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# KNOWLEDGE, ATTITUDES, AND BELIEFS OF SCHOOL TEACHERS REGARDING THE MANAGEMENT OF TRAUMATIC DENTAL INJURIES

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Mini-thesis submitted in partial fulfillment of the requirements for the  
degree of MSc in Paediatric Dentistry.

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Dr. Hiba Ali

Student ID: 3914160

Supervisor: Professor Nadia Mohamed

Co-supervisor: Dr Naeemah Noordien

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<https://etd.uwc.ac.za/>

## ABSTRACT

**Background:** Dental trauma presents a significant public health problem due to its high prevalence and effect on the quality of life of children and their families. School is the place where the most traumatic dental injuries (TDI's) occur. TDIs are more common in children of school-going age due to daily activities such as running, sporting activities, and bike riding, to mention a few. Previous studies have shown that teachers' knowledge of how to manage traumatic dental emergencies is inadequate.

**Aim:** To evaluate the knowledge, attitudes, and beliefs of school teachers regarding the management of traumatic dental injuries.

**Methods:** An exploratory cross-sectional study was conducted. The study was originally intended to target teachers from primary and secondary schools in the areas surrounding the Tygerberg Oral Health Centre which accepts referrals for traumatic dental injuries. However, due to the circumstances of the COVID-19 pandemic and the prevention protocols in South African schools, it was difficult to gain access to the schools and teachers identified in the original sample. A convenience sample was therefore used, targeting as many teachers as possible from primary and secondary schools in the Cape Town Metropole. A structured online questionnaire was used for data collection. The original questionnaire was reworked and presented as an online GOOGLE FORM.

**Results:** Findings of this study revealed that school teachers' knowledge regarding the management of dental trauma was insufficient. No significant relationship was reported between the school teachers' knowledge and sex, academic qualifications, and previous exposure to dental trauma. None of the participants had received any training with regard to the management of traumatic dental injuries.

**Conclusion:** The findings of this study revealed a significant lack of knowledge of school teachers regarding the management of dental trauma. Since school teachers would most probably be the first to witness traumatic accidents in the school environment, educational programmes highlighting the early management of TDIs such as posters, lectures, leaflets, and audio-visual aids should be used to improve teachers' awareness regarding this topic.

**Keywords:** Traumatic dental injuries, Emergency dental treatment, School teachers, and tooth avulsion.

## DECLARATION

I, the undersigned, Hiba Ali, hereby declare that the work contained in this thesis titled “Knowledge, attitudes, and beliefs of school teachers regarding the management of traumatic dental injuries” is my original work and has not been previously submitted at any university for any degree or examination.

Hiba Suliman Ali

May 2022



## ACKNOWLEDGMENTS

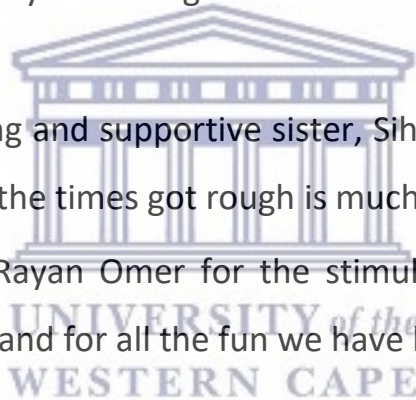
Firstly, I would like to convey my sincere gratitude to my supervisor Prof. N. Mohamed for the continual support during my studies and research, for her understanding, motivation, enthusiasm, and vast knowledge. Her guidance helped me throughout the study and writing of this thesis. I could not have imagined having a better counselor and mentor for my study.

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## **DEDICATION**

*This thesis is dedicated to my beloved parents*

*May their memory forever be a comfort and blessing*

*Their blessings and prayers enduring with me to succeed in my life cycle*

*Though their demise left a wide gap in my life the values they taught me prepared*

*me for a meaningful life*

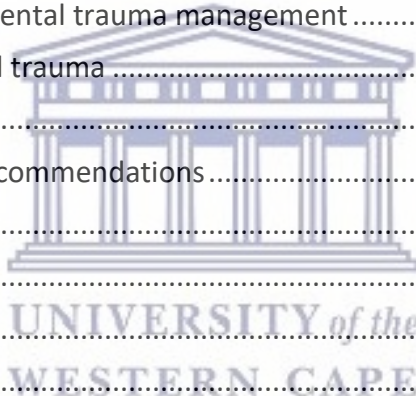
*This moment fills me with gratitude for them.*

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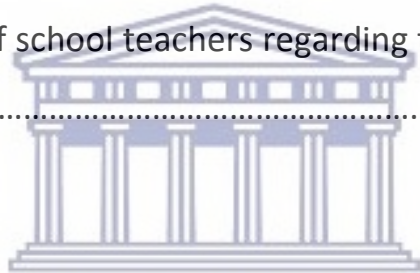
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## LIST OF ABBREVIATIONS

**AAPD:** American Academy of Paediatric Dentistry

**IADT:** International Association of Dental Traumatology

**TDIs:** Traumatic Dental Injuries

**PDL:** Periodontal ligaments

**HBSS:** Hanks Balanced Salt Solution

**ADHD:** Attention-Deficit Hyperactivity Disorder

**BMREC:** Biomedical Research Ethics Committee

**P1:** Participant 1...etc.



# CHAPTER 1

## INTRODUCTION AND LITERATURE REVIEW

### 1.1. Introduction

Traumatic dental injuries are considered to be one of the most significant oral health issues during childhood which can lead to much pain and distress (Kumar *et al.*, 2017). These injuries are widespread among children of school-going age, leading to an increased awareness among parents and school teachers as a result of the huge impact on functional and aesthetic aspects which can affect the patient's quality of life (Kumar *et al.*, 2017; Gaffar *et al.*, 2021; Kurnaz & Bayraktar, 2021). TDI's are more common in this group of children (Kumar *et al.*, 2017), due to daily activities such as running, sporting activities, and bike riding among others (Pacheco *et al.*, 2003). Literature has shown that traumatic dental injuries are becoming more of a public health concern as it affects the psycho-social and economic aspects of life for children and their families in 10 to 35 % of cases (Raooof *et al.*, 2012). Untreated fractured teeth caused by trauma were directly associated with an impact on the appearance of the children and affected their emotional state (Naidoo *et al.*, 2009; Kumar *et al.*, 2017). Children with traumatised teeth also experienced difficulties with eating and were teased more than those without traumatic dental injuries (Naidoo *et al.*, 2009). TDI's affect about one in five children (Naidoo *et al.*, 2009).

### 1.2. Incidence

A systematic review done by Glendor (2008) found that the incidence of traumatic dental injuries in the primary and permanent dentitions increased from 1995 to 2007 worldwide (Glendor, 2008). Data from various countries showed that 30% to 50% of school-aged children have sustained dental trauma; however, the traumatic dental injuries vary from one country to another (Young, *et al.*, 2012; Attarzadeh *et al.*, 2017) (Table 1.2.1 and Table 1.2.2).

