

## Effect of Educational Intervention on School Teachers' Awareness about Emergency Management of Dental Trauma

Samia Ali El-Nagar<sup>(1)</sup>, Samira E. Aboalizm<sup>(2)</sup>

<sup>1</sup>Lecturer of Community Health Nursing, Faculty of Nursing, Menoufia University, Egypt

<sup>2</sup>Lecturer of Adult Health Nursing, Faculty of Nursing, Menoufia University, Egypt

---

### Abstract :

**Background:** Dental trauma in children and adolescents represent one of the major public health problems worldwide. School is one of the locations with greatest prevalence of traumatic dental injuries. So, awareness of school teachers about emergency management of dental trauma is an important concept for long term maintenance of oral health and to prevent its future consequences.

**Aim:** This study was conducted to examine the effect of educational intervention on school teachers' awareness about emergency management of dental trauma in school children.

**Subjects & methods: Design:** Quasi-experimental with pre and post test was used.

**Setting:** This study was conducted at primary and preparatory schools in rural community in Shebin Elkom District, Menoufia Governorate.

**Sample:** Simple random sample consisted of 320 school teachers of both sexes from primary and preparatory schools which were selected and divided randomly into the intervention group and the control group.

**Tool:** Self administered structured questionnaires which included socio demographic data, previous experience and training of teachers on dental trauma, general knowledge of school teachers about dentition, awareness of school teachers about emergency management of dental trauma, and attitude of school teachers on education program about immediate management of dental trauma.

**Results:** This study revealed that forty five percent of school teachers had reported previous encounters students with dental trauma. The most common type of dental trauma seen by teachers was crown fracture followed by avulsion of teeth then displaced teeth. The most of school teachers' had not received any training about first aid of dental trauma. The majority of school teachers were not satisfied with their level of knowledge about emergency management of dental trauma and would like to attend an educational program in the dental trauma first aid. Moreover, at pre intervention less than two thirds of both groups had fair general knowledge about dentition compared to post intervention, the majority of the intervention group had good general knowledge and difference between both groups was statistically significant. Additionally, the majority of the intervention group and control group had poor knowledge about emergency management of dental trauma at pre intervention compared to post intervention, the most of the intervention group had good knowledge and there was statistically significant difference between both groups.

**Conclusion:** Majority of school teachers of the studied sample had poor awareness about emergency management of dental trauma before intervention and no statistically significant difference between both groups. After intervention, there was significant improvement in the knowledge and awareness of teachers about emergency management of dental trauma in the intervention group compared to the control group.

**Recommendations:** The ministry of health in collaboration with the ministry of education must hold in-service training program for the teachers to enhance their awareness about emergency management of dental trauma.

**Key words:** Dental trauma, Emergency management, School teachers, Awareness.

---

### I. Introduction

Children are the world's most valuable resources and it's the best hope for future. Because of the continuous engaged in physical activity, children are most likely to face trauma to the teeth and surrounding structures (Karande et al., 2012). A dental trauma can be defined as the effect of an accidental event that involves the hard and the support structures of a tooth. The most common age at which a dental trauma can occur is 8-12 years, when the periodontal structure surrounding the erupting teeth is weaker and provides minimal resistance to an extrusive force (Ozer et al., 2012).

Children, especially school children face particular health challenges including oral health problems related to the stages of their physical and mental development, which make them especially vulnerable to traumatic dental injuries (Prasanna et al., 2011). At present, this is considered a public health problem due to the growing rates of violence, automobile accidents, contact sports and injuries in the school environment (Faus-

Damiá et al., 2011). Some studies emphasize that the number of cases with dental trauma will exceed cases with dental caries or periodontal problems (Marchiori, 2013).

The prevalence of dental trauma in primary and permanent teeth is high throughout the world. Statistics from most countries showed that one fourth of all school children and almost one third of adults have suffered trauma to their permanent dentition, but there are variations among and within countries (Glendor, 2008; Taiwo & Jalo, 2011). Epidemiological data show that about 50% of children have their primary or permanent dentition affected by traumatic injuries throughout the school period (Togoo et al., 2011). Epidemiological studies have proved that the prevalence of traumatic dental injuries during the past three decades has been estimated around 20–25% in permanent teeth among children and adolescents (Andersson, 2013). Additionally, the prevalence of traumatic dental injuries among schoolchildren aged 12–15 years varies between 14.4–33.8% (Taiwo & Jalo, 2011; Kumar et al., 2011). Hence, schoolchildren constitute a group at risk of traumatic dental injuries (Skeie et al., 2014).

Dental trauma is an important public dental health problem among schoolchildren (Abdellatif et al., 2011; Al-Bajjali, & Rajab, 2014; Prasad et al., 2014). It has been reported that dental trauma injuries result in tooth fracture, displacement or loss, causing negative functional, esthetic and psychological effects to the children, adolescents and adults (Dua & Sharma, 2012; Bendo et al., 2014). There is perhaps no single dental disturbance that has greater psychological impact on the parents and the child than the loss or fracture of a child's anterior teeth. Primary and permanent anterior teeth are not only important for esthetics but also essential for phonetics, mastication, integrity of supporting tissues, psychological and mental wellbeing of children (Pujita et al., 2013).

Dental trauma can cause an irreversible dental loss with inconvenient consequences to the child and parents because of the long term follow-up and possible complications that can occur even after years post treatment. The economic costs of treatment, its impact on the oral health-related quality of life and the possibility of prevention, have made dental trauma a serious public dental health problem in children (Glendor, 2009). As noted, dental trauma appears to affect schoolchildren's oral health-related quality of life (Traebert et al., 2012; Bendo et al., 2014). Consequently, dental trauma that result in pain and discomfort, discoloration, and other esthetic alterations can lead children to avoid smiling or speaking in a natural way, perhaps affecting self-concept and social relationships. Also, consequences of dental trauma include feeling embarrassed to smile, laugh and show teeth, difficulty in social relationships, irritability and an inability to maintain a healthy emotional state (Aldrigui, 2011).

Home and school are the most common places where dental trauma occur (Glendor, 2009; Abdellatif et al., 2011; Prasad et al., 2014). For children and adolescents, parents and teachers are usually nearby when the accidents occur. Therefore, their knowledge about the management of dental trauma is vitally important for the prognosis of injured teeth and in helping the injured person to receive appropriate first-aid treatment as soon as possible (Hashim, 2011). Proper intervention can play an important role to improve the prognosis of a traumatized tooth (Raouf et al., 2012). The prognosis highly depends upon proper and prompt emergency management and proper advice, which may frequently be the responsibility of lay people such as the child's parents and their school teachers available at the accident site (Pujita et al., 2013; Skeie et al., 2014). Immediate management of traumatic dental injury does not require special skill but only knowledge; it can be performed by a lay person if one knows the procedures. The ideal situation is that such knowledge becomes everyone's basic practical knowledge. The earlier one learns the appropriate procedure, the higher chance one can save more traumatized teeth (Young et al., 2014).

School is one of the locations with greatest prevalence of dental trauma (Anjum et al., 2014). In most cases, the child is referred to a dentist without any emergency management at the accident site, resulting in irreversible complications and consequences (McIntyre et al., 2008). Therefore, school teachers can play a critical role in the primary management of dental trauma and improve the prognosis of traumatized teeth (Zakirulla et al., 2011; Anjum et al., 2014; Ghadimi et al., 2014). Many national and international studies in different countries have reported inadequate knowledge and awareness of school teachers regarding emergency management of dental trauma injuries (Mesgarzadeh et al., 2009; Hashim, 2011; Karande et al., 2012; Anjum et al., 2014; Raouf et al., 2014; Quaranta et al., 2014). School health nurses are responsible for promoting the health status of students in schools. They teach students about health issues, and help children and other school teachers to manage emergent health problems and injuries (Ghadimi et al., 2014). Also, they play an important role in the primary management of dental trauma and improving the prognosis of traumatized teeth (Choi et al., 2012; Ghadimi et al., 2014).

### **1.1. Significance of the study:**

Dental trauma injuries are widespread in the world and a serious public health problem among school children (Bayrak et al., 2012). School is one of the locations with greatest prevalence of dental trauma (Anjum et al., 2014). At least half of school children face the possibility of suffering dental trauma during school time

(Faus-Damiá et al., 2011). It is ignored problem among school children and frequently occurs without appropriate emergency management at the site of the accident. The resulting complications can be costly, time-consuming, and even irrecoverable. The prognosis of the injury can be improved if proper emergency management measures are taken (Lieger, 2009). Schools represent an environment with a noticeable risk of dental trauma and considered appropriate place for the development of activities that promote oral health, so teachers and other school staff close to the accident should have knowledge of how to manage dental trauma events (Anjum et al., 2014; Skeie, 2014). Therefore, the aim of the present study was to examine the effect of educational intervention on school teachers' awareness about emergency management of dental trauma.

