laugh. Children with missing anterior teeth feel embarrassment and cannot maintain a normal healthy emotional state without being irritable. Such kids were reported to be less satisfied from their food, maintained a negative attitude towards tooth brushing, and felt less comfortable about smiling, laughing or showing their teeth, when socializing with people. Wong *et al*. (2016) [30] assessed the changes in the oral health related quality of life in preschool children, who lost tooth due to untreated dental caries and extraction afterward. He reported that such kids suffered from severe mental and psychological stress and were uncomfortable in taking initiative and socializing with people. Giannetti *et al*. (2007)[31] assessed the changes in oral health related quality of life in school children who had a complete dislocation of the tooth out of socket and concluded that if patients got into tooth avulsion their quality of life is adversely affected.

The present study has evaluated the level of knowledge of 70 pediatricians working in Government and private hospitals in Karnal region, about various concepts involved transportation and preservation of avulsed tooth before re-implantation in children. All evaluated pediatricians were found well aware of tooth avulsion and 50% had already come across with the condition in their routine practice. The knowledge about various concepts involved in re-implantation of avulsed tooth was found varying significantly between individual to individual and question to question, irrespective of experience of the subject.

The right knowledge about the "Immediate management of permanent avulsed tooth by putting the avulsed tooth in its original socket and then refer to dentist" (Q1) was found correct only in 20 (28.57%) pediatricians. Out of those 20 (28.57%) subjects who have answered correctly, 5 (7.14%) were found in practice for less than 10 years, 7 (10%) for 10 to 20 years, 3(4.28%) for 20 to 30 years and 5 (7.14%) for above 30 years. Fifty (71.43%) pediatricians were found with incorrect knowledge about the importance of immediate management of permanent avulsed tooth or extra-oral/ dry period of avulsed tooth for re-plantation. Among the pediatricians who answered incorrectly 16 (22.86%) opted as 'refer to the dentist immediately without doing anything', 34 (48.57%) as 'put the tooth in transport media and refer to the dentist. Similar finding were reported by Balaban *et al*. (2011) [32] in their study that 67.8 % pediatricians considered their knowledge on oral health as insufficient and need educative training. The prognosis of the avulsed tooth depends on, how the tooth is treated within the first few minutes and steps taken to preserve and replant the tooth. Parents or guardians of the child are the first ones to report such cases to dental professionals, so awareness and knowledge regarding the handling of avulsed tooth is extremely important. The study by Unal *et al*. (2014) [33] revealed that in 65% of cases of tooth avulsion, the time from the injury to the arrival at a dental office exceeded 60 min. Ozer *et al*. (2012) [34] concluded that the 90.7% of visiting parents at Ondokuz Mayis University's Pediatric Dentistry Clinic, were having no knowledge about re-plantation of avulsed tooth in its socket where as 68.2% were found to have correct answers regarding the optimum time for which an avulsed tooth should be left out from the mouth prior to re-implantation. Abhinav Prakash (2015) [35] concluded that the prognosis of traumatized tooth often depends on the prompt and appropriate treatment given to patient by the people who are present at the site. Often these injuries occur in school environment and, therefore, the perception of school teachers towards this is crucial to the prognosis of tooth avulsion. The knowledge of school teachers towards immediate management of avulsed tooth is insufficient. Therefore, a teacher's orientation program towards management is highly suggested. Shetty (2009) [36] reported that the primary school teachers in Bangalore city have rudimentary knowledge about emergency management of dental avulsion and suggested that the teachers and other individuals, who are involved in the supervision of children in schools, should compulsorily receive simple instructions in dental first-aid as children spend considerable duration of the active day time at school. Only 45 of the respondents were confident of putting the tooth back into its alveolar socket. Among the respondents 200 would seek the dentists help immediately and 180 would not mind the delay of 30 minutes. Most of the respondents would clean the dirty avulsed tooth in tap water and only 10 respondents would use milk for transporting the avulsed tooth. A great majority of the respondents were not satisfied with the knowledge on the "management of dental trauma' & most of them expressed desire for further information. Nikam *et al*. (2014) [37] reported that the level of knowledge and attitude of parents and caregivers of children of age group 5-14 years about avulsed tooth management was fairly low and there was a need to provide the general population with information regarding emergency management of avulsed tooth. They further reported that 95% of the participants reported that their children experienced dental trauma at the age of 5–14 years, 65% said they preferred to place the avulsed tooth back into the child's mouth and 20% of the mother's said that they would discard the avulsed tooth and 95% of the participants felt the need of immediate dental consultation. Francisco *et al*. (2015) [7] assessed the knowledge of teachers about dental trauma and revealed that 13% of teachers would replant the tooth in the socket, 7 % said they would put the tooth in some liquid and 58% would store in a piece of paper, cloth or clean container. Only 15 % correctly answered that they would replant the avulsed tooth and then refer to the dentist. They concluded that knowledge of teachers must be improved using educational campaigns. Fujita *et al*. (2014) [38] reported in his

survey study that 55.9% of sixth year dental students and 28.3% of first year dental students have low level of knowledge about the transportation of avulsed tooth to the dental clinics and indicated towards the need to provide adequate education in this regard. Child's own mouth and saliva or mouth and saliva of parents / any person present at the accidental site is the right media of immediate transportation of avulsed tooth, which is easily and freely available without any immunological reaction on avulsed tooth. It is very unfortunate that very few pediatricians were found to be well aware of this concept. A ten year boy can easily be advised to carry an avulsed tooth in his oral cavity. However, sometime accidental ingestion and / or propulsion of avulsed tooth from mouth due to nausea and vomiting may happen.

