



EFFECTIVENESS OF DENTAL TRAUMATIC INJURIES' EDUCATIONAL MESSAGE ON SCHOOL TEACHERS IN BEIRUT-CLUSTER RANDOMIZED FIELD TRIAL

Carolina W. Yordi*, Sherine B.Y. Badr** and Mohamed Shokry***

ABSTRACT

Introduction: School teachers are most likely to be involved at the site of the injuries, making their knowledge of emergency management fundamental to the provision of an appropriate care to children and adolescents.

Aim of the study: To assess the effectiveness of educational message on the knowledge and practice of school teachers regarding dental trauma.

Materials and Methods: Cluster Randomized Controlled Trial. Schools of Beirut were divided into three categories (public, semi private and private). Two-hundred teachers of each category were selected randomly and divided into "Test and Control group". An educational message, using power point presentation, brochures and posters, was implemented to teachers in test group. Immediate and long term assessment were performed to evaluate the effect of the educational program.

Results: Immediately after the implementation of the educational message, there was a significant improvement in the knowledge and practice of teachers of the test group, persisting approximately the same six months later.

Conclusion: The implementation of a dental health educational program using more than one modality, proved to be effective in improving the knowledge of school teachers who are the first individuals to face dental trauma in schools.

KEY WORDS: Dental trauma, Tooth injuries, School teachers, Knowledge, Educational tools.

* BDS, Department of Pediatric Dentistry, Faculty of Dentistry, Beirut Arab University, Lebanon.

** BDS, MSc, PhD, DPHE, Associate Professor of Pediatric Dentistry, Faculty of Dentistry, Beirut Arab University, Lebanon, Faculty of Oral and Dental Medicine, Cairo University, Egypt.

*** BDS, MSc, PhD, Maxillofacial Surgery, Faculty of Dentistry, Beirut Arab University, Lebanon, Lecturer of Oral and Maxillofacial Surgery, Faculty of Dentistry, Alexandria University, Egypt.

INTRODUCTION

Oral and dental health education must evolve to promote organized community efforts to prevent and control disease prevalence. All dental professionals will require continued updating of knowledge and practice, in order to create supportive environments, strengthen community action, develop personal skills and re-orientate health services in the pursuit of oral health goals ⁽¹⁾, such as the provision of preventive programs delivered in a variety of settings.

According to the World Health Organization, one of the serious public health problems among children and adolescents throughout the world are DTI and can vary from minor enamel fractures to extensive maxillofacial damage involving the supporting structures and displacement or avulsion of teeth having significant functional, esthetic, and psychological negative effects on children^(2,3). Treatment in such cases can be complicated, expensive and sometimes lengthy ^(2,4-6).

The prevalence rates of 5–12% were found in children aged 6–12 years in the Middle East and also in young children with less than three years of age, due to their immature motor coordination, being more predisposed to falls. Other studies reported that more than 20% of all school children experienced dental trauma, with most of these injuries occurring before age nineteen^(5,7,8). Studies from Brazil showed that the prevalence of dental trauma in preschool is about 40% and in school it varies from 7.8% to 35.8% ⁽⁹⁾. Some studies assert that the number of cases with dental trauma will exceed dental caries or periodontal problems resulting in high costs to Public Health Services ^(10,11)

Since children spend much of their time in schools, teachers form the group who commonly supervise their physical activity and play an important role in managing these injuries, providing good care and improving its prognosis ^(12,13).

However, multiple studies have demonstrated that these individuals have relatively poor knowledge of this topic ⁽¹⁴⁻¹⁷⁾. This should not be underestimated, particularly because school is a place under surveillance. Therefore, educational staff should master emergency measures to help, calm children down and minimize accident sequela ^(18,19).

Various methods may be used to improve knowledge of school teachers, including educational brochures and posters, lectures, courses, seminars, and regular visits of dentists to schools. Furthermore, to achieve adequate awareness, educative and motivational programs can be planned, developed, and organized in schools such as the use of seminars and lectures during formal and continuing education of teachers ⁽¹⁶⁾.

Multiple international studies conducted in Iran, India, Turkey and other countries have implemented educational programs in order to raise the awareness regarding DTI among school teachers ^(15,18,20-22).

Actually, in Lebanon no dental health educational program concerning DTI has been implemented targeting school teachers. For this reason, this study was conducted to carry out effective educational program aimed to raise the awareness and reduce the incidence and consequences of DTI.

AIM OF THE STUDY

To assess the effectiveness of educational message on the knowledge and practice of school teachers regarding dental trauma.

MATERIALS AND METHODS

Study Design

Cluster Randomized Field Trial.

Study Setting

The study was conducted on school teachers in Beirut- Lebanon belonging to public, semi private and private schools.

Study Sampling

The list of schools was obtained from the Ministry of Education (UNESCO). Schools of Beirut were divided into three categories: public, semi private and private. Two-hundred teachers from each category were randomly selected from those who accepted to participate in the study and signed the consent form, with respect to confidentiality and anonymity. Finally, 600 teachers were included in this study. Each school category was divided into two groups: "Test and Control" each of 100 teachers.

Teachers were not informed of the identity of the group they belong to (Test/Control), educational material that they were going to receive and the duration of the trial⁽²³⁾. Pregnant women and assistant/substitute teachers were excluded from the study to prevent the risk of withdrawal throughout the implementation of the trial.

Questionnaire

Questionnaires in Arabic and English versions were constructed and distributed to the teachers and later collected by the investigator immediately after completion. The questionnaires were divided into three sections: The first section contained basic information such as socio-demographic details including: gender, age, level of education (high school or superior) and seniority (duration of work in the educational field). The second section identified whether the respondents received prior information concerning DTI or had previously experienced any case of dental trauma. The third section was referred to the knowledge and practice of DTI ^(12,13,23). Fig. (1)

Power point presentation, Brochure and Poster

The dental educational presentation, brochures and posters were very specific, colourful and with informative pictures. Brochures and posters were created in English and French to facilitate the understanding for all teachers involved, whether they were, English or French educated. A pilot study was conducted to test the questionnaire validity.