**Table 1.2.1: The incidence of traumatic dental injuries to permanent teeth in different countries.**

Country	Age range	Incidence	Reference
Saudi Arabia	12–14 years old	34%	Al-Majed <i>et al.</i> , 2001
Jordan	12 years old	5.5%	Rajab <i>et al.</i> , 2013
India	12-15 years old	14.1%	Kumar <i>et al.</i> , 2011
Iranian	9-14 years old	36%	Eslamipour <i>et al.</i> , 2016
Canadian	13-14 years old	18.5%	Locker, 2005
Brazil	9-14 years old	16.5%	Francisco <i>et al.</i> , 2013
South Africa	11-13 years old	6.4%	Naidoo <i>et al.</i> , 2009

**Table 1.2.2: The incidence of traumatic dental injuries to primary teeth in different countries.**

Country	Age range	Incidence	Reference
Saudi Arabia	5-6 years of age	32.8%	Al-Majed <i>et al.</i> , 2001
England	3 years of age	12.6%	Jones & Nunn, 1995
Sweden	4 years of age	30%	Stecksen-Blicks & Holm, 1995
Brazil	0–3 years of age	16.3%	Cunha <i>et al.</i> , 2001
Kuwait	2-6 years of age	11.2%	Hasan <i>et al.</i> , 2010)
South Africa	1-5 years of age	15%	Hargreaves <i>et al.</i> , 1999

The mean age for traumatic dental injuries was found to be 8.2 years (Ritwik *et al.*, 2015), while a study done in Rio de Janeiro, Brazil in 2003 found the mean age to vary between 7 and 11 years of age (Pacheco *et al.*, 2003). The incidence of dental trauma was reported to be more frequent in males (62%), because males have a tendency towards violent behaviour and are involved in more contact sports than females (Attarzadeh *et al.*, 2017; Gaffar *et al.*, 2021). The teeth most commonly affected by trauma are the maxillary central incisors as they are labially positioned compared to the mandibular incisors, making them more prone to direct facial trauma (Ulusoy *et al.*, 2012; Goettens *et al.*, 2014; Attarzadeh *et al.*, 2017). Incomplete formation of the radicular part of central incisors and the reduced resiliency of the periodontal ligament (PDL) between the

ages of 7 and 10 years predisposes the maxillary incisors to trauma, even with slight horizontal impacts (Pacheco *et al.*, 2003; Ulusoy *et al.*, 2012; Ritwik *et al.*, 2015).

With regard to the site of dental trauma, school is the place where the most traumatic dental injuries (TDIs) occur (Antunes *et al.*, 2016; Nirwan *et al.*, 2016; Kumar *et al.*, 2017). A study by Blinkhorn, (2000), in the North West of England, reported that school accidents account for 25% of traumatic dental injuries with more than one-third occurring at home. A South African study among 11- to 13-year-old schoolchildren showed that TDI's most commonly occurred at school and home, while only 5.7% of dental trauma accidents occurred in the street or other areas like swimming pools and playgrounds (Naidoo *et al.*, 2009). Data on the prevalence of traumatic dental injuries in South Africa is lacking (Naidoo *et al.*, 2009).

### **1.3. Aetiological factors**

Based on the aetiological factors, traumatic dental injuries could be classified into accidental and non-accidental injuries (Goswami *et al.*, 2020). Accidental injuries usually occur in the primary dentition between the ages of 2 and 4 years due to falls resulting from a lack of motor coordination (Goswami *et al.*, 2020). In the permanent dentition, falling during playing was reported to be the main cause of TDIs, in children between the ages of 7 and 12 years, followed by sporting injuries and collisions with hard objects (Naidoo *et al.*, 2009; Ulusoy *et al.*, 2012). Non-accidental dental injuries often occur due to fights or child abuse (Glendor, 2009; Cagetti *et al.*, 2019).

### **1.4. Risk factors**

A study conducted by Glendor, (2009) investigated the factors which significantly increase the susceptibility to dental trauma. These include malocclusion, an overjet of more than 4mm, incompetent lips, a short upper lip, and mouth breathing (Blinkhorn, 2000; Ulusoy *et al.*, 2012; Fujita *et al.*, 2014). Medical conditions which result in a lack of motor coordination (e.g., epilepsy) and behavioural conditions, make children more susceptible to dental trauma (Glendor, 2009). Gurbuz and Tan, (2010), reported that 27.5% of epileptic children had suffered traumatic dental injuries of some kind.

Hyperactivity is one of the symptoms associated with behavioural disorders such as attention-deficit/ hyperactivity disorder (ADHD) and anxiety disorder (Sabuncuoglu *et al.*, 2005). A child

with such a behavioural disorder is more predisposed to dental trauma, due to poor motor skills (Lalloo, 2003; Sabuncuoglu *et al.*, 2005).

A study conducted by Sabuncuoglu *et al.*, (2005) evaluated the association between attention-deficit hyperactivity disorder (ADHD) and traumatic dental injuries in 8 to 17- year- old children. They reported a significant association between ADHD and traumatic dental injuries (Sabuncuoglu *et al.*, 2005).

Obesity was implicated as a risk factor related to dental trauma (Sabuncuoglu *et al.*, 2005; Glendor, 2009). Previous studies suggested that obese children are less skillful and more prone to traumatic dental injuries (Sabuncuoglu *et al.*, 2005; Goettems *et al.*, 2014). A study conducted by Goettems *et al.*, (2014) in Brazil to determine the prevalence of dental trauma among 8 to 12-year-old children, reported that the prevalence of dental trauma was increased in overweight/ obese children.

### 1.5. Traumatic dental injuries

Traumatic dental injuries are often associated with other traumatic injuries such as maxillofacial fractures (Naidoo *et al.*, 2009). Several classification systems for traumatic dental injuries have been suggested (Pagadala & Tadikonda, 2015). The Andreasen classification system is the most common classification used (Feliciano & Caldas, 2006).

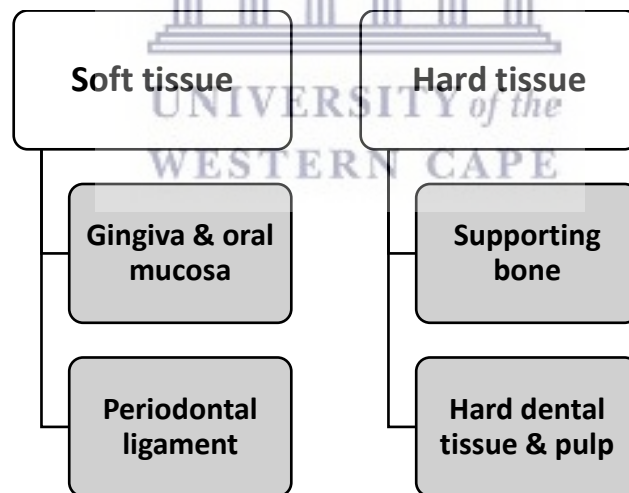


Figure 1.5.1: Andreasen classification of dental trauma (Andreasen & Andreasen 1994).

### 1.5.1. Injuries to gingiva and mucosa:

These injuries include laceration injuries, abrasion, contusion, and degloving injuries. These injuries are usually deep wounds that occur as a result of impact with a sharp object and are limited to the gingiva and oral mucosa (Pagadala & Tadikonda, 2015; Bourguignon *et al.*, 2020).

### 1.5.2. Injuries to the periodontal ligament:

Traumatic injuries to periodontal ligaments include:

- Concussion injuries where the tooth exhibits no mobility or displacement (Bourguignon *et al.*, 2020).
- Subluxation injuries: These injuries represent a loose tooth without displacement (Pagadala & Tadikonda, 2015; Bourguignon *et al.*, 2020).
- Extrusion: The affected tooth is loose and displaced from the socket in the axial direction (Bourguignon *et al.*, 2020).
- Lateral luxation involves displacement of the affected tooth in a buccal or palatal direction (Bakland and Andreasen, 2004; Bourguignon *et al.*, 2020).
- Intrusion is one of the most severe traumatic injuries that present with displacement of the tooth into the socket, resulting in the destruction of alveolar bone and squeezing of the periodontal ligaments (Bakland & Andreasen, 2004; Pagadala & Tadikonda, 2015).
- Avulsion: According to the International Association of Dental Traumatology (IADT) in 2012, avulsion is defined as the complete displacement of the tooth out of its socket (Mehta & VerMa, 2021). Moreover, avulsion injuries cause destruction to multiple surrounding structures such as the nerves, vascular tissues, bone, and supporting tissues (Poi *et al.*, 2013).

Dental trauma in the primary dentition is usually limited to the supporting structures such as luxation and sub-luxation injuries (Tewari *et al.*, 2019; Gaffar *et al.*, 2021). This is due to reduced alveolar bone density in the primary dentition in addition to a lower crown: root ratio (Tewari *et al.*, 2019).