The optimum storage medium for avulsed permanent to be re-planted (Q4) after a longer period as 'HBSS 'was found correct in 21.42% pediatricians. 5.71% were in practice for less than 10 years, 7.14% for 10 to 20 years, 5.71% for 20 to 30 years and 2.85% for more than 30 years. Those answered wrongly 8.57% preferred "ice water", 2.86% "tap water", 48.57% normal saline, 1.43% cotton pad, 12.86% child's mouth, 2.86% milk, and 1 1.43% Povidone iodine (betadine) solution as a storage media for avulsed tooth.

If the avulsed tooth cannot be re-implanted immediately, it should be stored in a proper medium. It is very crucial that the avulsed tooth is not left unattended to dry as cells on the root surface in the periodontal ligament will render unviable in such conditions. If a tooth is maintained in a dry environment prior to re-implantation, irreversible damage to PDL cells can cause an inflammatory response on the root surface, which leads to ankylosis and eventual tooth loss. Hank's Balanced Salt Solution (HBSS), a tissue culture medium is recommended as the best storage medium for avulsed permanent tooth in order to maintain the viability and enabling in multiplication of the periodontal ligament cells. If HBSS is not available then cold milk, the patient's saliva and water can be used as a storage medium (American Association of Endodontics, 1995; Krasner and Person, 1992). [39, 40] Sigalas *et al*. (2004) [41] reported that HBSS (tissue culture medium) was found to be superior among other storage media such as eye contact lens solution, water, milk and ice in maintaining the viability of PDL cells up to one hour. It is also observed that water had a most detrimental effect on PDL cells. Two percent milk preserved more viable cells than contact lens solution. Knowledge of correct measures regarding storage media was found to vary considerably. For transport for an avulsed tooth, dry storage of the tooth will cause irreversible injury to the periodontal membrane, resulting in loss of the reimplanted tooth over time. However, storing the tooth in water is not recommended since the osmolality of water is too low (Blomlof, 1981a; Sigalas *et al.,* 2004). [42, 41] Milk has a favorable osmolality and composition for the viability of periodontal ligament cells and has therefore been recommended for temporary storage of avulsed teeth before reimplantation (Blomlof, 1981b; Sigalas *et al.,* 2004). [43, 41] Despite years of research showing that cell membranes will be destroyed if stored in normal saline, an alarming number of physicians (42.4%) thought that a tooth could be stored in such a medium. There seems to be an urgent need to educate the physicians and correct these misconceptions.

Dali *et al*. (2014) [44] have also observed that fair knowledge and attitude of medical doctors working in Nobel medical college, Biratnagar, towards emergency management of avulsed tooth and need of educative program in their text. The study further revealed that 55.6% of medical doctors knew the correct meaning of avulsed tooth, only 41.3% had prior knowledge about management of an avulsed tooth, whereas 58.6 % were unaware of its management and 58.6% choose saline as best medium to preserve an avulsed tooth, 8.6% choose saliva, 4.3% choose milk. Hashim (2012) [9] assessed that around 68% of the physicians referred the avulsed tooth immediately to the dentist, none of them attempted to put the tooth back into socket before referring to dentist. When asked about storage medium for avulsed tooth, 42.4% of the physician would advice normal saline and only 8% knew that milk can be used as better medium. A total of 83.2% of the respondents were unsatisfied with their knowledge regarding emergency management of dental trauma. About 96.8 % of the physicians felt the need of educational programs in this regard. Talluri *et al*. (2014) [45] found that 32.8% of the medical professional's referred the patient to the dentist in case of avulsion, 4.3% said that no treatment was required in cases of avulsion, 55% suggested that saliva can be used as best storage medium, 37% preferred normal saline as storage medium whereas 6.9% preferred Povidone iodine lotion, 57% said that best time for re-implantation of avulsed tooth was within an hour 26% said within half an hour. They concluded that level of knowledge was inadequate and there was a need of appropriate training in this regard. Venkataramana *et al*. (2015) [10] assessed the knowledge and attitude of medical professionals teaching staff, postgraduates and house surgeons working in a medical hospital in Khammam district in Telangana regarding management of an avulsed tooth. They reported that 64% were aware of the meaning of an avulsed tooth, 54% suggested saline as the best storage medium for transportation.