Implementation of the trial

The trial was applied in four steps for the "Test Group". During the first step, teachers were asked to fill out a questionnaire in 20 minutes time. Secondly, they received an educational message using a power point presentation in order to improve their awareness level regarding DTI. During the third step, the same questionnaire was redistributed after the presentation to assess the immediate effect of the educational message ⁽²⁴⁾. Brochures were given to all teachers with the most relevant information regarding the topic. Moreover, a poster was delivered to each school visited. The last step of the study was applied after six months by redistributing the same questionnaire to assess the long term effect of the educational program.

The "Control Group" however, received the same questionnaire twice. Once at the beginning of the study and finally, after 6 months, without the implementation of any dental educational message in order to verify if there is a difference between the knowledge and practice of the two groups.

At the end of the trial, brochures and posters were also given to the teachers belonging to the control group in order to benefit them from the study.

At the end of the trial, brochures and posters were also given to the teachers belonging to the Control group in order to raise their awareness regarding DTI as well.

Data analysis

Data collected was qualitative, so it was presented in form of numbers and percentages.

Statistical analyses were performed using SPSS software for windows version 18.0. The statistical significance level was set at $p < 0.05$. Chi square test and Fisher Exact test were used to compare the knowledge and practice between different groups (public, semi private and private schools). Chi square test for trend was carried out to assess the percentage of true answers for each question over time.

NAME:		LAST NAME:	
PHONE NUMBER:			
CHOOSE THE MOST APPROPRIATE ANSWER. ONLY ONE OPTION IS ALLOWED.			
SECTION A:		C. KNOWLEDGE AND PRACTICE	
A1: GENDER ☐ Male ☐ Female A2: AGE ☐ 20-40 ☐ 41-60 ☐ 61 or more A3: NATIONALITY ☐ Lebanese ☐ Non-Lebanese	A4: LEVEL OF EDUCATION ☐ High School ☐ Superior Education. Speciality: A5: SENIORITY ☐ <1 year ☐ 1-5 years ☐ 6-10 years ☐ 11-15 years ☐ 16 and above	C1: DESCRIBE A SITUATION THAT COULD RESULT IN DENTAL TRAUMA AT THE SCHOOL SETTING: ☐ Sport activities ☐ Falls during walking or sports ☐ As a result of an object impact to the mouth ☐ Due to a conflict between students ☐ All of the above ☐ None of the above. Specify: C2: IMMEDIATE MANAGEMENT OF FRACTURED TEETH: ☐ The fractured part is useless, ignore it ☐ Try to find the fractured part, wrap it with gauze or tissue and bring it for examination and treatment ☐ Put it in liquid medium and bring it for examination and treatment ☐ Other. Specify: Do not know C3: IMMEDIATE MANAGEMENT OF DISPLACED TEETH: ☐ Do not touch, let it remains in its new position ☐ Try to put back to the original position ☐ Other. Specify: ☐ Do not know C4: WHAT WOULD YOU DO WITH THE CHILD IN CASE OF A KNOCKED-OUT TOOTH: ☐ Inform the family and transfer the child to a dentist ☐ Would contact the hospital ☐ Would not do anything, leave the child at school ☐ Would contact by phone a dentist, inform about the incident and listen to his/her advice ☐ Other. Specify: Do not know	C5: SHOULD KNOCKED- OUT BABY (PRIMARY) TEETH BE PUT BACK TO ORIGINAL POSITION: ☐ Yes ☐ No ☐ Do not know C6: SHOULD KNOCKED- OUT PERMANENT TEETH BE PUT BACK TO ORIGINAL POSITION: ☐ Yes ☐ No ☐ Do not know C7: IF YOU COULD FIND THE TOOTH, HOW WOULD YOU HOLD IT?: ☐ By the crown ☐ By the root ☐ Anyway- It does not make any difference ☐ I would leave it. C8: IF YOU WITNESS A CASE OF KNOCKED-OUT TOOTH WHAT WOULD IT BE YOUR APPROACH: ☐ The tooth is useless, ignore it ☐ Rub it vigorously to remove all the dirt ☐ Wash it with tap water ☐ Place Immediately ☐ Store it in a proper medium and seek dental clinic immediately ☐ Other. Specify: _ C9: MEDIUM FOR STORING THE AVULSED TOOTH (if it would be found): ☐ Place it in clean gauze or tissue ☐ Place it in milk ☐ Place it in physiological saline ☐ Place it in patient's saliva ☐ Place it in distilled water ☐ Place it in disinfectant solution ☐ Other. Specify: ☐ Do not know C10: HAVE YOU EVER HEARD OF ANYTHING THAT CAN BE PUT IN THE MOUTH TO PROTECT PERMANENT TEETH WHILE PRACTICING SPORTS: ☐ Yes ☐ No
SECTION B: PREVIOUS DENTAL TRAUMA EXPERIENCE			
B1: HAVE YOU EVER RECEIVED ANY INFORMATION RELATED TO TRAUMATIC INJURIES: ☐ Yes ☐ No B2: IF YES, MENTION THE SOURCE OF INFORMATION: ☐ First aid courses ☐ Education in pedagogic faculty ☐ Health Practitioner ☐ Other sources. Specify: B3: ARE YOU CONFIDENT DISTINGUISHING TYPE OF TEETH (PRIMARY AND PERMANENT): ☐ Yes ☐ No B4: WHAT DO WE MEAN BY DENTAL TRAUMATIC INJURIES: ☐ Caries in the tooth ☐ Violent knock on the teeth ☐ Tooth ache ☐ Do not know B5: HAVE YOU EVER EXPERIENCED ANY CASE OF DENTAL TRAUMA IN YOUR SCHOOL: ☐ Yes ☐ No			

Figure 1: Questionnaire Sample in English version

Ethical approval before the implementation of the trial was obtained from the concerned authorities: Institutional Review Board (IRB) Beirut Arab University (code: 2015H-0021-D-M-0081), Minister of Education "UNESCO", Minister of Health and the concerned authorities from the selected schools. Moreover, consent forms were signed by each one of the teachers.