### 1.5.3. Injuries to the hard dental tissues and pulp:

These include the following:

- Crown infraction/ crack of the enamel without loss of tooth structure (Pagadala & Tadikonda, 2015).
- Uncomplicated crown fracture: This type of fracture may be restricted to the enamel or involve enamel and dentine, without pulp exposure (Bakland & Andreasen, 2004; Pagadala & Tadikonda, 2015).
- Complicated crown fracture: This type of fracture involves enamel, dentine, and the pulp is exposed (Bakland & Andreasen, 2004; Aggarwal *et al.*, 2009).
- Uncomplicated crown root fractures involve enamel, dentine, and cementum but does not involve the pulp (Pagadala & Tadikonda, 2015).

The most common type of traumatic dental injury to permanent dentition is the enamel fracture followed by an uncomplicated crown fracture (Sandalli *et al.*, 2005; Gaffar *et al.*, 2021).

### 1.6. Early management of an avulsed tooth

Studies in the literature have focused on three areas i.e., transport media of the avulsed tooth, treatment of the periodontal ligament, and root canal treatment to decrease the possibility of inflammatory root resorption (Sheroan & Roberts, 2004; Udoye *et al.*, 2012; Poi *et al.*, 2013). According to the International Association of Dental Traumatology (IADT) in 2012, first aid management for permanent tooth avulsion should start with patient reassurance (Moule & Cohenca, 2016). Thereafter, the tooth should be handled only by its crown without touching the root (Moule & Cohenca, 2016). The tooth is then washed under cold running water for 10 seconds before replacing it in the socket (Raouf *et al.*, 2012). Management of tooth avulsion should therefore be immediate, and emergency intervention and treatment planning should be done as soon as possible (within 30 minutes) to achieve a favourable prognosis and ensure patient comfort (Raouf *et al.*, 2012; Ulusoy *et al.*, 2012; Lin *et al.*, 2016). An increase in extra-oral time subsequently reduces the prognosis and loss of the avulsed tooth may eventually occur (Udoye *et al.*, 2012). Therefore, if it is difficult to re-implant the avulsed tooth, it should be placed in an appropriate storage/ transport media (Poi *et al.*, 2013). Hanks Balanced Salt Solution (HBSS) has shown a high ability to maintain the viability of the periodontal ligament cells for extended periods, however, it is not always readily available at the site of trauma (Poi *et al.*, 2013; Mahal

*et al.*, 2013). Alternatives such as the patient's saliva or cold milk and saline have also been suggested in the literature (Goswami *et al.*, 2011; Poi *et al.*, 2013). Milk is the preferred storage media as it has a neutral pH, is rich in nutrients, and has an ideal osmolality for preserving the vitality of cells (Poi *et al.*, 2013). Though some studies have suggested that storing an avulsed tooth in the patient's mouth (saliva) may be favourable for PDL survival, the risk of the child swallowing or aspirating the tooth, exclude this option (Goswami *et al.*, 2011). Moreover, its osmolality is much lower than the physiologic osmolality, which may raise the harmful effects of bacterial contamination (Goswami *et al.*, 2011; Poi *et al.*, 2013). Tap water has inadequate properties and should not be used as a storage/ transport media for avulsed teeth (Poi *et al.*, 2013). It has a non-physiological pH and osmolality, which may lead to lysis of the PDL cells (Poi *et al.*, 2013).

### **1.7. Consequences of dental trauma**

The severity and prognosis of traumatic dental injuries mainly depend on certain factors such as the child's age at the time of trauma, stage of tooth development, the intensity of trauma, and timely referral for emergency treatment (Tewari *et al.*, 2019).

Complications following traumatic injuries to the primary dentition may appear shortly after the dental trauma (e.g., tooth discoloration or infection of the PDL), or after several months and be evident as root resorption (Holan & McTigue, 2019). Inflammatory root resorption can appear either on the external root surface or internally in the root canal (Tewari *et al.*, 2019). It usually occurs subsequently to luxation injuries and is linked to pulp necrosis and PDL inflammation (Tewari *et al.*, 2019).

Traumatic dental injuries in permanent teeth range from simple fractures of tooth enamel to more complicated injuries like tooth avulsion (Kumar *et al.*, 2017; Gaffar *et al.*, 2021). The most common complications of dental trauma in the permanent dentition associated with tooth avulsion may include ankyrotic root resorption, pulp necrosis, pulp canal obliteration, and inflammatory root resorption (Lin *et al.*, 2016).

In the case of luxation or avulsion injuries, healing by replacement cementum is common subsequent to localized inflammation which is stimulated by reimplantation of the tooth together with damaged cells which are attached to the root surface (Yu & Abbott, 2016). The combination of cemental destruction on the external surface of the root and bacteria in the pulp

canal system leads to external inflammatory resorption on the root surface which can be very serious and may result in early loss of the traumatised tooth (Trope, 2011; Abbott, 2016). These pathologic processes can occur following crown fractures, luxation, or avulsion injuries (Abbott, 2016). Complications may occur shortly after the dental trauma or may take a few years to appear (Lin *et al.*, 2016).

### **1.8. Prevention of dental trauma**

As sporting accidents are a common cause of dental trauma, patients who usually participate in sporting activities should be encouraged to use dental mouth guards during contact sports such as boxing, hockey, and rugby (Ilia *et al.*, 2014; Parker *et al.*, 2017). Mouth guards have proven to provide both hard and soft tissue protection (Sigurdsson, 2013; Parker *et al.*, 2017). Three types of mouth guards are available: stock, boil and bite, and custom-made. Stock mouth guards are readily available from sporting goods stores, are available in different sizes, and are said to have a universal fit (Sigurdsson, 2013). These types of mouth guards however have a poorer fit and retention compared to other types (Parker *et al.*, 2017). Boil and bite mouth guards are made of thermoplastic material, softened in warm water, and then molded in the patient's mouth (Sigurdsson, 2013). It should be carefully adapted to the teeth and surrounding structures to provide an acceptable fit, it still however does not provide adequate protection (Sigurdsson, 2013). Custom-made mouth guards must be made by a dentist (Sigurdsson, 2013; Ilia *et al.*, 2014). It fits the mouth exactly, therefore, providing superior retention and the best protection for the hard and soft dental tissues (Sigurdsson, 2013; Ilia *et al.*, 2014; Parker *et al.*, 2017).

### **1.9. Knowledge of school teachers with regards to the management of dental trauma**

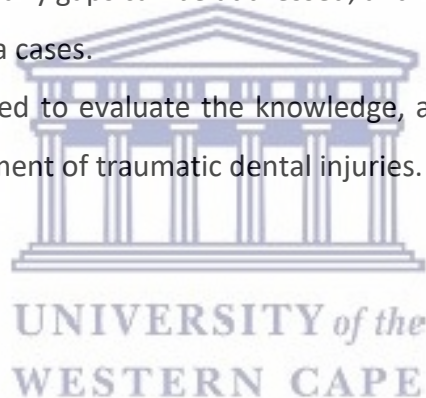
Participation of school staff members in emergency situations (e.g., an avulsed tooth) is very important to be able to provide optimal care to the child with dental trauma (Kumar *et al.*, 2017; Kurnaz & Bayraktar, 2021). As they are usually in close contact with children, teachers are often called upon to provide the first emergency care (Pacheco *et al.*, 2003). Studies in the literature have focused on the knowledge and awareness of school teachers regarding dental trauma (Pacheco *et al.*, 2003; Raof *et al.*, 2012; Kumar *et al.*, 2017). Results showed that most of the school teachers have never experienced dental trauma and they did not receive any first aid training (Raof *et al.*, 2012). Moreover, they reported lack of awareness regarding the emergency

management of traumatic dental injuries (Raouf *et al.*, 2012; Kumar *et al.*, 2017). A study conducted in 2012 by Raouf *et al.*, found that 13% of teachers stated that they would wash the tooth and place it back in its socket, 23% stated that they would place the tooth back in the mouth and refer the child to the dentist, while the rest of the school teachers stated that they would control bleeding or place the avulsed tooth in a piece of paper.