### 1.2. Aim of the study

The aim of this study was to examine effect of educational intervention on school teachers' awareness about emergency management of dental trauma in school children.

### 1.3. Research hypothesis:

1. School teachers will have a low level of awareness about emergency management of dental trauma.
2. Awareness of school teachers about emergency management of dental trauma will have improved after intervention in the study group compared with the control group.

## II. Subjects and Methods

### 2.1. Research design:

Quasi-experimental design with pre and post test was used to achieve the aim of the study.

### 2.2. Research setting:

The study was conducted at primary and preparatory schools in rural area in Shebin Elkom District, Menoufia Governorate. This setting was selected by using multistage random sample technique according to the following stages:

- The first stage was random selection of the one district from nine districts in Menoufia governorate. The selected district was Shebin Elkom.
- The second stage was random selection of 8 villages from 36 villages in the selected district.
- The third stage was random selection of 8 schools (4 primary schools and 4 preparatory schools) out of 28 schools from the selected setting by using simple random sample technique.

### 2.3. Research sample:

Simple random sample consisted of 320 school teachers of both sexes from primary and preparatory schools which were selected randomly. All participating teachers were divided randomly into two groups, 200 school teachers to the intervention group and the other 120 to the control group.

### 2.4. Sample size:

At 95 % confidence power of the study. Sample size was determined through the following equation (Steven

Thimpsone Equation ).

n =

$$n = \frac{N \times P (1-P)}{(N-1 \times (d^2 / Z^2)) + p (1-p)}$$

n= sample size  
N= Total society size= 760  
d= error percentage= (0.05).  
P= Percentage of availability of the character and objectivity= (0.5)  
Z= the corresponding standard class of significance 95% = (1.96)  
n=760 x (0.5 x 0.5) /759 x 0.05<sup>2</sup> / 1.96<sup>2</sup> + (0.5x 0.5).  
n= 760 x 0.25 / 759 x 0.002 / 3.84 + 0.25  
n= 190 / 0.63= 301

According to equation of calculating sample size, the sample size must be not less than 301. The sample size was increased to allow for drop out.

### 2.5. Tool of the study:

**Self administered structured questionnaires** were developed by the researchers after reviewing the related literature to collect the data from school teachers and included the following:

1. **Socio demographic data:** such as name, age, sex, education level, work experience as a school teacher, school type and residence.

**2. Previous experience of teachers on dental trauma:** This included questions about previous encounters student with dental trauma, types of dental injuries seen by teachers as crown fracture, displaced teeth, avulsion and soft tissue injury, previous dental trauma training, information on dental trauma first aid and source of dental trauma information.

**3. General knowledge of school teachers about dentition:** This included questions about eruption pattern in human life time, ages of eruption the permanent teeth and believes about importance for primary dentition. The general knowledge questionnaire contained 3 items, two items had 4 alternative options with one correct answer and one item had three options as yes/no or don't know.

**4. Awareness of school teachers regarding emergency management of dental trauma:** This included questions about immediate management first aid on three types of dental trauma especially crown fracture, displaced or moved and avulsion tooth, appropriate time for replacement of an avulsed tooth ideally, suitable method for holding the tooth, suitable storage medium for transferring an avulsed or fracture tooth to the dentist, proper cleaning technique for contaminated avulsed tooth before replantation. The awareness questionnaire contained 8 items, some items had 4 alternative options with one correct answer and some had three options as yes/no or don't know. Each correct answer was given one score based on predetermined key answer according to the literature, while incorrect and don't know answer was given zero. The total score for awareness regarding emergency management of dental trauma was 8 points.

**The scoring system was categorized as follow:**

- Poor knowledge (< 50%).
- Fair knowledge (50 - 75%).
- Good knowledge (>75%).

**5. Attitude of school teachers on education program about immediate management of dental trauma:** This included questions as do you think it is important to have an educational program regarding emergency management of dental trauma, are you satisfied with knowledge on the management of dental trauma, and willingness to attend an educational program on management of dental trauma. The response for each question in the form of yes or no.

## **2.6. Validity and reliability of the tool:**

The tool was developed by the researchers after reviewing of the related literature and tested for its content validity. Validity indicated the degree to which the tool measures what it is expected to measure. The questionnaire validity was determined by a panel of three experts. Modifications were carried out according to the panel judgment on clarity of the sentences and appropriateness of the contents. Reliability of the tool was established through test re-test method at a 15-day interval with a group of 32 teachers from primary and preparatory schools not participating in the study. Chronbach's alpha was applied for the reliability of the questionnaire and was found to be 0.84.

## **2.7. Pilot study:**

A pilot study was carried out on 10% of primary and preparatory teachers to assess clarity and applicability of the tool and estimate the time needed to fill each part. The necessary modification was done as revealed from the pilot study. The sample of the pilot study was excluded from the total sample to assure the stability of the result.

## **2.8. Ethical considerations:**

Necessary permission was obtained from directors of primary and preparatory schools after issuing letters to them from the Faculty of Nursing, Menoufia University explaining the aim of the study in order to obtain permission and help. Written informed consent was obtained from the participants who were willing to participate in the study. The participants were informed that participation in this study is voluntary; they can withdraw at any time during the study without giving reasons. The researchers were explained the aim of the study to all school teachers in the study sample. They reassured that any obtained information would be strictly confidential.

## **2.9. Data collection procedure:**

- Data collection for this study was carried out from the first of January 2015 to end of May 2015. Once permission was granted to conduct the study, the researchers were initiated collection.
- The data was collected from both groups (intervention group and control group) by using self administered questionnaire to evaluate school teachers' awareness about emergency management of dental trauma

- Before distributing the questionnaire the researchers introduced themselves and a brief explanation about the objective of the study was given to the teachers. Questionnaires were distributed to the selected teachers who agree to participate in the study. The researchers were presented during data collection to make any required clarifications about questionnaires to the subjects.
- The average time taken for completing questionnaires was around 20-25 minutes. After completion of the questionnaires, the researchers collect it and make sure that questionnaires were being filled fully.
- After collection of the data from both groups (pre test), the intervention was carried out in the schools of the study group, teachers were divided into groups; each group consisted of 6-10 teachers and attended two sessions and the duration of each session was 20- 30 minutes.
- First session which included, definition, causes, types of dental trauma, importance and difference between primary and permanent teeth.
- Second session which included information about immediate management first aid on three types of dental trauma especially crown fracture, displaced or moved and avulsion tooth, appropriate time for replacement of an avulsed tooth ideally, suitable method for holding the tooth, suitable storage medium for transferring an avulsed or fracture tooth to the dentist, proper cleaning technique for contaminated avulsed tooth before replantation.
- Each session followed by a summary of essential points. The teaching methods included lectures, group discussion while the teaching media included poster, computer slides and brochure. In the last session, teachers were given a guide booklet about emergency management first aid of dental trauma. This booklet was developed by the researchers after reviewing the related literature.
- At the end of intervention period (two months) post test was performed by using the same pretest questionnaire for intervention group and control group.

#### **2.10. Statistical analysis:**

Data were statistically analyzed by SPSS version 16. Student's t-test was used for parametric data. Mann-Whitney was used for non-parametric data. Chi-Squared ( $\chi^2$ ) was used for qualitative variables. P value <0.05 was considered significant.

### **III. Results**

**Table (1):** Reveals that the mean age of the studied groups was  $43.03 \pm 7.43$  years. More than half ( 58.4%) of the studied groups were females , half of studied groups (50.6) were from preparatory schools , three fourths ( 75.9 %) had university education, less than half (43.8 %) had 10- 20 years of experience as school teachers and majority of the studied groups (88.8% ) were from rural area and no statistically significant difference between the intervention group and the control group.

**Table (2):** Shows that forty five percent of the studied groups reported previous encounters students with dental trauma, and the most common type of dental trauma seen by school teachers was crown fracture followed by avulsion of teeth then displaced and soft tissue injuries teeth with no statistically significant difference between the intervention group and control group. Also, the majority (92.2 %) of school teachers' had not received any training about first aid of dental trauma and the majority (92.8 %) had not information about dental trauma with no statistically significant difference between the intervention group and the control group. Source of information about dental trauma among the studied groups were television and internet.

**Table (3):** Reveals that the majority (87.8%) of the school teachers were not satisfied with their level of knowledge about emergency management of dental trauma and most of them (96.9%) thought it is important for them to have an educational program in the dental trauma first aid and 89.7% would like to attend such program with no statistically significant difference between the intervention group and control group.