RESULTS

Socio-demographic characteristics

Socio-demographic characteristics of the teachers were significantly related to the school group. In private schools, there were significantly more females: 195 (97.5%) compared to semi private and private schools, 191 (95.5%) and 177 (88.5%) respectively. Significantly, more young teachers were found in semi private and private schools with a number of 115 (57.5%) and 103 (51.5%) respectively, compared to public school teachers: 70 (35.0%). Moreover, a significant difference was found regarding nationality, 200 (100%) teachers from public and semi private schools were Lebanese, contrary to teachers belonging to private schools, where 16 (8.0%) were Non-Lebanese. Furthermore, there were significantly more teachers with superior education (university degree) in private schools: 181 (90.5%), compared to semi private and public school teachers: 163(81.5%) and 159(79.5%) respectively. Also, private school teachers showed significantly more duration of work in the educational field (seniority): 86 (43%) compared to semi private and public school teachers: 74 (37%) and 75 (37.5%) respectively. Table (1)

Dental Trauma experience

Before the power point presentation, teachers from the test group; 18(18.0%), 15(15.0%) and 14 (14.0%) and those from the control group; 14 (14.0%), 8(8.0%) and 14(14.0%) belonging to public, semi private and private schools respectively,

received information related to traumatic injuries prior to being enrolled in the present study. Table (2)

In addition, 65(65.0%), 47(47.0%) and 59(59.0%) teachers from the test group and 45(45.0%), 48(48.0%) and 65(65.0%) teachers from the control group belonging to public, semi private and private schools respectively, were confident in distinguishing type of teeth (primary and permanent) before the implementation of the educational program. Table (3)

Moreover, 70(70.0%), 75(75.0%) and 64(64.0%) teachers from the test group; and 68(68.0%), 66(66.0%) and 78(78.0%) teachers from the control group belonging to public, semi private and private schools respectively, gave the correct answer regarding DTI definition, which are recognized as a violent knock on the teeth. Table (4)

Immediately after the presentation, the percentages had significantly increased in teachers belonging to the test group ($p\text{-value}<0.001$) and remained the same six months later. However, the correct answers of the control group did not increase in the period of six months.

Knowledge and practice

Concerning the immediate management of fractured teeth, 22(22.0%), 16(16.0%) and 24(24.0%) teachers from the test group; and 14(14.0%), 12(12.0%) and 12(12.0%) from the control belonging to public, semi private and private schools respectively, gave the correct answer regarding the immediate management of fractured teeth which is: "Put the fractured part in liquid medium and seek dental consultation for examination and treatment". Table (5)

Relating to the immediate management of displaced teeth, 32(32.0%), 11(11.0%) and 16(16%) teachers from the test group; and 25(25.0%), 16(16.0%) and 22(22.0%) from the control group

belonging to public, semi private and private schools respectively, gave the correct answer regarding the immediate management of displaced teeth which is: "Try to put back to the original position". Table (6)

Regarding the immediate management of avulsed primary teeth, 47(47.0%), 39(39.0%) and 39(39.0%) teachers from the test group and; 47(47.0%), 35(35.0%) and 36(36.0%) from the control group belonging to public, semi private, and private schools respectively, believed that they should not put back knocked-out primary teeth to their original position which is the correct answer. Table (7)

With reference to the replantation of avulsed permanent teeth, 49(49.0%), 29(29.0%) and 39(39.0%) teachers from the test group and; 34(34.0%), 36(36.0%) and 29(29.0%) teachers from the control group belonging to public, semi private and private schools respectively, assumed that they should put back knocked-out permanent teeth to their original position which is the correct answer. Table (8)

As regards to the handling of avulsed permanent teeth, 55 (55%), 46 (46%) and 52(52%) teachers from the test group; and 46(46.0%), 48(48.0%) and 43(43.0%) from the control group belonging to public, semi private and private schools respectively, stated that they would hold the tooth by the crown which is the correct answer. Table (9)

Concerning the immediate Replantation of avulsed permanent teeth, 8(8.0%), 7(7.0%) and 8(8.0%) teachers from the test group; and 7(7.0%), 8(8.0%) and 6(6.0%) from the control group, belonging to public, semi private and private

schools respectively, thought that they should place the avulsed permanent tooth immediately. Table (10)

Regarding the delayed Replantation, 36(36.0%), 32(36.0%) and 29(29.0%) teachers from the test group; and 47(47.0%), 31(31.0%) and 45(45.0%) from the control group belonging to public, semi private and private schools respectively, stated that they would store the knocked out teeth in a proper medium and seek a dental clinic immediately. Table (11)

Concerning the recommended mediums for storing the avulsed permanent tooth, 29(29.0%), 14(14.0%) and 27(27.0%) teachers from the test group; and 13(13.0%), 20(20.0%) and 22(22.0%) from the control group belonging to public, semi private and private schools respectively, gave the correct answer. Table (12)

Referring to the knowledge regarding mouth guards, 69(69.0%), 53(53.0%) and 74(74.0%) teachers from the test group; and 66(66.0%), 73(73.0%) and 68(68.0%) from the control group belonging to public, semi private and private schools respectively, heard of something that can be put in the mouth to protect the teeth while practicing sports. Table (13)

Regarding all the questions concerning knowledge and practice of DTI, the percentages significantly increased in the test group immediately after the power point presentation, observing an insignificant decrease six months later. On the contrary, no significant difference was found in the control group six months later. Table (5-13)

TABLE (1) Socio-demographic characteristics of the participants according to school group.