Al Jazairy *et al*. (2015) [46] observed that 89.4 % of the studied dentists were of the opinion that the extra oral period, storage medium and injury to the PDL are factors that may affect the outcome of replantation of the avulsed tooth, which is consistent with the results by Westphalen *et al*. (2007). [47] The extra-alveolar period has been recognized as the most critical factor for optimal periodontal healing (Andreasen *et al.,* 1995a, b, c; Barrett and Kenny; 1997). [24, 25, 48, 49] Saline, Hank's balanced salt solution (HBSS), and milk are examples of osmolality-balanced media suitable for storing avulsed teeth (Andersson and Andreasen, 2012). [3] The patient's saliva, although readily available at the site of trauma, contains bacteria and their by-products (Blomlöf, 1981a). [42] Furthermore, several studies have reported that the vitality of PDL cells can be sustained for 30 min when immersed in the patient's saliva, but it decreases remarkably after 60 min (Andreasen *at al.,* 1995a, b; Blomlöf, 1981b; Andreasen, 1981). [23, 24, 43, 50] However, while milk may not be readily available at the site of trauma, storage of the avulsed tooth in

milk at room temperature has been reported to preserve the viability of PDL cells for up to 60 min, whereas refrigerated milk preserves viability for an additional 45 min (Blomlöf *et al.,* 1981b; Lekic *et al.,* 1996), [43, 51] HBSS, on the other hand, was not included by some authors as an option in their questionnaire concerning storage medium due to its lack of availability at trauma sites (Krastl *et al.,* 2009). [52] Physiological saline solution is more commonly available than HBSS but is less available than milk. The highest percentage of our respondents (45%) reported HBSS as the best storage medium, followed by the patient's saliva (26.1%) and milk (24.1 %). This finding was not consistent with the results of previous studies, in which most of the participants reported the patient's saliva (Westphalen *et al.,* 2007) [47], saline (Baginska and Wilczynska-Borawska, 2013 [53], milk (Cohenca *et al.,* 2006; de Vasconcellos *et al.,* 2009; Yeng and Parashos, 2008) [54, 55, 56] as the preferable or recommended storage medium.

The proper handling of avulsed permanent tooth and its immediate gentle cleaning with the easily available tap water and proper cleaning technique for contaminated avulsed tooth (Q3) was found correct in 6 (08.57%) pediatricians 3 (4.28%) were having experience of <10 years and 3 (4.28%) > 10 to 20 years. Those 64 (91.43%) who answered incorrectly include 54 (77.14)% as wash with normal saline and 3 (4.28%) as scrub the tooth and clean it and 7 (10%) were found having no knowledge about the cleaning technique of avulsed permanent tooth. The IADT along with numerous others sources state that after avulsion of a permanent tooth, the tooth should be handled only by crown, gently rinsed off with water to clean away debris, and re-implanted as soon as possible by anyone present at the scene (American Academy of Pediatric Dentistry, 2004; Zemon and Kenny, 2001; Flores *et al.,* 2007; Kenney *et al.,* 2003; Mc Tigue, 2000; Trope, 1996; Andreasen, 1995a, b). [57, 58, 59, 60, 61, 62, 23, 24] Handling of the avulsed tooth and carrying the same in proper medium maintaining its vitality dictates the prognosis of the tooth. Al Ghamdi *et al*. (2016) [44] observed that the majority of the Saudi parent's choose washing the avulsed tooth under tap water, in contrast to the results obtained by other studies, where they preferred to scrub the tooth and clean it (Robertson and Noren, 2001; Raphael and Gregory, 1990; Namdev *et al.,* 2014; Shashikiran *et al.,* 2006). [34, 63, 45, 64]

Talluri *et al*. (2014) [45] studied that 64.7% of doctors would re-implant an avulsed tooth and follow this with an appropriate referral. Nasr *et al*. (2008) [65] showed that 78% of doctors would re-implant an avulsed tooth and follow this with a referral to an appropriate medical professional (Nasr *et al.,* 2008). [65] Talluri *et al*. (2014) [45] observed that100% of medical professionals expressed that they could account for avulsed teeth and 22.4% doctors stated that the appropriate treatment during the initial 30 minutes provides the best prognosis for traumatically avulsed teeth. Talluri *et al*. (2014) [45] revealed that 59.5% of the studied doctors had no recollection of any training in the management of dental injuries. This was similar to the study done by Nasr *et al*. (2008) [65] and agrees with Patel and Driscoll's (Harrison, 2014) [66] with only 6% of senior house officers had training in dental management as part of their undergraduate education. Lewis *et al*. (2016) [18] studied the importance of re-implantation and observed that approximately 40% of the pediatricians were not sure of undertaking the tooth saving procedures and storing medium of avulsed tooth in a solution compatible with cell viability. More than half of the pediatricians were unaware of the most appropriate storage medium. Similar findings were observed in a study by Khandelwal *et al*. (2013). [67]