**Table (4):** Shows that at the pre intervention, the majority of the intervention group (81.5%) and control group (85.8%) had correctly response that the teeth eruption takes place two times in human life time with no statistically significant difference between both groups compared to post intervention, the most of the intervention group (94.0%) had correctly response versus 86.7% of control group and difference between both groups was statistically significant. Also, at pre intervention only 10.0% of the intervention group and control group correctly response that the age of onset of eruption of the permanent teeth was 6-7 years compared to post intervention, the most of the intervention group (81.0%) had correctly response versus 12.5% of control group and difference between both groups were statistically significant. Additionally, 80% of the intervention group and 81.7% of control group considered the primary teeth as important as permanent teeth at pre intervention compared to post intervention, the most of the intervention group (98 %) had correctly response versus 81.7% of control group and there was statistically significant difference between both groups.

**Figure (1):** Shows that at pre intervention, 64.5% of the intervention group and 60% of control group had fair general knowledge about dentition with no statistically significant difference between both groups

compared to post intervention, 73% of the intervention group had good knowledge versus 12.5% of the control group and difference between both groups was statistically significant.

**Table (5):** Shows that at pre intervention only 27% of intervention group and 26.7% of control group had correctly response that suitable site for holding a tooth was crown with no statistically significant difference between both groups compared to post intervention, the most of the intervention group (96.0%) had correctly response versus 27.5% of control group and there was statistically significant difference between both groups. Regarding immediate management of fractured tooth, at the pre intervention, 20.0% of the intervention group and 28.3% of control group had correctly response that immediate management of fractured tooth was save it in liquid medium and send immediately to the dentist to reattach it and no statistically significant difference between both groups compared to post intervention, the most of the intervention group (98.0%) had correctly response versus 28.3% of control group and there was statistically significant difference between both groups. Regarding immediate management of displaced tooth at the pre intervention, 28.0 % of the intervention group and 35 % of control group had correctly response that immediate management of displaced tooth was try to put back in the original place and no statistically significant difference between both groups compared to post intervention, the most of the intervention group (93.0%) had correctly response versus 34.2% of control group and there was statistically significant difference between both groups.

Regarding immediate management of avulsed permanent tooth at the pre intervention, 35.0% of the intervention group and 34.2 % of control group had correctly response that avulsed permanent teeth should be put back into original position and no statistically significant difference between both groups compared to post intervention, 99% of intervention group had correctly response versus 34.2% of control group and there was statistically significant difference between both groups.

Regarding immediate management of avulsed temporary tooth, at the pre intervention, 57.0% of intervention group and 58.3 % of control group had correctly response that avulsed temporary tooth should not put back into original position and no statistically significant difference between both groups compared to post intervention, 73.5% of intervention group had correctly response versus 58.3% of control group and there was statistically significant difference between both groups.

**Figure (2):** Shows that at pre intervention, only 13% of both groups had correctly response about proper time for replacement of an avulsed tooth ideally that should be immediately compared to post intervention, 83.0 % of intervention group had correctly response versus 13.3% of control group with statistically significant difference between both groups.

**Figure (3):** Illustrates that at pre intervention , only 17.5% of intervention group and 11.7% of control group had correctly response about proper cleaning technique for contaminated avulsed tooth before replantation should rinse with tap water briefly only if saline is unavailable and no statistically significant difference between both groups compared to post intervention, 81.0 % of intervention group had correctly response versus 12.5% of control group and there was statistically significant difference between both groups

**Table (6):** Reveals that at pre intervention the most of the intervention group and control group did not know suitable storage medium (cold fresh milk, saline and child saliva) for transferring an avulsed or fractured teeth to the dentist compared to post intervention the most of intervention group was selected cold fresh milk (98%) followed by saline (97%) then child saliva (89%) as suitable storage medium and difference between both groups was statistically significant.

**Figure (4):** Shows that at pre intervention the majority of the intervention group (86.0%) and control group (87.5%) had poor knowledge about emergency management of dental trauma with no statistically significant difference between both groups compared to post intervention, the most of the intervention group (95.0%) had good knowledge about emergency management of dental trauma and there was statistically significant difference between both groups (P<0.001).

**Table (1): Distribution of socio-demographic data of the studied groups (320).**

Socio-demographic data	Groups				Total (N=320)		Test	P-value
	Intervention (N=200)		Control (N=120)		No.	%		
<b>Age (Y)</b> Mean ±SD	43.63±7.39		42.03±7.41		43.03±7.43		t=1.86	0.063
<b>Sex :</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	$\chi^2=0.45$	0.501
Male	86	43.0	47	39.2	133	41.6		
Female	114	57.0	73	60.8	187	58.4		
<b>Place of work</b>							$\chi^2=2.43$	0.119
Primary school	92	46.0	66	55.0	158	49.4		
Preparatory school	108	54.0	54	45.0	162	50.6		
<b>Education</b>							$\chi^2=0.44$	0.800
Secondary	42	21.0	28	23.3	70	21.9		
University	153	76.5	90	75.0	243	75.9		

Post graduates	5	2.5	75	1.7	7	2.2		
<b>Years of experience</b>								
<10	22	11.0	22	18.3	43	13.7	$\chi^2=5.14$	0.162
10-20	85	42.5	55	45.8	140	43.8		
21-30	87	43.5	40	33.3	127	39.7		
>30	6	3.0	4	2.5	10	2.8		
<b>Residence</b>								
Rural	174	87.0	110	91.7	284	88.8	$\chi^2=1.63$	0.201
Urban	26	13.0	10	8.3	36	11.2		

Table (2): Distribution of previous experience and training of the studied groups about dental trauma (320).

Previous experience and training	Groups				Total (N=320)		Test	P-value
	Intervention (N=200)		Control (N=120)					
	No.	%	No.	%	No.	%		
<b>Meeting a student with dental trauma in school environment</b>								
Yes	95	47.5	49	40.8	144	45.0	$\chi^2=1.34$	0.246
No	105	52.5	71	59.2	176	55.0		
<b>Types of dental injury seen by teachers in past year</b>								
Avulsion	27	38.4	13	26.5	40	12.5	$\chi^2=8.15$	0.043
Fracture	35	36.8	10	20.4	45	14.1		
Displacement	14	14.7	6	12.2	20	6.2		
Soft tissue injury	19	20.1	20	40.9	39	12.2		
<b>Dental trauma training</b>								
Yes	21	10.5	4	3.3	25	7.8	$\chi^2=5.34$	0.021
No	179	89.5	116	96.7	295	92.2		
<b>Information about dental trauma first aid</b>								
Yes	13	6.5	10	8.3	23	7.2	$\chi^2=0.37$	0.539
No	187	93.5	110	91.7	297	92.8		
<b>Source of information</b>								
Television	9	69.2	4	40.0	13	56.5	$\chi^2=5.62$	0.131
Internet	1	7.7	0	0.0	1	4.3		
Dentist	3	23.1	3	30.0	6	26.1		
Internet	0	0.0	3	30.0	3	13.1		

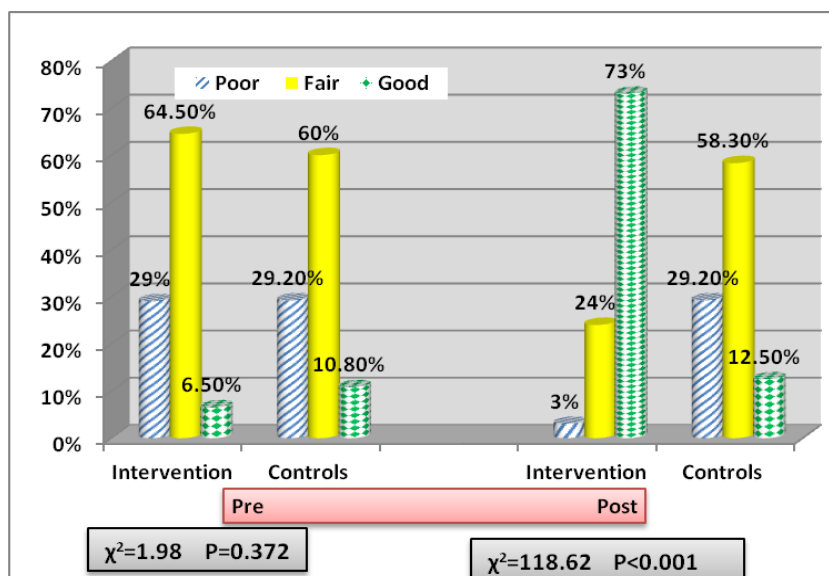
Table (3): Distribution of attitude of the studied groups on education program about immediate management of dental trauma (320).