	SCHOOL GROUPS			p-value
	Public N=200	Semi private N=200	Private N=200	
Gender				
<i>Male</i>	23(11.5%)	9(4.5%)	5(2.5%)	0.001*
<i>Female</i>	177(88.5%)	191(95.5%)	195(97.5%)	
Age				
20-40 years	70(35.0%)	115(57.5%)	103(51.5%)	0.001*
41-60 years	97(48.5%)	83(41.5%)	84(42.0%)	
61 years or more	33(16.5%)	2(1.0%)	13(6.5%)	
Nationality				
<i>Lebanese</i>	200(100.0%)	200(100.0%)	184(92.0%)	0.001*
<i>Non Lebanese</i>	0(.0%)	0(.0%)	16(8.0%)	
Education				
<i>High school</i>	41(20.5%)	37(18.5%)	19(9.5%)	0.006*
<i>Superior education</i>	159(79.5%)	163(81.5%)	181(90.5%)	
Seniority				
<1 year	4(2.0%)	10(5.0%)	2(1.0%)	0.043*
1-5 years	29(14.5%)	43(21.5%)	30(15.0%)	
6-10 years	28(14.0%)	31(15.5%)	30(15.0%)	
11-15 years	64(32.0%)	42(21.0%)	52(26.0%)	
16 and above	75(37.5%)	74(37.0%)	86(43.0%)	

*The statistical significance level was set at $p < 0.05$; Chi- Square test

TABLE (2) Information received related to traumatic injuries.

School Groups	Have you ever received any information related to traumatic injuries?		Time		p-value
			Before	6 months later	
Public	Control	Yes	14(14.0%)	14(14.0%)	1.000
		No	86(86.0%)	86(86.0%)	
	Test	Yes	18(18.0%)	100(100.0%)	<0.001*
		No	82(82.0%)	0(.0%)	
Semi Private	Control	Yes	8(8.0%)	8(8.0%)	1.000
		No	92(92.0%)	92(92.0%)	
	Test	Yes	15(15.0%)	100(100.0%)	<0.001*
		No	85(85.0%)	0(.0%)	
Private	Control	Yes	14(14.0%)	14(14.0%)	1.000
		No	86(86.0%)	86(86.0%)	
	Test	Yes	14(14.0%)	100(100.0%)	<0.001*
		No	86(86.0%)	0(.0%)	

*The statistical significance level was set at $p < 0.05$; Chi- Square test for trend

TABLE (3) Type of dentition (primary and permanent).

School Groups	Are you confident Distinguishing type of teeth?		Time			p-value
			Before	Immediate after	6 months later	
Public	Control	Yes	45(45.0%)		46(46.0%)	0.887
		No	55(55.0%)		54(54.0%)	
	Test	Yes	65(65.0%)	99(99.0%)	99(99.0%)	<0.001*
		No	35(35.0%)	1(1.0%)	1(1.0%)	
Semi Private	Control	Yes	48(48.0%)		48(48.0%)	1.000
		No	52(52.0%)		52(52.0%)	
	Test	Yes	47(47.0%)	92(92.0%)	92(92.0%)	<0.001*
		No	53(53.0%)	8(8.0%)	8(8.0%)	
Private	Control	Yes	65(65.0%)		65(65.0%)	1.000
		No	35(35.0%)		35(35.0%)	
	Test	Yes	59(59.0%)	91(91.0%)	91(91.0%)	<0.001*
		No				

* The statistical significance level was set at $p<0.05$; Chi- Square test for trend

TABLE (4) Definition of DTI.

School Groups	What do we mean by Dental Traumatic Injuries?		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	68(68.0%)		70(70.0%)	0.760
		False answers	32(32.0%)		30(30.0%)	
	Test	True answer	70(70.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answers	30(30.0%)	0(0.0%)	0(0.0%)	
Semi Private	Control	True answer	66(66.0%)		70(70.0%)	0.544
		False answers	34(34.0%)		30(30.0%)	
	Test	True answer	75(75.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answers	25(25.0%)	0(0.0%)	0(0.0%)	
Private	Control	True answer	78(78.0%)		78(78.0%)	1.000
		False answers	22(22.0%)		22(22.0%)	
	Test	True answer	64(64.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answers	36(36.0%)	0(0.0%)	0(0.0%)	

*The statistical significance level was set at $p<0.05$; Chi- Square test for trend

TABLE (5) Immediate management of Fractured Teeth.

School Groups	“Put it in liquid medium and seek dental consultation for examination and treatment”		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	14(14.0%)		17(17.0%)	0.558
		False answer	86(86.0%)		83(83.0%)	
	Test	True answer	22(22.0%)	90(90.0%)	84(84.0%)	<0.001*
		False answer	78(78.0%)	10(10.0%)	16(16.0%)	
Semi Private	Control	True answer	12(12.0%)		12(12.0%)	1.000
		False answer	88(88.0%)		88(88.0%)	
	Test	True answer	16(16.0%)	93(93.0%)	91(91.0%)	<0.001*
		False answer	84(84.0%)	7(7.0%)	7(7.0%)	
Private	Control	True answer	12(12.0%)		12(12.0%)	1.000
		False answer	88(88.0%)		88(88.0%)	
	Test	True answer	24(24.0%)	95(95.0%)	90(90.0%)	<0.001*
		False answer	76(76.0%)	5(5.0%)	10(10.0%)	

* The statistical significance level was set at $p<0.05$; Chi- Square test for trend

TABLE (6) Immediate management of Displaced Teeth.