However a non significant negative correlation between knowledge score and length of experience was observed in this study. Lewis *et al*. (2016) [17] also observed a negative correlation indicating recently passed out pediatricians had better knowledge than the more experienced. Similar findings were noted in a study conducted by Khandelwal *et al*. (2013). [67] This might be due to escalating incidence of orofacial trauma and increased awareness. Pithon *et al*. (2014) [68] found poor level of knowledge of primary school teachers in the public school network of North-Eastern Brazil with respect to management of dental trauma and its relationship with prognosis. Glendor Ulf (2009)[69] reviewed from different countries and groups of people but the result seem to be consistent, i.e. that a large part of the education process of professional caregivers and lay people regarding dental trauma care had failed. Too much hope seems to be on lay people to handle difficult cases such as tooth avulsion. His reports revealed that education of caregivers and lay people was a field where much remains to be explored. Mori *et al*. (2007)[2] concluded that the efficacy of campaign on avulsed tooth management was found positive and the respondents possessed all required adequate knowledge thus promoting implementation of more such educative campaigns in other schools. Natarajan and Gurunathan (2013) [8] observed that the level of knowledge among physical education teachers in Chennai regarding tooth avulsion and its emergency management was insufficient and recommended the need of implementing educative programs. Lewis, *et al*. (2017) [17] assessed pediatricians' knowledge, attitudes, and professional experience regarding oral health. Pediatricians may be able to play an important role in improving the dental health of their patients who have difficulty obtaining access to professional dental care. However, it is unclear to what degree pediatricians are knowledgeable about preventive oral health and the extent to which they may already be participating in prevention and assessment. Also, little is known about the incidence of dental problems in pediatric practice, and whether pediatricians attitude act as barrier to their patients' receiving professional dental care. Finally, it is important to know how pediatricians value the promotion of oral health and whether they would be willing to take on additional activities aimed at its improvement. Pani *et al.* (2015) [70] reported that the level of knowledge regarding traumatic dental injuries was highest among surgeons and lowest among emergency room technicians who are likely to be the first people to encounter such injuries. They further reported that the attitude towards management of traumatic dental injuries was most positive among nurses. Jyothi *et al*. (2011) [14] observed through survey study that only 78.5% of the medical doctors working in Sri Siddhartha medical college, Tumkur, know the correct meaning of avulsed tooth, They concluded that the knowledge of the medical doctors was fair although none were found to provide accurate and appropriate first aid. Samaei *et al*. (2015)

[15] reported that the knowledge and confidence of Australian Emergency Physicians and college trainees in managing dental emergencies was varied and Interactive training sessions in dental emergency management were highly indicated. The response rate was observed as 13.6% (404/3405) and college members were proportionally represented by region. Fewer than half (186/446; 42%) had received dental training. Sixty two percent (244/391) passed a knowledge test. More than 60% incorrectly answered a question on dental fracture, periodontal abscess, tooth eruption dates and ulcerative gingivitis. Forty two percent (166/416) incorrectly answered a question about Ludwig's angina. Eighty three percent (360/433) were confident in the pharmacological management of toothache but only 26% (112/434) were confident in recognizing periodontal diseases. Interactive workshops were preferred by most (386/415, 93%). Khandelwal (2013) [67] observed that 90% of physicians and Paediatric surgeons practicing in Indore area have accepted that they had no knowledge of dental trauma management and 93% of the practicing doctors were interested in attending an education program in this regard. Blakytny *et al*. (2001) [71] observed that majority of primary school teachers possessed a rudimentary knowledge of the emergency management of dental avulsion & further suggested to issue dental first aid instructions to them. Bhandary *et al.* (2014) [72] observed the need of training in the management of dental trauma as part of their training program for physical education teachers regarding dental trauma and its management in Karnataka state of India.

The pediatricians' knowledge about tooth trauma management and familiarity with basic oral health-related research were limited, particularly the research in the last decade (Koranyi *et al.,* 1991; Sanchez *et al.,*1997; Gift *et al.,* 1984).[73, 74, 75] Pediatricians can expand their involvement in oral health prevention, but they can never replace the care that dental professionals can provide. Time pressure, lack of accurate knowledge and inadequate staffing will make it difficult for pediatricians to devote the attention to oral health that all children deserve. Physicians' knowledge regarding tooth avulsion was found insufficient and only 18.8% refer pediatric patients to pediatric dentist (Ulusoy *et al.,* 2012). [76]

There was no correlation between knowledge score and level of dental education received in medical school and / or residency (Sezer *et al.,* 2013). [33] In Kuwait, 16.7% physicians had received information about tooth avulsion (Abu-Dawoud, 2007). [77] Holan and Shmueli (2003) [78] found that 55% of the physicians in their study had never received any information related to dental trauma. Hashim (2012) [9] highlighted that only 19.2% of the physicians had received training on managing avulsed teeth and the rest never had any educative program in this regard. The majorities 97.6% of the respondents was not satisfied with their level of knowledge and believe that they need further education. McCann *et al*. (2005) [79] observed that physicians and medical undergraduates in the United Kingdom were inadequately educated about dental trauma case and there is an urgent need to provide more courses on dental trauma management for physicians and pediatricians.