Attitude of school teachers	Groups				Total (n=320)		Test	P-value
	Intervention (N=200)		Control (N=120)					
	No.	%	No.	%	No.	%		
<b>Are you satisfied with your knowledge on the management of dental trauma</b>								
Yes	20	10.0	19	15.8	39	12.2	$\chi^2=2.38$	0.123
No	180	90.0	101	84.2	281	87.8		
<b>Do you think it is important to have an educational program regarding management of dental trauma?</b>								
Yes	196	98.0	114	95.0	310	96.9	$\chi^2=2.23$	0.135
No	4	2.0	6	5.0	10	3.1		
<b>Would you like to attend an educational program on management of dental trauma?</b>								
Yes	182	91.0	105	87.5	287	89.7	$\chi^2=0.99$	0.319
No	18	9.0	15	12.5	33	10.3		

**Table (4): Distribution of general knowledge of the studied groups about dentition according to pre and post intervention (320).**

General knowledge about dentition	Pre				Test P value	Post				Test P value
	Intervention		Control			Intervention		Control		
	No.	%	No.	%		No.	%	No.	%	
<b>Times of teeth eruption in human life</b>										
Once	21	10.5	8	6.7	$\chi^2=1.80$ P=0.613	6	3.0	7	5.8	$\chi^2=14.1$ 2 P=0.003
*Twice	163	81.5	103	85.8		188	94.0	104	86.7	
Three	2	1.0	2	1.7		6	3.0	2	1.7	
Don't know	14	7.0	7	5.8		0	0.0	7	5.8	
<b>Age of permanent tooth eruption</b>										
*6-7 y	20	10.0	13	10.8	$\chi^2=6.59$ P=0.086	162	81.0	15	12.5	$\chi^2=157.$ 0 P<0.001
8-10 y	92	46.0	52	43.3		30	15.0	50	41.7	
11-12 y	51	25.5	20	16.7		8	4.0	20	16.7	
Don't know	37	18.5	35	29.2		0	0.0	35	29.1	
<b>Primary teeth are important as permanent</b>										
*Yes	160	80.0	98	81.7	$\chi^2=1.97$ P=0.373	194	97.0	98	81.7	$\chi^2=23.5$ 8 P<0.001
No	22	11.0	16	13.3		6	3.0	16	13.3	
Don't know	18	9.0	6	5.0		0	0.0	6	5.0	
<b>Mean total score</b>	1.73 ±0.63		1.80±0.64		Mann-Whitney 0.63 P=0.529	2.70 ±0.52	1.81±0.66		Mann-Whitney 10.87 P<0.001	

\* Right answer



**Figure (1): Distribution of general knowledge of the studied groups about dentition according to pre and post intervention (320).**

**Table (5): Distribution of suitable site for holding a tooth and immediate management of fractured, displaced and avulsed tooth among the studied groups (320).**

Immediate management of fractured, displaced and avulsed tooth	Pre-test				Test	Post-test				Test
	Intervention (N=200)		Control (N=120)			Intervention (N=200)		Control (N=120)		
	No.	%	No.	%		No.	%	No.	%	
<b>Suitable site for holding a tooth</b>										
* Crown	54	27.0	32	26.7	$\chi^2=3.02$ P=0.388	192	96.0	33	27.5	$\chi^2=169.28$ P<0.001
- Root	90	45.0	46	38.3		6	3.0	46	38.3	
-Crown or root	40	20.0	26	21.7		2	1.0	26	21.7	
Don't know	16	8.0	16	13.3		0	0.0	15	12.5	
<b>Immediate management</b>										



<b>of fractured tooth</b> - *Save it in liquid medium and send immediately to the dentist - Wrap it with gauze and send to the dentist - Discard it - Don't know	40	20.0	34	28.3	$\chi^2=3.50$ $P=0.321$	196	98.0	34	28.3	$\chi^2=184.18$ $P<0.001$
	20	10.0	10	8.3		4	2.0	10	8.3	
	70	35.0	42	35.0		0	0.0	42	35.0	
	70	35.0	34	28.3		0	0.0	34	28.3	
<b>Immediate management of displaced tooth</b> - Let it remains in new position - *Try to put back in the original place - Don't know	52	26.0	25	20.8	$\chi^2=2.08$ $P=0.352$	12	6.0	26	21.7	$\chi^2=113.40$ $P<0.001$
	56	28.0	42	35.0		186	93.0	41	34.2	
	92	46.0	53	44.2		2	1.0	53	44.2	
<b>Avulsed permanent teeth should be put back into original position</b> - *Yes - No - Don't know	70	35.0	41	34.2	$\chi^2=1.20$ $P=0.548$	198	99.0	41	34.2	$\chi^2=166.90$ $P<0.001$
	64	32.0	45	37.5		2	1.0	45	37.5	
	66	33.0	34	28.3		0	0.0	34	28.3	
<b>Avulsed temporary teeth should be put back into original position</b> - Yes *No - Don't know	24	12.0	21	17.5	$\chi^2=2.86$ $P=0.238$	53	26.5	19	17.5	$\chi^2=58.0$ $P<0.001$
	114	57.0	70	58.3		147	73.5	70	58.3	
	62	31.0	29	24.2		0	0.0	31	24.2	

\* Right answer

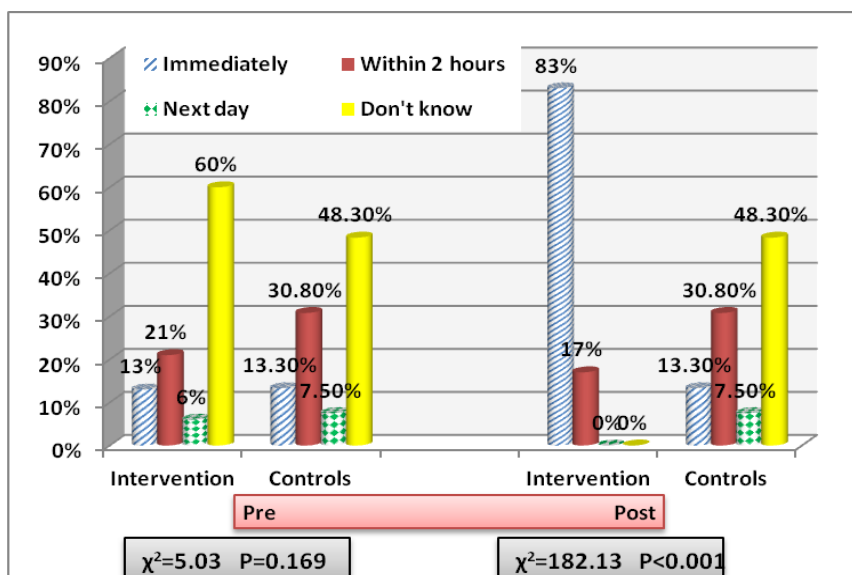


Figure (2): Appropriate time for replacement of an avulsed tooth ideally among the studied groups according to pre and post intervention (320).

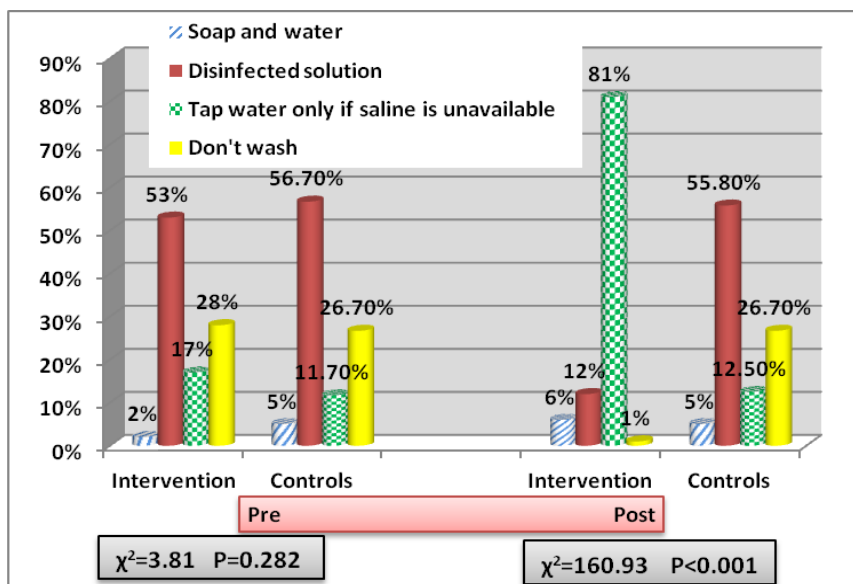
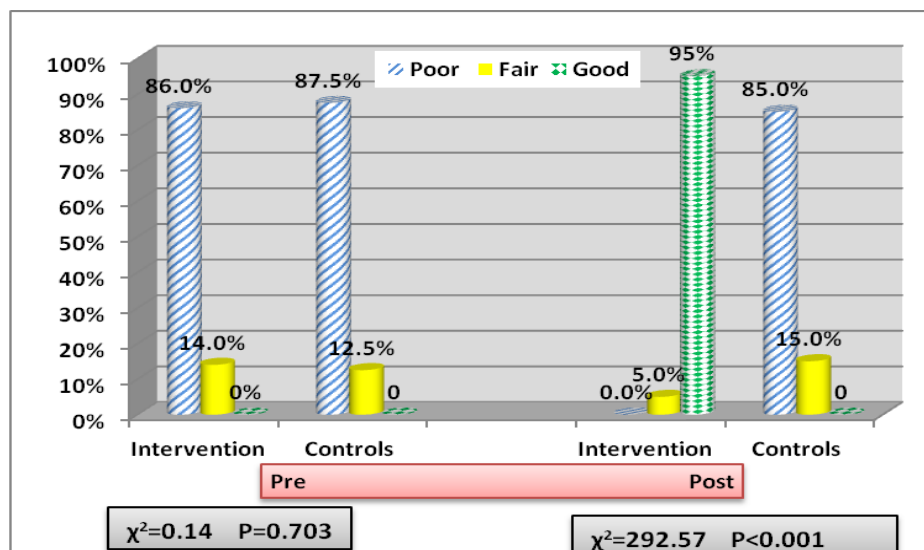