School Groups	“Try to put back to the original position”		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	25(25.0%)		25(25.0%)	0.871
		False answer	75(75.0%)		75(75.0%)	
	Test	True answer	30(30.0%)	91(91.0%)	86(86.0%)	<0.001*
		False answer	70(70.0%)	9(9.0%)	14(14.0%)	
Semi Private	Control	True answer	16(16.0%)		16(16.0%)	1.000
		False answer	84(84.0%)		84(84.0%)	
	Test	True answer	11(11.0%)	95(95.0%)	92(92.0%)	<0.001*
		False answer	89(89.0%)	5(5.0%)	8(8.0%)	
Private	Control	True answer	22(22.0%)		22(22.0%)	1.000
		False answer	78(78.0%)		78(78.0%)	
	Test	True answer	16(16.0%)	98(98.0%)	88(88.0%)	<0.001*
		False answer	84(84.0%)	2(2.0%)	12(12.0%)	

*The statistical significance level was set at $p<0.05$; Chi- Square test for trend

TABLE (7) Immediate management of avulsed primary teeth.

School Groups	“knocked- out primary teeth should not be put back to their original position”		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	47(47.0%)		45(45.0%)	0.671
		False answer	53(53.0%)		55(55.0%)	
	Test	True answer	47(47.0%)	99(99.0%)	86(86.0%)	<0.001*
		False answer	53(53.0%)	1(1.0%)	14(14.0%)	
Semi Private	Control	True answer	35(35.0%)		35(35.0%)	1.000
		False answer	65(65.0%)		65(65.0%)	
	Test	True answer	39(39.0%)	100(100.0%)	91(91.0%)	<0.001*
		False answer	61(61.0%)	0(.0%)	9(9.0%)	
Private	Control	True answer	36(36.0%)		39(39.0%)	0.558
		False answer	64(64.0%)		61(61.0%)	
	Test	True answer	39(39.0%)	96(96.0%)	94(94.0%)	<0.001*
		False answer	61(61.0%)	4(4.0%)	6(6.0%)	

**The statistical significance level was set at $p<0.05$; Chi- Square test for trend*

TABLE (8) Replantation of avulsed permanent teeth.

School Groups	“Knocked-out permanent teeth should be put back to original position”		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	34(34.0%)		34(34.0%)	1.000
		False answer	66(66.0%)		66(66.0%)	
	Test	True answer	42(42.0%)	99(99.0%)	93(93.0%)	<0.001*
		False answer	58(58.0%)	1(1.0%)	7(7.0%)	
Semi Private	Control	True answer	36(36.0%)		36(36.0%)	1.000
		False answer	64(64.0%)		64(64.0%)	
	Test	True answer	29(29.0%)	100(100.0%)	98(98.0%)	<0.001*
		False answer	71(71.0%)	0(.0%)	2(2.0%)	
Private	Control	True answer	29(29.0%)		29(29.0%)	1.000
		False answer	71(71.0%)		71(71.0%)	
	Test	True answer	39(39.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answer	61(61.0%)	0(.0%)	0(.0%)	

**The statistical significance level was set at $p<0.05$; Chi- Square test for trend*

TABLE (9) Handling of avulsed permanent teeth .

School Groups	“Avulsed permanent teeth should be hold by the crown”		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	46(46.0%)		46(46.0%)	0.776
		False answer	54(54.0%)		54(54.0%)	
	Test	True answer	55(55.0%)	97(97.0%)	95(95.0%)	<0.001*
		False answer	45(45.0%)	3(3.0%)	5(5.0%)	
Semi Private	Control	True answer	48(48.0%)		48(48.0%)	1.000
		False answer	52(52.0%)		52(52.0%)	
	Test	True answer	46(46.0%)	100(100.0%)	93(93.0%)	<0.001*
		False answer	54(54.0%)	0(.0%)	7(7.0%)	
Private	Control	True answer	43(43.0%)		43(43.0%)	1.000
		False answer	57(57.0%)		57(57.0%)	
	Test	True answer	52(52.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answer	48(48.0%)	0(.0%)	0(.0%)	

**The statistical significance level was set at $p<0.05$; Chi- Square test for trend*

TABLE (10) Immediate replantation of avulsed permanent teeth.

School Groups	“Place Immediately”		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	7(7.0%)		8(8.0%)	0.788
		False answer	93(93.0%)		92(92.0%)	
	Test	True answer	8(8.0%)	68(68.0%)	67(67.0%)	<0.001*
		False answer	92(92.0%)	32(32.0%)	33(33.0%)	
Semi Private	Control	True answer	8(8.0%)		8(8.0%)	1.000
		False answer	92(92.0%)		92(92.0%)	
	Test	True answer	7(7.0%)	98(98.0%)	95(95.0%)	<0.001*
		False answer	93(93.0%)	2(2.0%)	5(5.0%)	
Private	Control	True answer	6(6.0%)		6(6.0%)	1.000
		False answer	94(94.0%)		94(94.0%)	
	Test	True answer	8(8.0%)	87(87.0%)	87(87.0%)	<0.001*
		False answer	92(92.0%)	13(13.0%)	13(13.0%)	

**The statistical significance level was set at $p<0.05$; Chi- Square test for trend*

TABLE (11) Delayed replantation of avulsed permanent teeth.