Previous studies have shown that teachers' knowledge of how to manage acute traumatic dental emergencies is inadequate (Al-Asfour *et al.*, 2008; Antunes *et al.*, 2016; Attarzadeh *et al.*, 2017). The knowledge of non-medical personnel (e.g. parents and school teachers) towards traumatic dental injuries indicates that the level of knowledge is low (Al-Asfour *et al.*, 2008; Attarzadeh *et al.*, 2017).

School teachers can play a major role in improving the immediate first-aid actions taken at the time of dental trauma (Pacheco *et al.*, 2003; Al-Asfour *et al.*, 2008; Antunes *et al.*, 2016; Gaffar *et al.*, 2021; Kurnaz & Bayraktar, 2021). It is therefore important to ascertain their level of knowledge in this regard so that any gaps can be addressed, and measures can be put in place to improve the prognosis of trauma cases.

The present study was conducted to evaluate the knowledge, attitudes, and beliefs of school teachers regarding the management of traumatic dental injuries.



## CHAPTER 2

### RESEARCH METHODOLOGY

There is a lack of reliable data regarding the knowledge of school teachers when it comes to the first aid management of traumatic dental injuries in South Africa. This study, however, only concentrated on schools in the Western Cape.

#### **2.1. Aim:**

To evaluate the knowledge, attitudes, and beliefs of school teachers regarding the management of traumatic dental injuries.

#### **2.2. Objectives:**

- To assess the knowledge of school teachers regarding first-aid management of dental trauma.
- To determine the attitudes and beliefs of school teachers towards the management of dental trauma.

#### **2.3. Study design:**

An exploratory cross-sectional study was conducted.

#### **2.4. Study population and sample size:**

The study was originally intended to target teachers from primary and secondary schools from the areas surrounding the Tygerberg Oral Health Centre which accepts referrals for traumatic dental injuries. Schools were stratified according to the number of schools in each area and a sample size of 220 teachers was determined by the statistician.

Data collection was scheduled for 2020 to allow completion of the degree by April 2021. However, due to the Covid-19 pandemic, this was not possible as schools were closed. Even though ethics clearance was obtained from the University of the Western Cape and the Department of Education, numerous roadblocks were encountered when trying to contact the schools, even during lockdown level 1. Due to the Covid prevention protocols in place in South African schools at the time, it was difficult to gain access to the schools and teachers identified in the original sample as these requests were blocked by the secretaries and no staff was on site. The recommended number of participants could therefore not be attained.

It was thus necessary to cast the net wider and include teachers from schools outside the intended study area and study methods had to be changed to allow the research to continue under the strict Covid regulations. Participants were therefore recruited through word of mouth by distributing the questionnaire as widely as possible. A convenience sample was thus used, targeting as many teachers as possible from primary and secondary schools in the Cape Town Metropole.

## **2.5. Data collection:**

A structured online questionnaire was used for data collection. The original questionnaire was reworked and presented as an online GOOGLE FORM because face-to-face interaction was not allowed due to the Covid-19 prevention protocols in South African schools. The questionnaire was adapted from various sources (Al-Asfour *et al.*, 2008; Raof *et al.*, 2012; Kumar *et al.*, 2017). The questionnaire was organized into four sections or themes. Section one focused on the sociodemographic details of the teacher. The second section contained questions to elicit knowledge of the teachers regarding traumatic dental injuries. The third and fourth sections were comprised of questions to ascertain the behaviour and attitudes of school teachers towards traumatic dental injuries in school children. Open-ended written comments to statement responses were included within each section, with the intention to increase the diversity of comments and capture more information-rich detail from the teachers (Denscombe, 2014). This descriptive component, therefore, informed the quantitative aspect so that more meaningful conclusions could be drawn. The online questionnaires were completed in English by the school teachers themselves.

## **2.6. Data analysis:**

Exploratory data analysis was performed on the categorical variables presented in the dataset using frequencies, percentages, and graphs. Fishers' exact tests were used to determine if there were associations between categorical variables and if the cell values were less than 5. All tests were deemed statistically significant at  $p < 0.05$ . Data was analysed using STATA 17 (Stata Corp. 2021. *Stata Statistical Software: Release 17*. College Station, TX: Stata Corp LLC). Within the four sections of the questionnaire, questions were posed to the teachers, to elicit the open-ended written responses which directly related to each respective section. Thematic analysis was

conducted for these open-ended questions. Under each theme, similar responses were grouped together and analysed accordingly.

### **2.7. Data protection and ethical approval:**

Permission to include teachers in the study was sought from the Western Cape Department of Education. The study was subjected to ethical approval by the Research Committee of the University of the Western Cape and the Biomedical Research Ethics Committee (BMREC) (Approval number: BM19/7/8). After submitting a revised protocol, the change in the study title and sample was also approved.

The first page of the online questionnaire was divided into two sections. The first section contained all the relevant information regarding the study and described the importance of the research. The second part consisted of a tick box indicating consent. Voluntary participation and autonomy of the information gathered were emphasized. If participants chose not to consent to participate in the study, they did not progress to the next page. Completion of the online form was therefore also taken as an indication of consent. Contact details of the principal investigator, supervisors, and BMREC were added to the first page of the online form. No personal information was recorded on the Google form. Numerical codes were assigned to maintain the confidentiality of participants and ensure that information gathered could not be attributed to a particular individual. Only the principal researcher had access to these records.

### **2.8. Budget:**

There were no study expenses as questionnaires were completed online.

## CHAPTER 3

### RESULTS

This study assessed the knowledge and attitudes of school teachers regarding the emergency management of traumatic dental injuries (TDIs) in primary and secondary schools in Cape Town. A total of forty-two teachers submitted completed questionnaires that comprised quantitative and qualitative components.

#### 3.1. Socio-demographic characteristics

The table below displays the socio-demographic characteristics of the school teachers who participated in the study.

**Table 3.1.1: Sample demographics**

Question	N (42)	%
<b>Sex</b>		
Male	2	4.8
Female	40	95.2
<b>Age</b>		
<=35	17	40.5
36-45	6	14.3
>45	19	45.2
<b>Highest Qualification achieved</b>		
High school	2	4.8
Diploma	6	14.2
University degree	32	76.2
Other	2	4.8



### 3.2. Exposure to first aid training and general dental knowledge

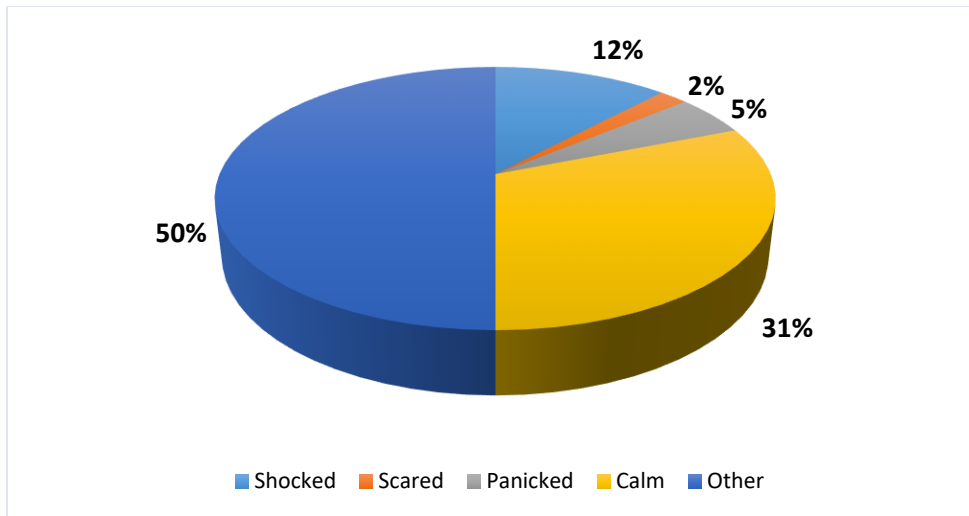
Table 3.2.1: First aid training and general dental knowledge.