Figure (3): Proper cleaning technique for contaminated avulsed tooth before replantation among the studied groups according to pre and post intervention (320).

Table (6): Distribution of suitable storage transport medium among the studied groups according to pre and post intervention (320).

Storage transport medium	Pre				Test P value	Post				Test P value
	Intervention (N=200)		Control (N=120)			Intervention (N=200)		Control (N=120)		
	No.	%	No.	%		No.	%	No.	%	
<b>Ice</b>										
Yes	26	13.0	12	10.0	$\chi^2=3.46$ P=0.326	10	5.0	14	11.7	$\chi^2=135.31$ P<0.001
No	44	22.0	35	29.2		176	88.0	30	25.0	
Don't know	130	65.0	73	60.8		14	7.0	76	63.3	
<b>*Cold fresh milk</b>										
Yes	4	2.0	6	5.0	$\chi^2=2.32$ P=0.328	196	98.0	8	6.7	$\chi^2=270.78$ P<0.001
No	60	30.0	35	29.2		2	1.0	38	31.7	
Don't know	136	68.0	79	65.8		2	1.0	74	61.7	
<b>*Saline solution</b>										
Yes	38	19.0	24	20.0	$\chi^2=3.74$ P=0.155	194	97.0	21	17.5	$\chi^2=216.49$ P<0.001
No	18	9.0	19	15.8		4	2.0	21	17.5	
Don't know	144	72.0	77	64.2		2	1.0	78	65.0	
<b>*Child saliva</b>										
Yes	0	0.0	1	0.8	$\chi^2=2.11$ P=0.347	178	89.0	2	1.7	$\chi^2=256.66$ P<0.001
No	45	22.5	23	19.2		30	10.0	24	20.0	
Don't know	155	77.5	96	80.0		2	1.0	94	78.4	
<b>Cold water</b>										
Yes	2	1.0	4	3.3	$\chi^2=4.04$ P=0.132	0	0.0	3	2.5	$\chi^2=149.93$ P<0.001
No	46	23.0	35	29.2		190	95.0	37	30.8	
Don't know	152	76.0	81	67.5		10	5.0	80	66.7	
<b>Wrap in clean gauze or tissue paper</b>										
Yes	12	6.0	15	12.5	$\chi^2=4.35$ P=0.113	0	0.0	13	10.8	$\chi^2=214.94$ P<0.001
No	28	14.0	18	15.0		192	96.0	19	15.8	
Don't know	160	80.0	87	72.5		8	4.0	88	73.3	
<b>Antiseptic solution</b>										
Yes	44	22.0	36	30.0	$\chi^2=3.07$ P=0.215	8	4.0	34	28.3	$\chi^2=195.38$ P<0.001
No	28	14.0	12	10.0		184	92.0	17	14.2	
Don't know	128	64.0	72	60.0		8	4.0	69	57.5	

\* Right answer



**Figure (4): Distribution of knowledge of the studied groups about emergency management of dental trauma according to pre and post intervention (320).**

#### IV. Discussion

Appropriate management is very much important for the future prognosis of teeth affected by dental trauma, especially in young children. Those most likely to be involved at the site of a dental trauma are school aged children and school teachers, so building teacher awareness about emergency management of dental trauma fundamental to the provision of correct care to an injured children (Bayrak et al., 2012).

The present study showed that forty five percent of school teachers had reported previous encounters students with dental trauma with no statistically significant difference between the intervention group and control group. This result was in agreement with Mesgarzadeh et al., (2009) who assessed elementary school staff knowledge and attitude with regard to first-aid management of dental trauma in Iran. They reported that forty seven percent of participants had experienced close encounters students with dental trauma. Additionally, Pithon et al., (2014) who assessed the level of knowledge of primary school teachers in the public school of Northeastern Brazil with respect to management of dental trauma. They reported that fifty three percent of school teachers had experienced previous dental trauma among children. In a study conducted by Raouf et al., (2012) who assessed elementary school staff knowledge and attitude with regard to first-aid management of dental trauma in Iran. They showed that sixty one percent of the primary school teachers in Kerman reported exposure to dental trauma. Furthermore, Raouf et al., (2014) who evaluated the short- and long-term effects of an educational intervention on teachers' awareness regarding dental trauma first aid. They revealed that the majority of participants reported personally having witnessed a traumatic dental injury. Also, Sharifi et al., (2014) who evaluated knowledge of primary school teachers about the management of dental trauma in Kermanshah. They reported seventy one percent of the teachers had exposure to dental trauma at least once. Besides Ghadimi et al., (2014) who revealed seventy two percent of participants reported previous close encounters students with dental trauma. Differences observed could be related to the difference of the performed sampling procedures.

The present study revealed that the most common type of dental trauma seen by teachers was crown fracture followed by avulsion of teeth then displaced teeth with no statistically significant difference between the intervention group and control group. This result was supported by Prasad et al., (2014) who assessed prevalence of traumatic dental injuries among school children in Farukhnagar, District Gurgaon. They revealed that the most common type of traumatic dental injuries was fracture. Additionally, Freire et al., (2014) who assessed the association of traumatic dental injuries with individual, socio-demographic and school-related factors among 12-year-old schoolchildren in Midwest Brazil. They reported the same result.

As regard to dental trauma training first aid, the current study found that most of school teachers' had not received any training about first aid of dental trauma with no statistically significant difference between both groups. It is important to educate the public on the necessary emergency procedures in different situation in order to improve the prognosis of any potential injury. This result was supported by Raouf et al., (2014) who evaluated the short- and long-term effects of an educational intervention on teachers' awareness regarding dental trauma first aid. They revealed that eighty one percent did not have any formal training in dental trauma emergency management. Additionally, Young et al., (2014) who investigated Hong Kong secondary school students' knowledge about emergency management of dental trauma. They found only three percent of the whole sample had learned about management of dental injury in the training program. Moreover, Pithon et al., (2014) who assessed Brazilian primary school teachers' knowledge about immediate management of dental trauma. They found that no training program on how to deal with emergency situations about dental trauma. Also, Hashim (2011) who evaluated dental trauma management awareness among primary school teachers in the Emirate of Ajman, United Arab Emirates. He found that most of teachers had not training about first aid of dental trauma. Furthermore; Shamarao et al., (2014) who assessed the knowledge and attitude of school teachers in rural India with regard to immediate management of avulsed teeth. They found only fourteen percent of the total school teachers responded to have attended a dental education program and having received training regarding dental first aid.