Statistically analysis

The data being statistically non significant neither it is following a trend ($\chi 2=0.488$, df=3, p=0.921). Furthermore, a non-significantly better awareness and mean knowledge score (0.35) was observed about Q1 among pediatricians having more than 30 years of experience compared to those having 20 to 30 years (0.27) followed by 10 to 20 years (0.28) and less than 10 years of experience. The analysis of data for Q2 between groups found varying non significantly, neither it is following a trend ($\chi 2=1.936$, df=3, p=0.586). Furthermore, a non-significantly better awareness and mean knowledge score (0.36) was observed among respondents having 20 to 30 years of experiences as compared to rest of the pediatricians while those in less than 10 years and 10 to 20 years experienced pediatricians had almost equal mean score 0.20 followed those having more than 30 years of experience (0.14). Similarly analysis of data for Q3 between groups found varying non-significantly, without following any trend ($\chi 2=3.773$, df=3, p=0.287). Furthermore, a non-significantly better awareness and mean knowledge score (0.15) was observed among respondents having less than 10 years of experience followed by those having 10 to 20 years (0.12) of experience compared to rest of the pediatricians. Inter question analysis of means of knowledge score found varying significantly where as non significant variation was observed between questions Q1, & Q2 with Q3.

CONCLUSIONS

This study has provided the baseline informations about various concepts of avulsed tooth management before re-plantation including transportation and preservation, among the pediatricians working in Karnal city of Haryana, India. A total seventy pediatricians (58 male and 12 female) were evaluated. Keeping the observations and their evaluation of present study in view following conclusions were drawn.

1. Mild negative correlation between the first aid knowledge and experience of paediatricians was observed about the transportation and storage of avulsed permanent tooth before re-plantation. The length of experience of pediatricians does not play any significant role.
2. Collaboration between dentist, pediatricians and physicians is the need of hour for the implementation of oral health education programs in India.
3. Promote the need for super specialty facilities for avulsed tooth re-implantation in Government and private sector hospitals in India.
4. Strict requirement of refresher courses for pediatricians.
5. Stringent requirement for addition of basic courses on dental trauma management in medical undergraduate and post graduate course curriculum.
6. Strict requirement for inclusion of the standard operating protocol of dental trauma management in the postgraduate curriculum of pediatrics.