Question	N (42)	%
<b>Have you received any first-aid training?</b>		
No	42	100
Yes	0.0	0.0
<b>Would you be able to distinguish between permanent and primary (milk) teeth?</b>		
Yes	29	69.0
No	13	31.0

### 3.3. Exposure to dental trauma

Table 3.3.1: The exposure of school teachers to dental trauma.

Question	N (42)	%
<b>Have you ever witnessed dental trauma?</b>		
Yes	19	45.2
No	23	54.8
<b>If yes, what is a type of dental trauma?</b>		
Tooth fracture	2	4.8
Knocked out tooth	8	19.1
Soft tissues trauma (bruises, bleeding)	7	16.7
Other	25	59.5



**Figure 3.3.1: The reaction of school teachers who had previously witnessed dental trauma.**

**Referring to Figure 3.3.1, the reported reactions of the school teachers to witnessing dental trauma are listed below:**

Question posed: What did you do immediately after witnessing the trauma?

Four of the participants stated that they asked for help (P9, P20, P25, P36).

Three participants (P9, P25, P36) said to “Call a doctor”

P20: “Report it to a teacher with more experience”

Three of the participants mentioned that they had been concerned about the control of bleeding at the time of the dental trauma (P13, P22, P38).

P13: “Got ice and tried to stop the bleeding. Sought the help of a professional”

P22: “Suck ice to stop bleeding in the toddler’s mouth”

P38: “Assist learner, place gauze in his mouth for bleeding, and sent him to the school nurse”

Five of the participants were willing to clean the injury site and call the child’s parents (P2, P5, P11, P14, P31).

P2: “Called parents to inform them of the trauma”

P5: “Washed the child's mouth with saltwater and placed the tooth in a bank bag with gloves and called the parent to collect the child immediately”

P11: “Attend to the child. Rinse their mouth with water”

P14: “contact the parents to take the child”

P31: “rinse with tap water “

Thirty of the participants did not respond to this question.

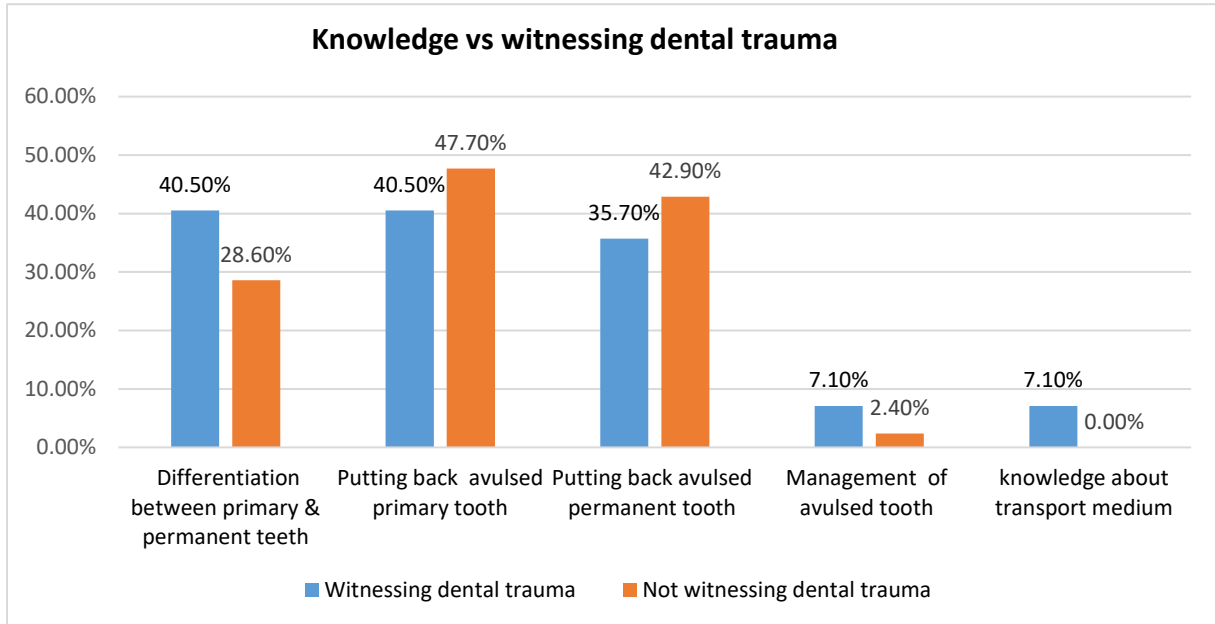


Figure 3.3.2: Knowledge of dental trauma management vs witnessing dental trauma.

### 3.4. Management of primary avulsed teeth

Table 3.4.1: The knowledge of school teachers regarding the management of dental trauma in primary teeth.

Question	N (42)	%
Do you think primary (baby/ milk) teeth should be put back into the mouth after being knocked out?		
Yes	5	11.9
No	37	88.1

### **Individual participant responses: Management of an avulsed primary tooth**

Most of the participants (37) stated that an avulsed primary tooth should not be placed back in the mouth.

P14: "The tooth came out for a reason, as soon as it's out it can become contaminated"

Twenty-five participants stated that milk teeth would exfoliate anyway, and a permanent tooth would erupt in its place, is therefore no need to put it back (25).

Three of participants stated that it should not be replaced, because it could damage permanent teeth (P2, P8, P10).

Four of the participants believed that the child could manage without a few milk teeth (P3, P25, P30, P41).

Four of the participants stated that they did not feel capable to place an avulsed tooth back in the mouth (P23, P16, P19, P33).

P23: "I cannot put the tooth back. Just try to stop the bleeding". Three other participants expressed similar sentiments (P16, P19, P33).

Five of the participants believed that reimplantation of an avulsed primary tooth was the best treatment option (P18, P24, P34, P29, P32).

P24: "If milk teeth were removed too early then the permanent teeth sprout out. The mouth might be too small or not ready to have permanent teeth". Two other participants expressed similar statements (P18, P34).

P29: "No, only if it is more traumatic for the child. I am aware that the milk teeth help guide the permanent teeth, so if it is at all possible for it to go back without causing greater trauma then yes"

P32: "Important for normal speech development"

### 3.5. Management of permanent avulsed teeth

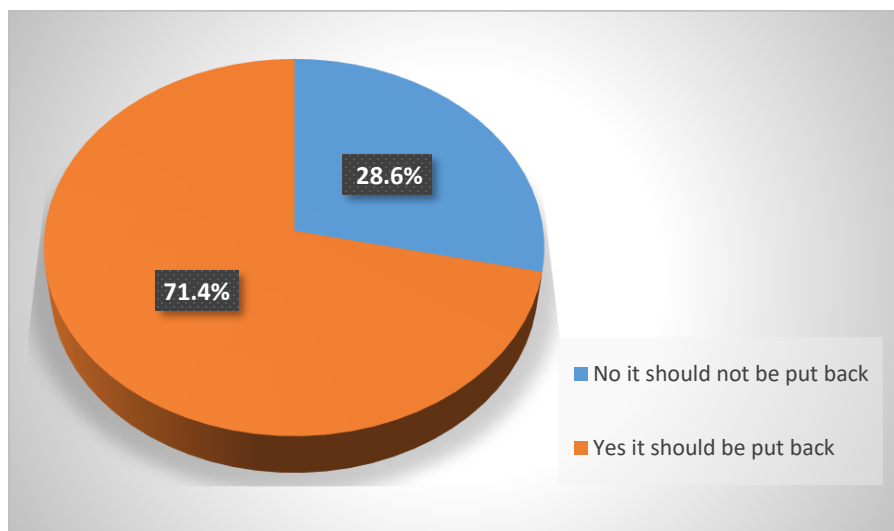


Figure 3.5.1: Teachers' response to putting an avulsed permanent tooth back into the socket.