Regarding to information on dental trauma first aid, the results of the current study revealed that most of school teachers' had not information about dental trauma and there was no statistically significant difference between both groups. This result was supported by Pithon et al., (2014) who assessed the level of knowledge of primary school teachers in the public school of Northeastern Brazil about management of dental trauma. They revealed that eighty six percent of school teachers' had not information about dental trauma during academic education and first aid. Another study conducted by Young et al., (2014) who investigated Hong Kong secondary school students' knowledge about emergency management of dental trauma. They showed that about thirty percent of the respondents had acquired information about dental injury management from other sources besides from first-aid training program. Furthermore, Sharifi et al., (2014) who evaluated knowledge of primary school teachers about the management of dental trauma in Kermanshah. They revealed approximately eighty percent of the teachers had information about dental trauma, thirty six percent of them acquired this knowledge through the training course, twenty nine percent via newspaper and thirty five percent via radio or television. Attitude of schools teachers on education program about immediate management of dental trauma, the present study showed that the majority of the school teachers were not satisfied with their level of knowledge about emergency management of dental trauma and most of them thought it is important for them to have an educational program in the dental trauma first aid and would like to attend such program with no statistically significant difference between the intervention group and control group. This result was supported by Krishnan & Joseph, (2014) who evaluated the knowledge and attitude to emergency management of dental trauma among a group of school teachers in Pondicherry, India. They reported that around ninety four percent were not satisfied with their level of knowledge in management of dental trauma. Moreover, Hashim, (2011) who assessed the level of knowledge of primary schools teachers in the Emirate of Ajman with regards to the immediate emergency management of dental trauma. He showed that most teachers were unsatisfied with their level of knowledge for dental trauma and the majority was interested in having further education on the topic. Likewise, Namdev et al., (2014) who evaluated awareness level of a sample of Indian parents in the management of dental trauma. They reported ninety two percent of parents felt that it is important to have an educational program in management of dental trauma and ninety three percent of parents were not satisfied with their knowledge on the management of dental trauma and ninety five percent of parents would like to attend an educational program on management of dental trauma. Furthermore, Antunes et al., (2015) who assessed knowledge and behaviors in group of Brazilian primary school teachers about dental trauma. They reported ninety four percent of school teachers like to learn about dental trauma. Additionally, Anjum et al., (2014) who assessed knowledge and attitude of primary school teachers in Vikarabad town regard emergency management of dental trauma. They found that majority of school teachers were eager to have knowledge regarding dental trauma through continues dental education programs and workshops. Furthermore, Pujita et al., (2013) who assessed awareness of school teachers concerning the emergency management of traumatized teeth. They reported most of the teachers in the urban and rural area were unsatisfied initially with the knowledge they had in managing dental trauma.

Concerning general knowledge of the studied groups about dentition, the present study revealed that at the pre intervention, eighty one percent of the intervention group and eighty five percent of control group had correctly response that the teeth eruption takes place two times in human life time compared to post intervention, ninety four percent of the intervention group had correctly response versus eighty six percent of control group and difference between both groups was statistically significant. This result was in accordance with the study done in India. by Sai Sankar et al., (2013) found more than three fourths of the school teachers

know that the teeth eruption takes place two times in human life time. Additionally, Chaudhary et al., (2011) who assessed impact of teaching on dental knowledge in fifth standard of primary school children of south Delhi. They found in the pre- education assessment seventy two percent of children having knowledge that tooth eruption take place twice in a life while after giving dental health education, all the children knew about eruption of the teeth.

Also, the present study found that at pre intervention only ten percent of the intervention group and control group had correctly response that the age of onset of eruption of the permanent teeth was 6-7 years compared to post intervention, eighty one percent of the intervention group had correctly response versus twelve percent of control group and difference between both groups was statistically significant. This result was supported by Sai Sankar et al., (2013) found thirteen percent of teachers could answer correctly the age of onset of eruption of the permanent teeth and these results were similar to the study done by Subramaniam et al., (2011).

Additionally, the present study revealed that eighty percent of the intervention group and eighty one percent of control group considered the primary teeth as important as permanent teeth at pre intervention compared to post intervention, ninety eight percent of the intervention group had correctly response versus eighty one percent of control group and difference between both groups was statistically significant. In contrast, another study conducted in India by Sai Sankar et al., (2013) found only three percent of the study population considered the primary teeth as important as permanent teeth and rest of them does not give much importance to the primary dentition thinking that these teeth will be ultimately replaced by the permanent teeth. The difference may be related to studied sample and socio demographic characteristics.

The present study revealed that less than two thirds of both groups had fair general knowledge about dentition at pre intervention compared to post intervention, seventy three percent of the intervention group had good general knowledge versus twelve percent of control group and difference between both groups was statistically significant. In contrast, another study conducted in India by Sai Sankar et al., (2013) revealed that the majority of teachers had poor knowledge about dentition. The difference may be related to variation in educational level of the studied sample.

Regarding to immediate management of fracture, displaced and permanent avulsed tooth, the present study showed that the majority of both groups at pre intervention did not know immediate management of fracture, displaced and permanent avulsed tooth compared to post intervention, the most of the intervention group had a higher correct knowledge about immediate management of fracture tooth (save it in liquid medium and send immediately to the dentist), displaced tooth (try to put back in the original place) and permanent avulsed tooth (should be put back into original position) than control group with statistically significant difference between both groups. This result was in agreement with Francisco et al., (2015) reported that only 15% correctly answered that they would replant the avulsed tooth and then referred to the dentist. Additionally, Karande et al.,(2012) revealed that after the lecture there was marked improvement in the level of knowledge about taking fracture fragment to the dentist to reattach it compared to twenty six percent before the lecture and seventy four percent who felt there was no need to keep the fracture fragment which decrease to four percent after the lecture. Also, showed that there was change in the level of knowledge of the teachers from sixteen percent before the lecture to ninety five percent after the lecture regarding replantation of permanent tooth. Moreover, Young et al., (2012) showed that only thirty two percent of the respondents possessed the knowledge of how to correctly manage fractured teeth. Only twenty three percent knew how to manage displaced teeth, and sixteen percent knew that permanent teeth should be replanted.

As regard to temporary teeth, the present study showed that more than half both groups had correctly response that avulsed temporary tooth should not be put back into original position compared to post intervention, the most of intervention group had correctly response and there was statistically significant difference between both groups. Similarly, Young et al.,(2012) revealed that three fourths of teachers had correctly answered that avulsed primary teeth should not be replanted to the original position

Regarding to immediate management of permanent tooth, permanent tooth that has been completely avulsed requires prompt and effective management and should be reinserted into its socket. This can be done by all individuals. If the avulsed tooth can be located, it is best to immediately replant it at the accident site. The time limit for immediate replantation varies, ranging from 5 to 30 min; ideally the recommended time limit is 20 minutes or less (Ali et al., 2013). According to Ghadimi et al., (2014) reported that appropriate replantation of an avulsed tooth a 90% chance of success has been reported if done within 30 minutes; however, after two hours, the chance of success decreases to 5%. The present study revealed that at pre intervention, only thirteen percent of both groups had correctly response about proper time for replacement of an avulsed tooth should be immediately compared to post intervention, eighty three percent of intervention group had correctly response with statistically significant difference between both groups. This finding was supported by Reddy et al., (2015) who showed opinion among the participants regarding the ideal time for implanting the tooth with twenty one percent of respondents said it should be done immediately, eight percent within 30 minute, twenty

percent within few hours and the rest said it can be done the next day. Additionally, Karande et al., (2012) showed that eighty six percent of the teachers in Pune City did not know the ideal storage period before the lecture which changed after the lecture to eighty eight percent of the teachers who felt that replantation should be carried out within 15 minutes of the injury. On the other hand, another study conducted by Ghadimi et al., (2014) who assessed effect of using an educational poster on elementary school health teachers' knowledge about emergency management of traumatic dental injuries. They revealed that before intervention, seventy percent of health teachers in the test group answered correctly appropriate time for referring a student with an avulsed tooth, while after intervention there was an improvement in knowledge in the test group, but the increase was not significant. This finding may be due to awareness of health teachers of the need for immediate dental treatment for serious dental injuries like avulsion before distribution of the educational poster.

Concerning proper cleaning technique for contaminated avulsed tooth before replantation, the present finding revealed that at pre intervention, only seventeen percent of intervention group and eleven percent of control group had correctly response about proper cleaning technique for contaminated avulsed tooth that should rinse with tap water briefly only if saline is unavailable compared to post intervention, eighty one percent of intervention group had correctly response and there was significant difference between both groups. This finding was in accordance with Reddy et al., (2015) who showed that fifty percent of respondents did not know what to do if the knocked tooth was covered with dirt; twenty four percent said they would rinse it with tap water. In contrast with the study done by Jyothsn, (2012) reported that majority of subjects considered sterile saline for cleaning teeth. Moreover, Anjum et al., (2014) showed that thirty two percent of teachers were cleaning the avulsed teeth with the tap water and twenty four percent of them were unaware of management of avulsed teeth. Additionally, Ghadimi et al., (2014) who showed that forty percent of school health teachers' in the test group answered correctly proper action when the avulsed tooth is found on the ground while after intervention ninety percent in the test group answered correctly.