Bibliography

1. Abdellatif, A. M. and Hegazy, S. A. (2011). Knowledge of emergency management of avulsed teeth among a sample of Egyptian parents. *Journal of Advanced Research,* 2: 157-162.
2. Mori, G.G., Castilho, L.R., Nunes, D.C., Turcio, K.H.L. and Molina, R.O. (2007). Avulsion of permanent teeth: Analysis of the Efficacy of an informative campaign for professionals from elementary schools. *Journal of Applied Oral Sciences,* 15(6):534-238.
3. Andersson, L, Andreasen, J. O, Day, P., Heithersay, G., Trope, M. and Diangelis, A.J., *et al*. (2012). International association of dental traumatology guidelines for the management of traumatic dental injuries: Avulsion of permanent teeth. *Dental Traumatology*, 28:88-96.
4. Zaleckiene, V., Peciuliene, V., Brukiene, V. and Drukteinins, S. (2014). Traumatic Dental injuries: Etilogy, prevalence and possible outcomes. *Stomatologia*, 16(1):7-14.
5. Qazi, R.S. and Nasir, K.S. (2009). First-aid knowledge about tooth avulsion among dentists, doctors and lay people. *Dental Traumatology*, 25: 295–299.
6. Ferreira, E.L., Filho, F.B., Correr, G.M., Leonardi, D.P., Fariniuk, L.F., Campos, E.A. *et al*. (2009). Dental avulsion, from dental replantation to dental implant: a case report with a 20-years follow-up. *Brazilian Journal of Dental Traumatology*, 1(1):13-9.
7. Francisco, S.S., de Jesus Soares, A. and Murrer, R.D. (2015). Evaluation of elementary education teacher's knowledge on avulsion and tooth replantation. *Le Réseau de recherche en santé buccodentaire et osseuse,* 12(1):32-40.
8. Natarajan, K. and Gurunathan, D. (2013). Knowledge of tooth avulsion and its emergency management among physical education teachers in Channai. *IOSR Journal of Dental and Medical Sciences*, 11(5):21-24.
9. Hashim, R. (2012). Physicians' knowledge and experience regarding the management of avulsed teeth in United Arab Emirates. *Journal of International Dental and Medical Research*, 5(2):91-95.
10. Venkataramana, M. Pratap, K.V.N.R, Padma, M.T., Kalyan, S.V., Bhargava, A.S.K. and Varma, S.C.L. (2015). Knowledge and attitude of medical professionals towards emergency management of avulsed tooth in a teaching medical hospital Khammam Town, South India. *Journal of Indian Association of Public Health Dentistry*, 13 (2):183-186.
11. Addo, M. E., Parekh, S., Moles, D.R. and Roberts, G.J. (2007). Knowledge of dental trauma first aid: The example of avulsed incisors in casualty departments and schools in London. *British Dental Journal*, 202: E27.
12. Bazmi, B.A., Singh, A.K., Kar, S. and Mubtasum, H. (2013). Storage media for avulsed tooth- A review. *Indian Journal of Multidisciplinary Dentistry*, 3(3):742-9.
13. Raoof, M., Vakilian, A., Kakoei, S., Manochehrifar, H. and Mohammadalizadeh, S. (2013). Should Medical Students Be Educated About Dental Trauma Emergency Management? A Study of Physicians and Dentists in Kerman Province, Iranian *Journal of Dental Education*, 77(4):494-501.
14. Jyothi, K.N., Venugopal, P., Nanda, S. and Shah, M.K. (2011). Knowledge and Attitude of Medical Doctors towards Emergency Management of Avulsed Tooth- A Cross Sectional Survey. *Journal of Dental Sciences and Research*. 2 (1): 156-167.
15. Samaei, H., Weiland, T.J., Dilley, S. and Alexander, J. G. (2015). Knowledge and confidence of a convenience sample of Australasian Emergency Doctors in managing dental emergencies: Results of a Survey. *Emergency Medicine International*. 2015; Article ID 148384.
16. Chanchala, H.P., Shanbhog, R., Ravil, M.D. and Raju, V. (2016). Pediatrician's perspectives on dental trauma management. A cross –sectional survey. *Journal of Indian Association of Public Health Dentistry*, 14:4 419-423.
17. Lewis, C. W., David, C., Grossman, D.C., Domoto, P. K., Domoto, D.D.S. and Deyo, R.A. (2017). The role of the paediatricians in the oral Health of children: A National Survey. *Pediatrics,* 106(6): 1-7.
18. Hatem, M. and Taher, E.M. (2015). Libyan general dentists' knowledge of dental trauma management. *International Dental & Medical Journal of Advanced Research*, 1: 1–6.
19. 19Dua, R. and Sharma, S. (2012). Prevalence causes and correlates of traumatic dental injuries among seven to twelve years old school children in Dera Bassi. *Contemporary Clinical Dentistry*, 3 (1):38-41.
20. Al-Majed, I., Murray, J. J. and Maguire, A. (2001). Prevalence of dental trauma in 5-6- and 12-14-year-old boys in Riyadh Saudi Arabia. *Dental Traumatology,* 17:153–8.
21. Andersson, L. (2013). Epidemiology of traumatic dental injuries. *Journal of Endodontics,*39,3S: S2-S5
22. Brien, O. M. (1993). Children's dental health in the United Kingdom. London: *Her Majesty's Stationary Office*.
23. Andreasen, J. O., Borum, M. K, Jacobsen, H. L. and Andreasen, F. M. (1995a). Replantation of 400 avulsed permanent incisors 2. Factors related to pulpal healing. *Endodontics and Dental Traumatology*, 11:59-68.
24. Andreasen, J. O., Borum, M. K. and Andreasen, F. M. (1995b). Replantation of 400 avulsed permanent incisors diagnosis of healing complications. *Endodontics and Dental Traumatology*, 11:69-75.
25. Ravn, J. J. (1974). Dental injuries in Copenhagen schoolchildren, school years 1967-1972. *Community Dentistry and Oral Epidemiology*, 2:231-45.
26. Soares Ade J., Gomes, B. P., Zaia, A. A., Ferraz, C. C. and de Souza-Filho, F. J. (2008). Relationship between clinical-radiographic evaluation and outcome of teeth replantation. *Dental Traumatology,* 24:183–8.
27. Pileggi, R., Dumsha, T. C. and Nor, J. E. (2002). Assessment of post-traumatic PDL cells viability by a novel collagenase assay. *Dental Traumatology,* 18:186–9.
28. *International Association of Dental Tramatology*. (2012).