#### Individuals' responses: Management of an avulsed permanent tooth

The majority of the participants (71.4%) agreed that reimplantation of an avulsed permanent tooth is the best treatment option.

Twenty-two of the participants stated that the tooth should be placed back for aesthetic, speech, and function purposes(22)

P1: "Loss of teeth can have a detrimental effect on an individual's self-esteem and confidence"

P13: "Don't know if the information is correct but I have heard it keeps the tooth alive"

P22: "It is permanent, and no other teeth will grow there"

Five of the participants mentioned that reimplantation of an avulsed permanent tooth mainly depends on the condition of the tooth (P15, P20, P23, P34, P38).

P15: "If the permanent tooth is in a good condition, it should be put back in its place"

P34: "Can be used for life if not damaged too much". Two other participants made similar statements (P20, P23).

P38: "If the permanent tooth is still healthy"

Five of the participants stated that an avulsed permanent tooth should not be placed back into the socket (P7, P12, P14, P29, P42).

P7: "Should not be put back, you can injure a nerve or cause damage to the gum". P42 said something similar.

P14: "I don't think a tooth can be put back, a false tooth could replace the tooth knocked out"

Two participants (P29, P12) advised that the child should be taken to a dentist "if a permanent tooth is knocked out"

Seven of the participants did not answer the question.

### **3.5.1. Management of the tooth surface immediately after an avulsion injury:**

#### **Individual responses to the question: "If a tooth was knocked out of the mouth and fell on the ground, how would you clean it?"**

Most of the participants agreed that an avulsed tooth should be cleaned in the case of contamination. Twenty-three teachers mentioned that they would use water to rinse an avulsed tooth.

Seventeen of the participants suggested to put the tooth under running water (17).

P23: "Rinse in clean water. Then place in a clean container". Participants (P2, P6, P16) expressed similar statements.

Two participants (P3, P5) advised to "rinse the tooth with water and put in milk" while two of the participants (P1, P7) mentioned that they would put the avulsed tooth in milk to clean it.

P1: "I would put it in a cup of milk"

P7: "Place it in milk"

Two of the participants (P11, P27) mentioned that they would use a mouth wash to rinse an avulsed tooth.

P11: "Place it in strong mouth wash"

P27: "Rinse it with water and mouth wash"

Five school teachers (P10, P18, P29, P33, P38) stated that they would not clean an avulsed tooth as they would prefer to take the tooth directly to the dentist.

P18: "I would not. Put in a bag and take to the dentist"

P33: "pick up with tissue and place in a plastic Ziploc bag"

P10: "I would not clean it" two other participants expressed similar statement (P29, P38).

The rest of the participants (10) were unable to answer this question

### 3.6. Impact of knowledge on dental trauma management

#### 3.6.1. Knowledge vs age:

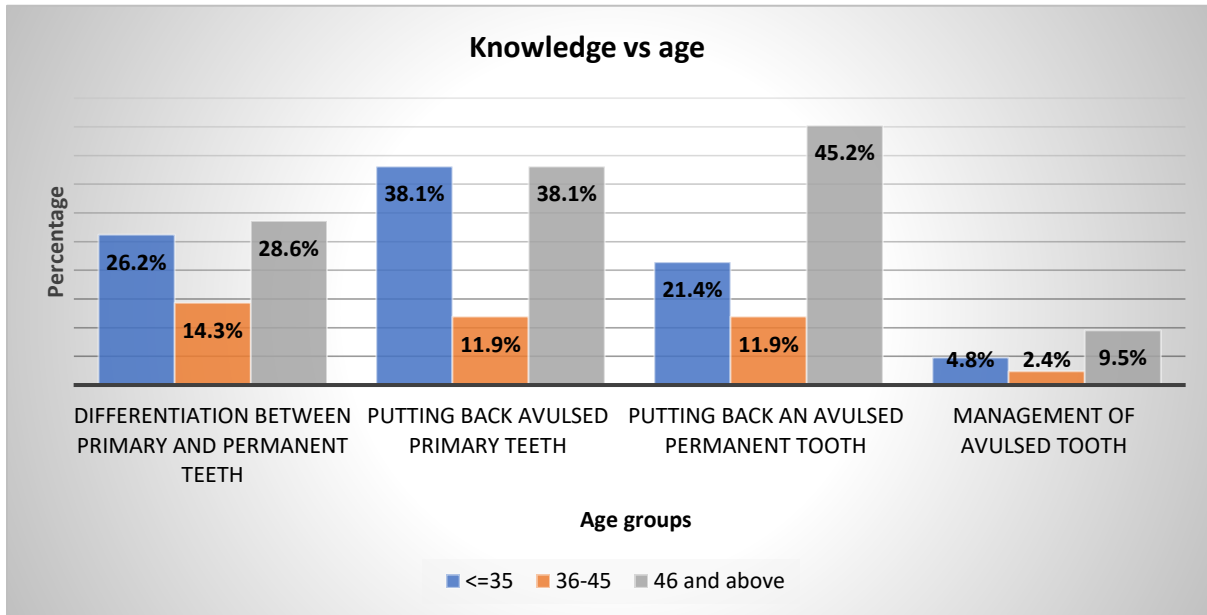
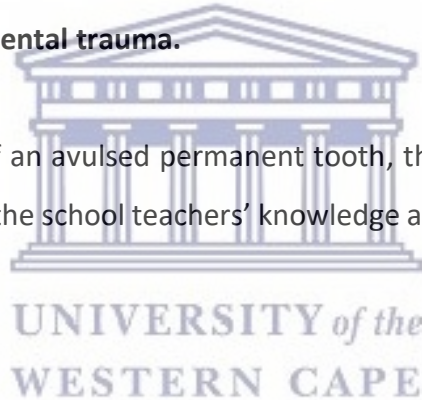


Figure 3.6.1.1: Association between the age groups and the provision of correct answers regarding the management of dental trauma.

Regarding the reimplantation of an avulsed permanent tooth, the Fisher's exact test showed a significant association between the school teachers' knowledge and age groups ( $p$  value= 0.018).



### 3.6.2. Knowledge vs qualification level:

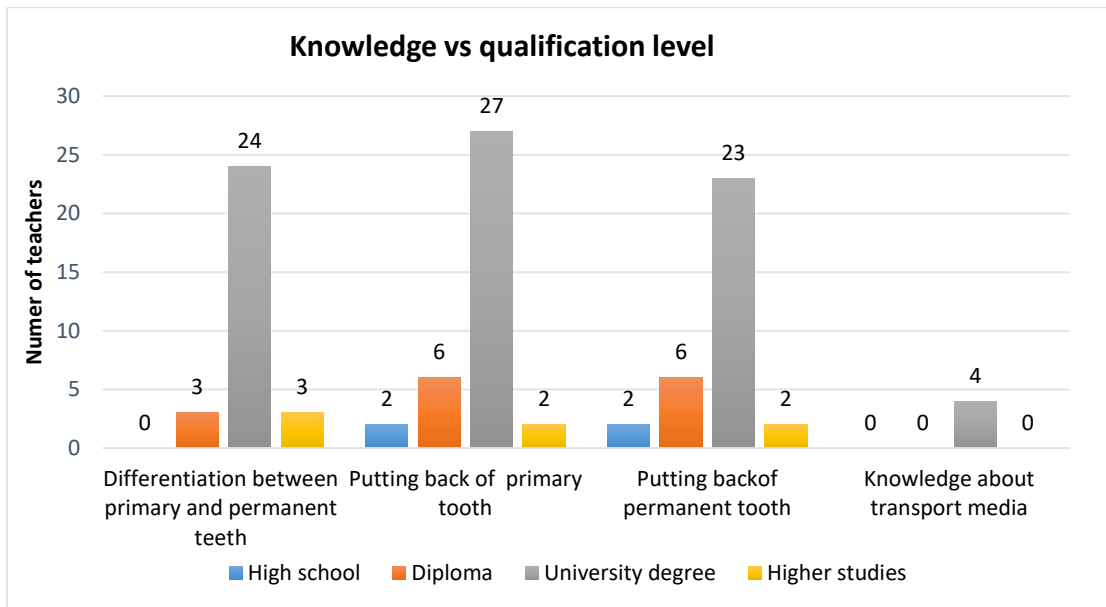


Figure 3.6.2.1: Knowledge of school teachers regarding the management of dental trauma vs qualification level.