The prognosis of avulsion depends upon immediate and appropriate replantation of the avulsed tooth in the socket or rapid transportation of the child and the tooth in proper storage media to a dentist. The suitable storage media to allow periodontal and pulp healing are milk, physiological saline, and saliva. Cold milk serves as an appropriate medium for avulsed teeth for up to 3 h, because of its optimum osmolarity and pH composition which are physiologically compatible with the vitality of periodontal ligament cells present on the root, whereas physiological saline remains effective for only 30 min. Storage in tap water should be considered the last option as its hypotency may result in necrosis of the cells in the periodontal membrane, whereas storage in saliva may cause infection of the periodontal membrane, however, only saliva is always available for storage purposes at the site of the accident (Mesgarzadeh, 2009).

The present study revealed that at pre intervention, the most of the intervention group and control group did not know suitable storage medium (cold fresh milk, saline and child saliva) for transferring an avulsed or fractured teeth to the dentist compared to post intervention, the most of intervention group was selected cold fresh milk followed by saline then child saliva as suitable storage medium and difference between both groups was statistically significant. This finding was in accordance with Reddy et al., (2015) who showed that majority of respondents in India did not know how to maintain the avulsed tooth till they reach the dentist and the respondents mentioned use of different liquids as storage media to preserve the avulsed tooth. Sixteen percent said they would use tap water, twelve percent ice, eleven percent select cotton, six percent antiseptic solution, and only five percent said they would use milk and persons own mouth for transport of tooth. This could be attributed to inadequate knowledge regarding suitable medium for transport of an avulsed tooth. Additionally, Zakirulla et al., (2011) who assessed knowledge and attitude of Saudi Arabian school teachers with regards to emergency management of dental trauma. They found that the majority of teachers choose tap water as storage media and only twenty eight percent select milk. In contrast, Singh et al., (2015) who evaluated knowledge and attitude of school teachers about emergency management of traumatic dental injury. They reported that eighty seven percent of teachers gave the correct answer regarding storage medium. Another study conducted by Ghadimi et al., (2014) revealed that before distribution of the educational poster, fifty percent of participating health teachers in the control group and fifty six percent in the test group preferred milk and saline as storage media for transferring an avulsed tooth. While after intervention hundred percent of health teachers selected milk and saline as suitable storage media. The difference may be related to the studied sample characteristics and educational program about emergency management of dental trauma that conducted in other countries.

Regarding to knowledge of the studied groups about emergency management of dental trauma, The present result revealed that at pre intervention, the majority of the intervention group and control group had poor knowledge about emergency management of dental trauma with no statistically significant difference between both groups compared to post intervention, the most of the intervention group had good knowledge and difference between both groups was statistically significant. This finding was in agreement with Zakirulla et al., (2011) who revealed that majority of school staff in Saudi Arabia had little knowledge related to handling of traumatic dental injuries and emergency management of avulsed permanent teeth in school children.

Additionally, Ahluwalia et al., (2015) revealed that overall knowledge regarding the emergency management of avulsed tooth was low in school teachers of Patiala district. Moreover, Anjum et al., (2014) concluded that the primary school teachers in Vikarabad town had little and poor knowledge of emergency management of dental trauma. Additionally, Karande et al.,(2012) who assessed awareness of school teachers regarding prevention and emergency management of dental traumatic injuries in school children in pune city before and after dental educational program. They reported that there was a marked improvement in level of knowledge at post intervention as compared to pre intervention. Similarly, Ghadimi et al., (2014) revealed that health teachers had a low level of knowledge about traumatic dental injuries management and the use of an educational poster improved the knowledge of health teachers.

## V. Conclusion

**Based on the results of this study and research hypothesis, it was concluded that:**

Majority of school teachers of the studied sample had poor awareness about emergency management of dental trauma before intervention and no statistically significant difference between both groups. After intervention, there was significant improvement in the knowledge and awareness of teachers about emergency management of dental trauma in the intervention group compared to the control group.

## VI. Recommendations

**Based on the findings of this study, the following recommendations were suggested:**

- The ministry of health in collaboration with the ministry of education must hold in-service training program for the teachers to enhance their awareness about emergency management of dental trauma.
- Developing and establishing educational programs by health care providers for children, parents, and teachers concerning the importance of early management for dental trauma, ways of preventing traumas, and procedures for appropriate emergency management.

## References

- [1]. Abdellatif, A.M., & Hegazy, S.A. (2011). Knowledge of emergency management of avulsed teeth among a sample of Egyptian parents. *J Adv Res*, 2, 157-162.
- [2]. Ahluwalia, P., Pannu, P., Kalra, S., Kaur, A., Behl, D., & Gambhir, R.S. (2015). Assessment of knowledge and attitudes of school teachers regarding emergency management of an avulsed permanent tooth. *Saint Int Dent J*, 1, 16-21.
- [3]. Al-Bajjali, T.T., & Rajab, L.D. (2014). Traumatic dental injuries among 12-year-old Jordanian schoolchildren: an investigation on obesity and other risk factors. *Al-Bajjali and Rajab BMC Oral Health*, 14,101 Page 2 of 7.
- [4]. Aldrigui, J.M., Abanto, J., Carvalho, T.S., Mendes, F.M., Wanderley, M.T., Bönecker, M., & Raggio, D.P. (2011). Impact of traumatic dental injuries on quality of life of young children. *Health Qual. Life Outcomes*, 24, 78. doi: 10.1186/1477-7525-9-78.
- [5]. Ali, F.M., Bhushan, p., Khan, M., & Ustad, F. (2013). Attitude and knowledge tooth avulsion among sports teachers. *Reviews of progress*, Vol 1 , ISSUE 3, May 15 ISSN: 2321-3485
- [6]. Andersson, L. (2013). Epidemiology of traumatic dental injuries. *J Endod*, 39, 2-5.
- [7]. Anjum, M., Reddy, P., Monica, M., Yadav, K., Abbas, I., & Reddy, A. (2014). Knowledge and attitude of primary school teachers in emergency management of dental trauma: A cross sectional study. *Webmed Central DENTISTRY*, 5(10):WMC004735.
- [8]. Antunes, A. A., Pretti, R. T., Lima, L. F., Salgado, V. E., Almeida, M. H., & Antunes, L. S. (2015). Traumatic dental injury in primary teeth: Knowledge and management in Brazilian preschool teachers. *Journal of Dent. orl Hyg*, 7(2), pp.9-15.
- [9]. Bayrak, S., Tunc, E.S., Sari, E. (2012). Evaluation of elementary school teachers' knowledge and attitudes about immediate emergency management of traumatic dental injuries. *Oral Health Prev Dent*, 10, 253-258.
- [10]. Bendo C.B., Paiva, S.M., Varni, J.W., Vale, M.P. (2014). Oral health-related quality of life and traumatic dental injuries in Brazilian adolescents. *Community Dent Oral Epidemiol*, 42,216-223.
- [11]. Chaudhary, F., Khayyam, K.U., Siddiqui, M.J., Anjum, R., & Muzammil, S. (2011). Impact of teaching on dental knowledge in fifth standard of MCD primary school children of south Delhi. *Journal of Applied Pharmaceutical Science*, 1(7), 91-93.
- [12]. Choi, D., Yeroshalmi, F., Dougherty, N. J. (2012). Dental trauma management by New York City school nurses. *Journal of Dentistry for Children*, 79(2):74-8.
- [13]. Dua, R., & Sharma, S. (2012). Prevalence, causes, and correlates of traumatic dental injuries among seven-to-twelve-year-old school children in Dera Bassi. *Contemp Clin Dent*, 3, 38-41.
- [14]. Faus-Damiá, M., Alegre-Domingo, T., Faus-Matoses, I., Faus-Matoses, V., & Faus- Llácer, V.J. (2011). Traumatic dental injuries among schoolchildren in Valencia, Spain. *Med Oral Patol Oral Cir Bucal*, 16(2), e292-5.
- [15]. Francisco, S.S., Soares, A.J., & Murrer1, R.D. (2015). Evaluation of elementary education teachers' knowledge on avulsion and tooth replantation. *RSBO*, 12(1), 32-40.
- [16]. Freire, M. C.M., Vasconcelos, D. N., Vieira, A., Araújo, J. Moreira , R., & Nunes , M. ( 2014). Association of traumatic dental injuries with individual, sociodemographic and school related factors among schoolchildren in Midwest Brazil. *Int. J. Environ. Res. Public Health*, 11, 9885-9896;
- [17]. Ghadimi, S., Seraj, B., Keshavarz , H., Shamshiri, A.R. and Abiri , R. (2014). The effect of using an educational poster on elementary school health teachers' knowledge of emergency management of traumatic dental injuries. *J Dent*, 11(6), 620-628.
- [18]. Glendor, U. (2008). Epidemiology of traumatic dental injuries—a 12 year review of the literature. *Dent Traumatol* 24, 603-611.
- [19]. Glendor, U. (2009). Aetiology and risk factors related to traumatic dental injuries- a review of the literature. *Dent Traumatol*, 25(1), 19-31.
- [20]. Hashim, R. (2011). Dental trauma management awareness among primary school teachers in the Emirate of Ajman, United Arab Emirates. *Eur J Paediatr Dent*, 12, 99-102.