School Groups	Store it in a proper medium and seek dental clinic immediately		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	47(47.0%)		41(41.0%)	0.393
		False answer	53(53.0%)		59(59.0%)	
	Test	True answer	36(36.0%)	69(69.0%)	67(67.0%)	<0.001*
		False answer	64(64.0%)	31(31.0%)	33(33.0%)	
Semi Private	Control	True answer	31(31.0%)		31(31.0%)	1.000
		False answer	69(69.0%)		69(69.0%)	
	Test	True answer	32(32.0%)	98(98.0%)	95(95.0%)	<0.001*
		False answer	68(68.0%)	2(2.0%)	5(5.0%)	
Private	Control	True answer	45(45.0%)		45(45.0%)	1.000
		False answer	55(55.0%)		55(55.0%)	
	Test	True answer	29(29.0%)	87(87.0%)	87(87.0%)	<0.001 *
		False answer	71(71.0%)	13(13.0%)	13(13.0%)	

**The statistical significance level was set at $p < 0.05$; Chi- Square test for trend*

TABLE (12) Storage medium.

Schools	Medium for storing the avulsed tooth		Time			-p-value
			Before	During	After	
Public	Control	True answers	13(13.0%)		14(14.0%)	0.836
		False answers	87(87.0%)		86(86.0%)	
	Test	True answers	29(29.0%)	97(97.0%)	99(99.0%)	<0.001*
		False answers	71(71.0%)	3(3.0%)	1(1.0%)	
Semi Private	Control	True answer	20(20.0%)		31(31.0%)	0.104
		False answer	80(80.0%)		69(69.0%)	
	Test	True answer	15(15.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answer	85(85.0%)	0(0.0%)	0(0.0%)	
Private	Control	True answer	22(22.0%)		22(22.0%)	1.000
		False answer	78(78.0%)		78(78.0%)	
	Test	True answer	28(28.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answer	72(72.0%)	0(0.0%)	0(0.0%)	

**The statistical significance level was set at $p < 0.05$; Chi- Square test for trend*

TABLE (13) Knowledge regarding mouth guards according school groups.

School Groups	Have you heard of anything that can protect teeth while sports		Time			p-value
			Before	Immediate after	Six months later	
Public	Control	True answer	66(66.0%)		69(69.0%)	0.651
		False answer	34(34.0%)		31(31.0%)	
	Test	True answer	69(69.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answer	31(31.0%)	0(.0%)	0(.0%)	
Semi Private	Control	True answer	73(73.0%)		82(82.8%)	0.124
		False answer	27(27.0%)		17(17.2%)	
	Test	True answer	53(53.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answer	47(47.0%)	0(.0%)	0(.0%)	
Private	Control	True answer	68(68.0%)		76(76.0%)	0.208
		False answer	32(32.0%)		24(24.0%)	
	Test	True answer	74(74.0%)	100(100.0%)	100(100.0%)	<0.001*
		False answer	26(26.0%)	0(.0%)	0(.0%)	

*The statistical significance level was set at $p < 0.05$; Chi- Square test for trend

DISCUSSION

In response to the World Health Organization (WHO) guidelines in the year 1978, many countries utilized school teachers as health education promoters by increasing their knowledge in oral health and disease. However, despite the willingness to impart general oral health education, they seem to lack formal basic training in oral health matters such as emergency management of DTI, which will hinder the effectiveness of teacher's role in promoting oral health ⁽²⁵⁾.

Dental Traumatic Injuries are considered a public health problem and if not treated timely and appropriately, they will not only cause disability or loss of teeth, but also will have a negative impact on the quality of life of the individual. Primary and permanent anterior teeth are not only important for aesthetics but also essential for phonetics, mastication, integrity of supporting tissues, psychological, physical and mental wellbeing⁽²²⁾. The International Association of

Dental Traumatology and American Academy of Pediatric Dentistry acknowledge that DTI could have improved outcomes if the public was aware of first aid measures and the need to seek immediate treatment ⁽²⁶⁾. Emergency treatment of DTI at the site of the accident is particularly important since an initial mismanagement will directly be reflected in the subsequent treatment, which can be complicated and lengthy; thus affecting the prognosis of the case and the patient's wellbeing.

More than 20% of school aged children are reported to be affected by dental trauma ⁽²⁷⁾. For this reason, we centred our study in school teachers who are usually the first individuals to respond to the traumatic incident in schools.

Actually, in Lebanon, no attempt has been made by the government or any dental organization to educate teachers by providing them information regarding DTI. Consequently, the purpose of the study was to assess the effectiveness of educational message on the knowledge of teachers regarding

DTI in schools of Beirut-Lebanon for better practice and prognosis of these cases.

This study was carried out between January and July, 2016 in the city of Beirut-Lebanon. It was decided to work with teachers from public, semiprivate and private schools. A cluster randomized controlled trial, commonly used in school-based evaluations of educational interventions, was designed. This cluster randomized design appears to have begun back in 1940 with Lindquist's book on "Methods in education research in schools" and has been defined as a comparative study in which the units randomized are groups whose members have an identifiable feature in common ^(28, 29). Two-hundred teachers per group (public, semi private and private) were randomly selected and a questionnaire was applied to assess their knowledge regarding the topic prior to the implementation of the educational program. Consequently, a total of 600 teachers were included in the study; half of them belonging to the test group and the other half to the control group. A similar sample size was used by Sreelakshmi et al. in 2016 ⁽¹⁴⁾ and Shamarao et al. in 2014 ⁽¹⁷⁾. Up to our knowledge, none of studies conducted compared the three school categories all together.

In the present study, a non interventional control group was included, so that we could compare any change of knowledge between the test and control groups from baseline till the end of the study after six months.

The majority of successful interventional studies have used a multifaceted approach. Based upon these findings, it was decided to combine the survey with an oral presentation in conjunction with informational brochures and posters. The most commonly used methods of oral presentation are seminars and lectures. A lecture using Power Point presentation performed in this study provided a good opportunity for direct contact with the teachers, thus giving a more dynamic discussion and immediate feedback in order to respond to any doubt they may have, as well as enhancing their comprehension

about the topic to ensure that the information being delivered is understood ⁽²⁴⁾. After 30 minutes of lecture, followed by questions and answers, it was possible to motivate the teachers by improving their knowledge and practice regarding DTI.