### 3.6.3. Knowledge on trauma management:

#### 3.6.3.1. Transport media:

The figure below displays the percentage of participants that are aware of what a transport media is.

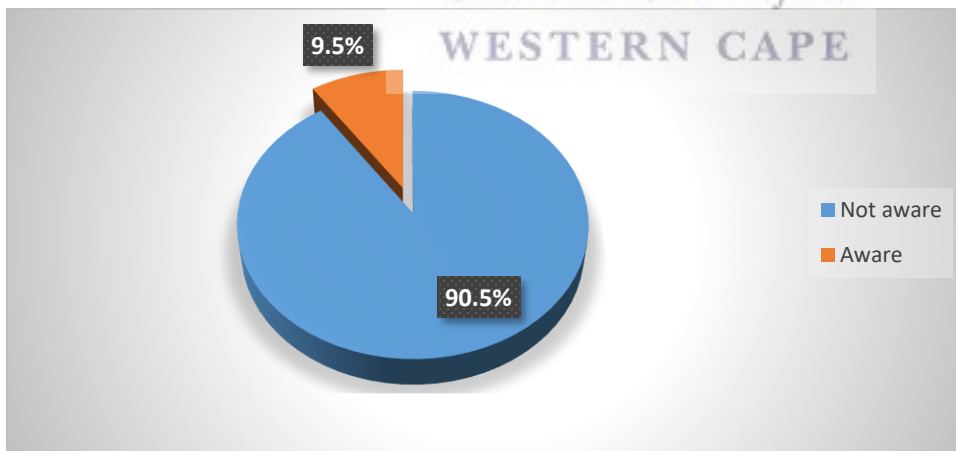


Figure 3.6.3.1.1. Knowledge of school teachers regarding the use of a transport media in dental trauma.



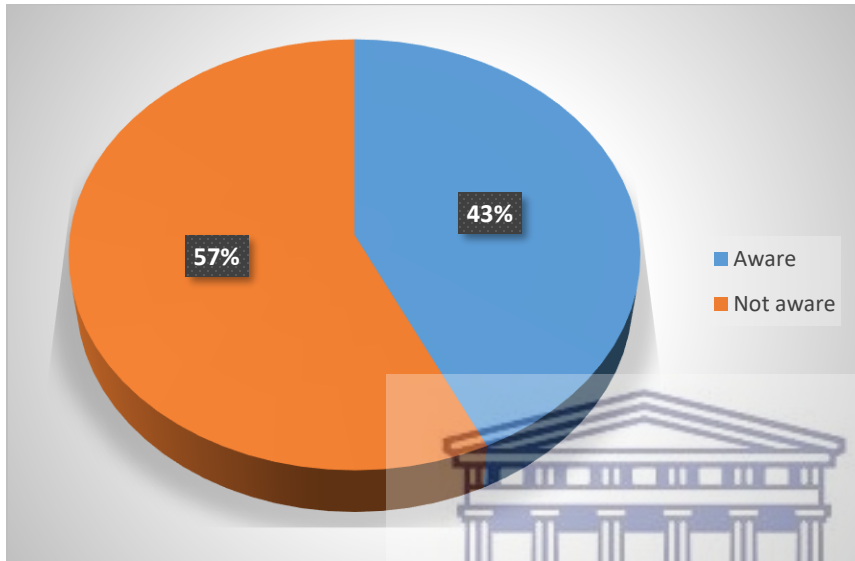
### **Individual responses to the question regarding the types of transport media**

The vast majority of the participants (37/42) stated that they never heard about a transport media.

Three of the participants(P10, P21, P32) suggested that the tooth be kept in a cup of milk.

#### **3.6.3.2. Tetanus vaccine:**

The following figure represents the percentage of school teachers that were aware of the importance of the tetanus vaccine in dental trauma.



**Figure 3.6.3.2.1: Awareness of the importance of the tetanus vaccine in dental trauma.**

### **Participant responses: The indications for tetanus vaccine in dental trauma**

Less than half of the participants (43%) stated that the tetanus vaccine is necessary in cases of dental trauma.

P31: "To strengthen the immune system"

P42: "Could prevent other complications"

Twelve of the participants stated that it is needed to prevent infection (12).

Three of the participants (P3, P13, P25) believed that it depends on the situation. If the child was cut/ knocked with a metal object it might be necessary.

It is interesting to note that one of the participants (P16) mentioned that the tetanus vaccine might be needed in the case of soft tissue injuries.

P16: "In the scenario of trauma being caused by metal and cutting the lip or gum"

Eight of the participants stated that the tetanus vaccine is not necessary for traumatic dental injuries (8).

P18: "I thought a tetanus vaccine is for a dog bite or rusty nails "

P20: "I am not a Dr and therefore I do not make these decisions. I will tell the parent to take the child to the dentist immediately"

P4: "Nothing else has impacted the gum so they don't need a tetanus shot"

P36: "When a child's milk teeth fall out you don't take them for a shot"

Twelve of the participants indicated a lack of knowledge regarding the importance of the tetanus vaccine in dental trauma and the repercussions.

### 3.6.3.3. Immediate management post-dental trauma:

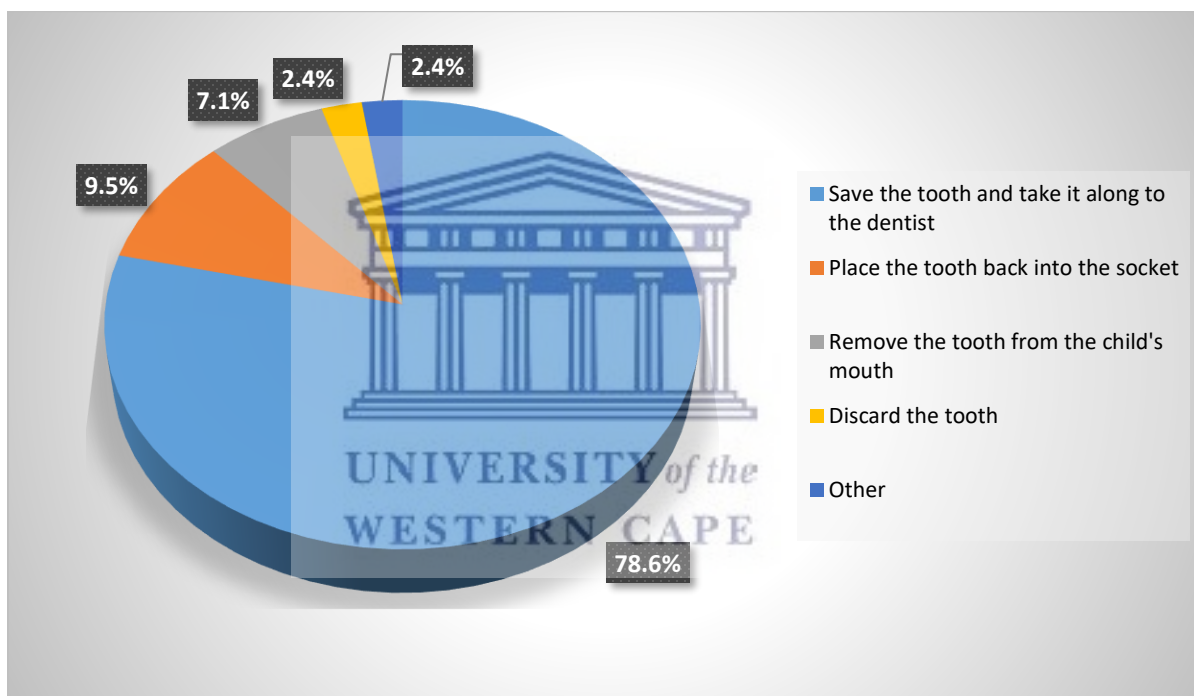


Figure 3.6.3.3.1: Participants' responses regarding the management of an avulsed permanent tooth.