29. Cortes, M., Marcenes, W. and Sheiham, A. (2002). Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12-14-year-old children. *Community Dent Oral Epidemiology*, 30: 193-8.
30. Wong, S., Anthonappa, R. P., Ekambaram, M., Mcgrath, C., King, N. M. and Winters, J. C. (2016). Quality of life changes in children following emergency dental extractions under general anaesthesia. *International Journal of Paediatric Dentistry,*27(2): 80-86.
31. Gianneti L, Murri A, Vecci F and Gatto R. (2007). Dental avulsion: therapeutic protocols and oral health related quality of life. *European Journal of Paediatric Dentistry,* 8(2):69-75.
32. Balaban, R., Aguiar, C. M., Araujo, A. C. S. and Filho, E. D. (2011). Knowledge of the paediatricians regarding child oral health. *International Journal of Paediatric Dentistry*, 22: 286-291.
33. Unal, M., Oznurhan, F., Kapdan, A., Aksoy, S. and Durer, A. (2014). Traumatic dental injuries in children. Experience of a hospital in the central Anatolia region of Turky. *European Journal of Paediatric Dentistry*, 15:17-22.
34. Ozer, S., Yilmaz, E. I., Bayrak, S. and Tunc, E. S. (2012). Parental knowledge and attitudes regarding the emergency treatment of avulsed permanent teeth. *European Journal of Dentistry,* 6: 370-375.
35. Abhinav Prakash, A. (2015). Perception of teachers towards traumatic tooth avulsion and its management amongst school children department of oral pathology. *Journal of Oral Health and Dental Management*, 14(6):391-394.
36. Setty, J.V. (2009). Knocked-out tooth: Knowledge and attitudes of. *Journal of Dental Research,* 3(3):9-16.
37. Nikam, A.P., Kathariya, M.D., Gupta, A. and Kathariya, R. (2014). Knowledge and attitude of patient/Caretaker toward management of avulsed tooth in Maharashtrian population: A Questionnaire method. *Journal of International Oral Health*, 6(5): 1-4.
38. Fujita, Y., Shiono Y and Maki K. (2014). Knowledge of emergency management of avulsed tooth among Japanese dental students. *Biomed central Oral Health,* 14:34: 2-6.
39. American Association of Endodontics (1995). Treatment of the avulsed permanent tooth: recommended guidelines.
40. Krasner, P. and Person, P. (1992). Preserving avulsed teeth for re-plantation. *Journal of American Dentist Association*, 123:80-8.
41. Sigalas, E., Regan, J. D., Kramer, P. R.,Witherspoon, D. E. and Operman, L. A. (2004). Survival of human periodontal ligament cells in media proposal for transport of avulsed teeth. *Dental Traumatology*, 20:21-8.
42. Blomlöf, L. and Lindskog, S. (1981a). Hammarström L. Periodontal healing of exarticulated monkey teeth stored in milk or saliva. *Scandinavian Journal of Dental Research.* 89: 251–9.
43. Blomlöf, L. (1981b). Storage of human periodontal ligament cells in a of different media. *Journal of Dental Research.* 60:1904–6.
44. Dali, M., Naulakh, D. and Rajbanshi, L. (2014). Knowledge, attitude and practice in emergency management of avulsed tooth among medical doctors in Nobel Medical College, Biratnagar, Nepal: A cross sectional survey. *International Journal of Dental Health Sciences*, 01(1): 3-12.
45. Talluri, D., Bommireddy, V. S., Rao, V. and Ravoori, S. (2014). Management of dental injuries by South Indian medical professionals - A hospital based questionnaire design study. *International Journal of Applied Dental Sciences*, 1(1): 18-21.
46. Al-Jazairy, Y. H., Halawany, H. S., Almaflehi, N. S., Alhussainan, N. S., Nimmi Biju Abraham, N. B. and Jacob, V. (2015). Knowledge about permanent tooth avulsion and its management among dentists in Riyadh, Saudi Arabia. *Biomed Central Oral Health*, 15:135.
47. Westphalen, V. P., Martins, W. D., Deonizio, M. D., Da Silva., Neto, U. X., Da Cunha, C. B. and Fariniuk, L. F. (2007). Knowledge of general practitioners dentists about the emergency management of dental avulsion in Curitiba Brazil. *Dental Traumatol*ogy, 23:6–8.
48. Andreasen, J. O., Borum., M. K, Jacobsen., H. L. and Andreasen., F. M. (1995c). Replantation of 400 avulsed permanent incisors. 4. Factors related to periodontal ligament healing. *Endodontics and Dental Traumatology,* 11:76–89.
49. Barrett, E. J. and Kenny, D. J. (1997). Avulsed permanent teeth: a review of the literature and treatment guidelines. *Endodontics and Dental Traumatology,* 13:153 –63.
50. Andreasen, J. O. (1981). Effect of extra-alveolar period and storage media upon periodontal and pulpal healing after replantation of mature permanent incisors in monkeys. *International Journal of Oral Surgery,* 10:43–53.
51. Lekic P., Kenny D., Moe H. K., Barretti E. and McCulloch, C. A. (1996). Relationship of clonogenic capacity to plating efficiency and vital dye staining of human periodontal ligament cells: implications for tooth replantation. *Journal of Periodontal Research* 31:294–300.
52. Krastl, G., Filippi, A. and Weiger, R. (2009). German general dentists' knowledge of dental trauma. *Dental Traumatol*ogy, 25:88–91.
53. Baginska, J. and Wilczynska-Borawska, M. (2013). Continuing dental education in the treatment of dental avulsion: Polish dentists' knowledge of the current IADT guidelines. *European Journal of Dental Education,* 17:e88–92.
54. Cohenca, N., Forrest, J. L. and Rotstein, I. (2006). Knowledge of oral health professionals of treatment of avulsed teeth. *Dental Traumatology,* 22:296–301.
55. de Vasconcellos, L.G., Brentel, A. S., Vanderlei, A. D., de Vasconcellos, L. M., Valera, M. C. and de Araújo, M. A. (2009). Knowledge of general dentists in the current guidelines for emergency treatment of avulsed