As complementary educational tools, brochures were given to teachers and also a poster per school in order to increase the power of the educational message and to spread the information to more teachers, parents and any other children guardians. Displaying educational posters in classrooms is a practical and effective means to improve knowledge of DTI ⁽²³⁾.

Chi square test for trend was carried out to compare the knowledge level over a period of time (before and after the implementation of the educational message)

Due to the approvals given by the ministries to undertake the study, teachers belonging to public schools were the most helpful and supportive with the study. On the other hand, private schools were the least cooperative since they considered that it was not their job to learn about DTI because they have a nurse at the school. However, once they accepted, they showed great curiosity and interest.

Despite the fact that teachers' level of awareness concerning DTI before the implementation of the educational program was noticeably inadequate, and regardless of how unsatisfied they felt with their lack of knowledge; they exhibited a positive attitude towards receiving more information regarding emergency management of these injuries. The positive attitude of the teachers reflected in our study is similar to the response observed in a survey done by Shamarao et al. in 2014 ⁽¹⁷⁾.

Immediately after the implementation of the educational message, there was a significant improvement in the knowledge and practice of teachers belonging to the test group. Even six months later, an improvement of 90% and above was still noticeable in some areas. While, in the control group there was no knowledge acquisition

in the majority of the questions; similar to a study conducted by Ghadimi et al. in 2014⁽²¹⁾. However, a slight increase in the correct answers was observed in questions regarding storage medium and mouth guards, which was related to the fact that the questionnaire itself raised their curiosity level of knowing more and even some of the teachers used to discuss these topics with each other after the completion of the survey.

In private schools, there were significantly more females than males and also more teachers with a superior educational level compared to public and semi private schools, which is related to the fact that private schools have particular recruitment policies that pursue specific requisites for teachers requiring university degree. After the analysis of the first questionnaire, it was observed that the gender, level of education of teachers and the school group they belonged to (private, semi private and public) were not directly associated with the understanding or the knowledge they had regarding DTI. This is probably because very little or no information about this topic had been previously given to most of them. However, six months later, a more noticeable decrease was observed in the correct answers of public school teachers in questions regarding the management of DTI such as fractures, displacement, avulsion, immediate and delayed replantation; which is in accordance with a study done in Kuwait by Al-Asfour et al. in 2008⁽²⁴⁾. Conversely, the lowest decrease was detected in private school teachers which could be directly related to their level of education. Similarly, there are studies showing that the level of education has a positive impact on teachers' knowledge about topics that do not belong to their specific area of study, including dental trauma⁽¹⁹⁾.

This acts as an indicator that teachers may need more frequent reinforcement within shorter periods of time. Most likely the information has to be repeated before any long standing effect can be noted. Knowledge retention is critically important in emergency management of DTI education as we

attempt to teach concepts that participants may use and apply at any time in the future.

It can be said that a combination of the questionnaires, a power point presentation, and informational brochures and posters provided positive and successful results. Even after 6 months, the level of knowledge concerning DTI among these teachers (belonging to the test group) was very satisfactory. Similar studies conducted by Grewal (2015), Ghadimi (2014), Pujita (2013), Arian (2012) and McIntyre et al. (2008); assessed the knowledge of elementary school staff members regarding management of DTI before and after educational intervention. Also it was found that a combination of lectures and brochures significantly enhance the knowledge among staff, and the improvement persisted over time.

This study has a few limitations. For instance, there is no data on whether participants were parents of young children or not, which could be a confounding factor. Also, the subject that each participant was responsible for teaching was not recorded (e.g. biology, physical education, geography).

Intuitive guessing has been previously suggested regarding this topic when employing questionnaires which could be a possible limitation of this study.⁽³⁰⁾

This study was conducted only in Beirut by taking a representative sample of the teachers and no other cities of Lebanon were included in the trial.

CONCLUSION

The lack of knowledge of teachers regarding DTI before the implementation of the educational message was confirmed.

Within the limitation of this study we can conclude that, the implementation of a health educational program regarding DTI using more than one modality, proved to be effective in improving the knowledge of school teachers who are the first individuals to face dental trauma in schools.

RECOMMENDATIONS

1. Dentists as health educators and authorities in the country, as Ministry of Health and Ministry of Education, must work together to reach more school teachers for the continuous dissemination of knowledge with an emphasis on the management of DTI.
2. More studies should be conducted in other regions of Lebanon to assess teachers' knowledge as well and to widen the awareness level, in addition to conducting direct interviews with the target group.
3. To ensure accessibility to proper information; brochures and posters describing the emergency procedures in traumatic situations should be displayed in high-risk environments, such as schools, so that appropriate action can be taken during such events.