- [21]. Jyothsna, V.S. (2012). Knocked-out tooth: Knowledge and attitudes of. *Journal of Dental Sciences and Research*, 3( 3), 9-16.
- [22]. Karande, N., Shah, P., Bhatia, M., Lakad, L., & Bhalla, M. (2012). Assessment of awareness amongst school teachers regarding prevention and emergency management of dental traumatic injuries in school children in Pany City, before and three months after dental educational program.. *Journal of contemporary dental practice* 13(6), 873-877.
- [23]. Krishnan, B., & Joseph, J. (2014). Knowledge of basic dental physiology among teachers can improve preliminary management of acute dental avulsion in school children. *Int J Clin Exp Physiol*, 1, 63-7.
- [24]. Kumar, A., Bansal, V., Veerasha, K.L., & Sogi, G.M. (2011). Prevalence of traumatic dental injuries among 12- to 15-year-old schoolchildren in Ambala district, Haryana, India. *Oral Health Prev Dent*, 9, 301-5.
- [25]. Lieger, O. Graf, C., El-Maaytah, M., & Von Arx, T. (2009). Impact of educational posters on the lay knowledge of school teachers regarding emergency management of dental injuries. *Dent Traumatol*, 25, 406-12.
- [26]. Marchiori, E.C., Santos, S.E., Asprino, L., Moraes, M., & Moreira, R.W. (2013). Occurrence of dental avulsion and associated injuries in patients with facial trauma over a 9-year period. *Oral Maxillofac Surg*, 17(2), 119-26.
- [27]. McIntyre, J.D., Lee, J.Y., Trope, M., & VannWF, J.R. (2008). Effectiveness of dental trauma education for elementary school staff. *Dent Traumatol Journal*, 24(2), 146-50.
- [28]. Mesgarzadeh, A.H., Shahamfar, M., & Hefzolle-san, A. (2009). Elementary school staff knowledge and attitude with regard to first-aid management of dental trauma in Iran: a basic premise for developing future intervention. *Oral Health Prev Dent*, 7(3), 297-308.
- [29]. Namdev, R., Jindal, A., Bhargava, S., Bakshi, L., Verma, R., & Beniwal, D. (2014). Awareness of emergency management of dental trauma. *Contemp Clin Dent*, 5, 507-13.
- [30]. Ozer, S., Ipek, Yilmaz, E., Bayrak, S., & Sen Tunc, E. (2012). Parental knowledge and attitudes regarding the emergency treatment of avulsed permanent teeth. *Eur J Dent*, 6, 370-5.
- [31]. Pithon, M.M., Lacerda-Santos, R., Magalhães, P.H.B., & Coqueiro, R.S. (2014). Brazilian primary school teachers' knowledge about immediate management of dental trauma. *Dental Press J Orthod*, 19(5), 110-5 .
- [32]. Prasad, S., Tandon, S., Pahuja, M., & Wadhawan, A. (2014). Prevalence of traumatic dental injuries among school going children in Farukhnagar, District Gurgaon. *International Journal of Scientific Study*, 2(1).
- [33]. Prasanna, S., Giriraju, A., & Narayan, N.L. (2011). Knowledge and attitude of primary school teachers with toward tooth avulsion and dental first aid in Davangere City: cross sectional survey. *International journal of clinical pediatric Dentistry*, 4(3), 203- 206.
- [34]. Pujita, C., Nuvvula, S., Shilpa, G., Nirmala, S., & Yamini, V. (2013). Informative promotional outcome on school teachers' knowledge about emergency management of dental trauma. *J Conserv Dent*, 16(1), 21-27.
- [35]. Quaranta, A. De Giglio, O. Coretti, C. Vaccaro, S. Barbuti, G., & Strohmenger, L. (2014). What do parents know about dental trauma among school-age children? A pilot study. *Ann Ig*, 26, 443-446
- [36]. Raoof, M., Shokouhinejad, N., Izadi, A., Nourzadeh, M., Afkham, A., & Forghani, F.R. (2014). Long-term effect of an educational intervention regarding dental trauma first aid: A phase II study. *Dent Traumatol*, 30, 296-301.
- [37]. Raoof, M., Zaherara, F., Shokouhinejad, N., & Mohammadalizadeh, S. (2012). Elementary school staff knowledge and attitude with regard to first-aid management of dental trauma in Iran: A basic premise for developing future intervention. *Dent Traumatol*, 28(6), 441-447.
- [38]. Reddy, M. P., Mamtha, B., Waghay, S., Lavanya, R., Kumar, B., & Babu, D.B. (2015). Knowledge and awareness on emergency management of avulsed tooth among patients attending a dental College, India. *J Res Adv Dent*, 4, 1s, 133-140.
- [39]. Sai Sankar, A. J. , Sreedevi, E. , Suresh Babu, M. , Naveen, V. , & Rajavardhan, K. (2013 ). School teacher's knowledge regarding dental health. *Indian Journal of Dental Sciences*, Issue,2, Vol.:5.
- [40]. Shamarao, S., Jain, J., Ajagannanavar, S.L., Haridas, R., Tikare, S., & Kalappa, A.A. (2014). Knowledge and attitude regarding management of tooth avulsion injuries among school teachers in rural India. *J Int Soc Prevent Communit Dent*, 4, S44-8.
- [41]. Sharifi, R., Mohtadzadeh, A., Nourbakhsh, R., & Razavi Satvati, S.A. (2014). Knowledge of primary school teachers about the management of dental trauma in Kermanshah, 2012. *Educ Res Med Sci*, 2(3), 28-30.
- [42]. Singh, M., Ingle, N.A., Kaur, N., Yadav, P. (2015). Evaluation of knowledge and attitude of school teachers about emergency management of traumatic dental injury. *J Int Soc Prevent Communit Dent*, 5(2), 108-113.
- [43]. Skeie, M.S., Evjensvold, T., Hoff, T., & Asgeir, B. (2014). Traumatic dental injuries as reported during school hours in Bergen. *Dental Traumatology*; doi: 10.1111/edt.12146 Published by John Wiley & Sons Ltd.
- [44]. Subramniam, R., Mitta, I. S., Hiregoudar, M., Mohandas, U., Sakeenabi, B., & Prasanth, G.M. (2011). Knowledge of upper primary and secondary school physical education instructors in Avangere City, India, about emergency management of dental trauma. *J Educ Ethics Dent*, 1, 18-23.
- [45]. Taiwo, O.O., & Jalo, H.P. (2011). Dental Injuries in 12-year old Nigerian students. *Dent Traumatol*, 27, 230-4.
- [46]. Togoo, R.A., Yaseen, S.M., Al-Shehri, D.A., Al-Ghamdi, A.S., Ali Al-Hafed, M.S., & Meer, A. ( 2011). Knowledge and attitude of Saudi Arabian school teachers with regards to emergency management of dental trauma. *Int Journal Clin Dent Sci*, 2(2), 25-29.
- [47]. Traebert, J., Lacerda, J.T., Foster Page, L.A., Thomson, W. M., & Bortoluzzi, M. C. (2012). Impact of traumatic dental injuries on the quality of life of schoolchildren. *Dental Traumatology*. doi: 10.1111/j.1600-9657.2012.01114.x
- [48]. Young, C., Wong, K.Y., Cheung, L.K. (2012). Knowledge about emergency management of dental trauma of primary and secondary teachers in Hong Kong. *Hong Kong Med J*, 18 (5) , October 2012 ,www.hkmj.org
- [49]. Young, C., Wong, K.Y., & Cheung, L.K. (2014). A survey on Hong Kong Secondary school students' knowledge of emergency management of dental trauma. *PLoS ONE* 9(1): e84406. doi:10.1371/journal.pone.0084406
- [50]. Young, C., Wong, K.Y., & Cheung, L.K. (2014). Effectiveness of educational poster on knowledge of emergency management of dental trauma - Part 2: Cluster randomised controlled trial for secondary school students. *PLoS ONE* 9(8), e101972. doi:10.1371/journal.pone.0101972
- [51]. Zakirulla, M., Togoo, R.A., Yaseen, S.M., Al-Shehri, D.A., Al-Ghamdi, A.S., & Al-Hafed, M.S. (2011). Knowledge and attitude of Saudi Arabian school teachers with regards to emergency management of dental trauma. *Int J Clin Dent Sci*, 2(2), 25-29.