teeth and dental trauma prevention. *Dental Traumatology,* 25:578–83.
56. Yeng, T. and Parashos, P. (2008). An investigation into dentists 'management methods of dental trauma to maxillary permanent incisors in Victoria Australia. *Dental Traumatology,* 24:443–8.
57. American Academy of Pediatric Dentistry (2004). Clinical guideline on management of acute dental trauma. *Pediatric Dentistry*, 26:120-127.
58. Zamon, E. and Kenny, D. (2001). Replantation of Avulsed Primary Incisors: A Risk-Benefit Assessment. *Journal of Canadian Dental Association*, 67:386-391.
59. Flores, M. T., Malmgren, B., Andersson, L., Andreasen, J.O., Bakland, L. K., Barnett, F., *et al. (*2007). The International Association of Dental Traumatology. "Guidelines for the management of traumatic dental injuries. III. Primary teeth". *Dental Traumatology,* 23(4):196–202.
60. Kenny, D. J., Barrett, E.J. and Casas, M. J. (2003). Avulsions and intrusions: the controversial displacement injuries. *Journal of Canadian Dental Association,* 69:308-13.
61. Mc Tigue, D. J. (2000). Diagnosis and management of dental injuries in children. *Pediatric Clinics of North America,* 47: 1067-84.
62. Trope, M. (1996). Protocol for treating the avulsed tooth. *Journal of the California Dental Association,* 24: 43-9.
63. Rapheal, S. L. and Gregory, P. J. (1990). Parental awareness of the emergency management of avulsed teeth in children. *Australian Dental Journal*,35:130-3.
64. Shashikiran, N. D., Reddy, V.V. and Nagaveni, N. B. (2006). Knowledge and attitude of 2,000 parents (urban and rural-1,000 each) with regard to avulsed permanent incisors and their emergency management, in and around Davangere. *Journal of Indian Society of Pedodontics Preventive Dentistry*, 24:116-21.
65. Nasr, I. H., Papineni, McIntosh. A., Mustafa, S. and Cronin, A. (2008). Algorithm of first-aid management of dental trauma for medics and corpsmen". *Dental Traumatology*, 24(6):698–701.
66. Harrison, L. (2014). Dental trauma: guidelines for pediatricians updated. *Medscape Medical News*, http://www.medscape.com/viewarticle/819755.
67. Khandelwal, V. Gupta, A. and Khandelwal, S. (2013). Awareness about management of 'avulsed teeth' among primary contact doctors. *Journal of Indian Association of Paediatric Surgeons*, 18(2):92-98
68. Pithon, M. M., dos Santos, R. L., Magalhães, P. H. B. and Coqueiro, R. da S. (2014). Brazilian primary school teachers' knowledge about immediate management of dental trauma. *Dental Press Journal of Orthodontics*, 19(5), 110–115.
69. Glendor, U.l.f. (2009). On dental trauma in children and adolescents. Incidence, risk, treatment, time and costs. *Swedish Dental Journal*, 140 (Suppl). 1-52.
70. Pani, S. C., Eskandrani, M. R., Al-kadhi, K. and Al-hazmi, A. (2015). Knowledge and attitude toward dental trauma first aid knowledge among a sample of emergency room personnel across Saudi Arabia. *Saudi Journal of Oral Sciences*, 2(1):30-33.
71. Blakytny, C., Surbuts, C., Thomas, A. and Hunter, M.L. (2001). Avulsed permanent incisors: Knowledge and attitudes of primary school teachers with regard to emergency management. *International Journal of Paediatric Dentistry*, 11:327-332.
72. Bhandary, S. and Shetty, S.D. (2014). Knowledge of physical education teachers regarding dental trauma and its management in Karnataka. *International Journal of Research in Dentistry*, 4(1): 20-28.
73. Koranyi, K., Rasnake, L. K. and Tarnowski, K. J. (1991). Nursing bottle weaning and prevention of dental caries: a survey of pediatricians. *Journal of Paediatric Dentistry*, 13:32-34.
74. Sanchez, O. M., Childers, N. K., Fox, L. and Bradley, E. (1997). Physicians' views on pediatric preventive dental care. *Pediatrician Dentistry*, 19:377-383.
75. Gift, H. C., Milton, B. and Walsh, V. (1984). Physicians and caries prevention: results of a physicians survey on preventive dental services. *Journal of American Medical Association,* 252:1447-1448S.
76. Ulusoy, A. T., Onder, H., Cetin, B. and Kaya, S. (2012). Knowledge of medical hospital emergency physicians about the first-aid management of traumatric tooth avulsion. *International Journal of Paediatric Dentistry*, 22:211-6.
77. Abu-Dawoud, M., AI-Enezi, B. and Andersson, L. (2007). Knowledge of emergency management of avulsed teeth among young physicians and dentists. *Dental Traumatology*, 23:348-355.
78. Holan, G. and Shumueli, Y. (2003). Knowledge of physicians in hospital emergency rooms in Israel on their role in cases of avulsion of permanent incisors. *International Journal of Paediatric Dentist*, 13: 13-9.
79. Mc Cann, P. J., Sweeney, M. P., Gibson, J. and Bagg, J. (2005). Training in oral diseases, diagnosis and treatment for medical students and doctors in the United Kingdom. *British Journal of Oral and Maxillofacial Surgery*, 43(1):61-

How to cite this article:

Isha Bisla (2020) 'Assessment of First Aid Knowledge About Transportation And Storage Of Avulsed Permanent Tooth of A Child Before Re-Plantation, Among the Paediatricians of Karnal City, Haryana, India, A Survey Study', *International Journal of Current Advanced Research,* 09(07), pp. 22751-22762. DOI: http://dx.doi.org/10.24327/ijcar.2020. 22762.4498