REFERENCES

1. Sprod A, Anderson R & Treasure E. Effective oral health promotion: Literature Review. 1996.
2. Abdellatif AM, Hegazy SA. Knowledge of emergency management of avulsed teeth among a sample of Egyptian parents. *J Adv Res* 2011;2:157-62.
3. Cortes MI, Marcenes W, Sheiham A. 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 Epidemiol* 2002; 30:193–8.
4. Diangelis AJ, Andreasen JO, Ebeleseder KA, Kenny DJ, Trope M, Sigurdsson A, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 1. Fractures and luxations of permanent teeth. *Dent Traumatol* 2012;28:2–12.
5. Glendor U. Epidemiology of traumatic dental injuries—a 12 year review of the literature. *Dent Traumatol* 2008;24: 603–611
6. Andreasen JO, Andreasen FM, Andersson L. Textbook and colour atlas of traumatic injuries to the teeth. 4th edn. Oxford, Blackwell Munksgaard; 2007. P. 383–427.
7. Ankola A, Hebball M, Sharma R, Nayak S. Traumatic dental injuries in primary school children of South India – a report from district-wide oral health survey. *Dental Traumatology* 2013; 29: 134–138.
8. Mesgarzadeh AH, Shahamfar M, Hefzolllesan A. Evaluating knowledge and attitudes of elementary school teachers on emergency management of traumatic dental injuries: A study in an Iranian urban area. *Oral Health Prev Dent* 2009;7(3):297–308.
9. Dame-Teixeira N, Alves LS, Susin C, Maltz M. Traumatic dental injury among 12-year-old South Brazilian school-children: prevalence, severity, and risk indicators. *Dent Traumatol* 2013;29:52–58.
10. Marchiori EC, Santos SE, Asprino L, Moraes M, Moreira RW. Occurrence of dental avulsion and associated injuries in patients with facial trauma over a 9-year period. *Oral Maxillofac Surg.* 2013;17(2):119–26.
11. Bonini GAVC, Marcenes W, Oliveira LB, Sheiham A, Bonecker M. Trends in the prevalence of traumatic dental injuries in Brazilian preschool children. *Dent Traumatol.* 2009;25(6):594–8.
12. Kane AW, Babacar T, Moustapha D, Malick M, Mouhamed S, Yves B. Attitude and knowledge of primary school teachers of initial management of dental trauma. *JOHR* 2011;2(2):51–54.
13. Tzigkounakis V, Merglova V. Attitude of Pilsen primary school teachers in dental traumas. *Dental Traumatology*; 2008; 24: 528–531.
14. Sreelakshmi N, Rajendra Reddy E, Thabitha Rani S, Rajesh Aduri, Vinay Kumar L, Mahita P. Assessment of Knowledge and Attitude among Public and Private School Teachers in Urban and Rural Areas towards Management of Traumatic Dental Injuries. *Journal of International Oral Health* 2016; 8(3):344–350.
15. Grewal N, Shangdiar GD, Samita G. Efficacy of a comprehensive dental education program regarding management of avulsed permanent teeth as a valid indicator of increased success rate of treatment of avulsion in a North Indian population. *Contemp Clin Dent* 2015;6:477–82.
16. Singh M, Ingle NA, Kaur N, Yadav P. Evaluation of knowledge and attitude of school teachers about emergency management of traumatic dental injury. *J Int Soc Prevent Communit Dent* 2015;5:108–13.
17. Shamarao S, Jain J, Ajagannanavar SL, Haridas R, Tikare S, Kalappa AA. Knowledge and attitude regarding management of tooth avulsion injuries among school teachers in rural India. *J Int Soc Prevent Communit Dent* 2014;4:S44–8.

18. Arikan V, Sonmez H. Knowledge level of primary school teachers regarding traumatic dental injuries and their emergency management before and after receiving an informative leaflet. *Dent Traumatol* 2012;28(2):101-7.
19. Feldens EG, Feldens CA, Kramer PF, da Silva KG, Munari CC, Brei VA. Understanding school teacher's knowledge regarding dental trauma: a basis for future interventions. *Dent Traumatol* 2010;26:158-163.
20. Raoof M, Shokouhinejad N, Izadi A, Nourzadeh M, Afkham A, Forghani FR, et al. Longterm effect of an educational intervention regarding dental trauma first aid: A phase II study. *Dent Traumatol* 2014;30:296301.
21. Ghadimi S, Seraj B, Keshavarz H, Shamshiri AR, Abiri R. The Effect of Using an Educational Poster on Elementary School Health Teachers' Knowledge of Emergency Management of Traumatic Dental Injuries. *Journal of Dentistry, Tehran University of Medical Sciences, Tehran, Iran* 2014; Vol. 11, No. 6
22. Pujita C, Nuvvula S, Shilpa G, Nirmala S, Yamini V. Informative promotional outcome on school teachers' knowledge about emergency management of dental trauma. *J Conserv Dent* 2013;16(1):21-7.
23. Young C, Wong KY, Cheung LK. Effectiveness of Educational Poster on Knowledge of Emergency Management of Dental Trauma - Part 2: Cluster Randomised Controlled Trial for Secondary School Students. 2014. *PLoS ONE* 9(8): e101972. doi:10.1371/journal.pone.0101972.
24. Al-Asfour A, Andersson L. The effect of a leaf et given to parents for first aid measures after tooth avulsion. *Dent Traumatol* 2008; 24:515-21.
25. Sae Sankar AJ, Sreedevi E, Suresh Babu M, Naveen V, Rajavardhan K. School teacher's knowledge regarding dental health. *Indian J Dent Sci* 2013;5:1558.
26. Zakirulla M, Togoo RA, Yaseen SM, Al-Shehri DA, Al-Ghamdi AS, Al-hafed MS, et al. Knowledge and attitude of Saudi Arabian school teachers with regards to emergency management of dental trauma. *Int J Clin Dent Sci* 2011;2(2):25-9.
27. Ankola A, Hebbal M, Sharma R, Nayak S. Traumatic dental injuries in primary school children of South India – a report from district-wide oral health survey. *Dental Traumatology*; 2013; 29: 134–138.
28. Stockwell MS, Catallozzi M, Camargo S, Ramakrishnan R, Holleran S, Findley SE, Kukafka R, Hofstetter AM, Fernandez N, Vawdrey DK. Registry-linked electronic influenza vaccine provider reminders: a cluster-crossover trial. *Pediatrics*. 2015 Jan; 2015; 135 (1):e75-82.
29. Lindquist EF. Statistical analysis in educational research. Boston: Houghton Mifflin. 1940.
30. McIntyre JD, Lee JY, Trope M, Vann WF Jr. Elementary school staff knowledge about dental injuries. *Dent Traumatol* 2008; 24(3):289-98.