### **Individual responses: immediate management of an avulsed permanent tooth**

Most of the participants (78.6%) stated that in the case of tooth avulsion they preferred to save the tooth and send the child to the dentist.

Fifteen of the participants stated that they don't have any knowledge, they prefer to take the tooth to the dentist to see if he/ she can still do something about it. (15)

P12: "I would just think that would be the logical thing to do. I would not remove any tooth or even tamper with the child's mouth because I am not trained accordingly to do so"

P31: "I would rather a trained professional treat the learner"

P40: "Never through any tooth away"

Four of the participants (P5, P10, P15, P26) stated that the avulsed permanent tooth should be replaced back, if that is possible.

Two teachers (P1,P27) stated that it was not their responsibility to decide what type of treatment should be carried out in such situations:

P1: "It is not my responsibility as a teacher to decide what happens to the child's tooth.

The parent must decide hence I will save the tooth"

P27: "We are not allowed to work in a child's mouth"

Five of the respondents (P3,P19, P33, P37, P42) believed that an avulsed permanent tooth should not be placed back in the socket, as it could be swallowed by the child.

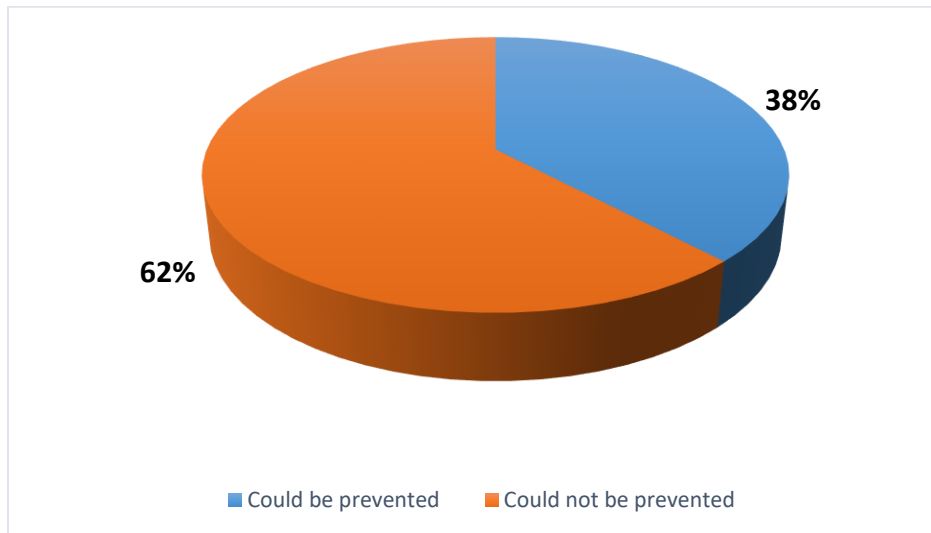
P3: "if it is bleeding, I will not be able to put it back into the socket"

P19: "No should not place it back, the child could choke". three other participants stated something similar (P33, P37, P42).

Five of the respondents knew nothing about this topic and eight of them did not answer this question.

#### 3.6.3.4. Prevention of dental trauma:

The following figure displayed the school teachers' knowledge regarding dental trauma prevention.



**Figure 3.6.3.4.1: Knowledge of school teachers regarding dental trauma prevention.**

#### Individual responses to the question of how to prevent traumatic dental injuries

In reference to Figure 3.6.3.4.1, more than half of the participants (62%) believed that traumatic dental injuries could not be prevented. Individual responses displayed that.

P12: "It doesn't matter what measure you put in place; children still get injured in the playground"

Three of the participants (P1, P9, P23) believed that dental trauma could not be prevented if it's an accident.

Eight school teachers stated that traumatic dental injuries could be prevented, and they suggested the use of mouth guards during sports activities. (8)

Three of the participants (P15, P20, P24) stated that dental trauma could be prevented by improving the safety measures in place.

P14: "Good supervision and informing the children before an activity to be careful"

P18, P21: "Create awareness"

The rest of the school teachers (24) revealed inadequate knowledge regarding the methods of dental trauma prevention.

### 3.7. Attitudes regarding dental trauma

Table 3.7.1: The attitudes of school teachers regarding the management of dental trauma.

Question	N (42)	%
<b>Which health care provider do you think is the best for dental trauma management?</b>		
General physician	0	0.0
Pediatrician	0	0.0
Pediatric dentist	16	38.1
General dentist	25	59.5
Other	1	2.4
<b>Do you believe that it is the teacher's responsibility to manage dental injuries when the child is in your care?</b>		
Yes	27	64.3
No	15	35.7
<b>Do you have a protocol in place for dental injuries at the school or during sports events?</b>		
Yes	16	38.1
No	26	61.9
<b>Would you be interested in getting training on how to manage dental injuries?</b>		
Yes	26	61.9
No	16	38.1



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# CHAPTER 4

## DISCUSSION

Sporting activities, falls and accidents are the most common causes of traumatic dental injuries (Juneja *et al.*, 2018). Students of school-going age are very often predisposed to traumatic dental injuries, due to their immature motor coordination and involvement in daily activities such as running, sporting activities, and bike riding (Al-Obaida, 2010; Gupta *et al.*, 2011). The awareness of first-aid management of dental trauma is crucial since any delay may reduce the long-term prognosis of these injuries (Moule & Cohenca, 2016).

The literature indicates a gross lack of knowledge among school teachers regarding the emergency management of dental trauma (Al-Obaida, 2010; Antunes *et al.*, 2016; Attarzadeh *et al.*, 2017; Tahririan *et al.*, 2022). In addition, no studies have previously been done in South Africa concerning the knowledge and attitudes of school teachers regarding dental trauma management.

This study aimed to assess the knowledge of school teachers and determine their attitudes and beliefs when it comes to the management of dental trauma. Factors related to the teachers' education and experiences were identified which may contribute to the development of strategies to improve their knowledge and attitudes towards managing traumatic dental injuries.

### 4.1. Socio-demographic characteristics

The demographic and professional characteristics of the respondents are presented in (Table 3.1.1). Most of the respondents were female, while just two male teachers participated in this study. The association of sex with knowledge was statistically insignificant. Due to COVID-19 measures, access to schools was restricted, thus necessitating the use of electronically distributed questionnaires to gather data. The response rate of teachers was low. This sample is therefore not a true reflection of the teaching community in Cape Town. More studies of this nature are thus needed.

In terms of age, less than half of the participants ( $n = 19/42$ , 45.2%) were older than 45 years of age, ( $n = 17/42$ , 40.5%) were 35 years of age or younger, and ( $n = 6/42$ , 14.3%) were 36-45 years of age.

As shown in (Table 3.1.1), most of the respondents ( $n = 32/42$ , 76.2%) had a university degree, ( $n = 6/42$ , 14.2%) had a diploma, ( $n = 2/42$ , 4.8%) completed high school and ( $n = 2/42$ , 4.8%) of the respondents chose the “other” option which did not clarify the educational level of the participants.

#### **4.2. Exposure to first aid training and general dental knowledge**

As reported in (Table 3.2.1), none of the participants had received any first-aid training. These findings might have a potentially negative influence on the teachers’ knowledge. Similar results were reported by Al-Obaida, (2010) in Saudi Arabia where the majority of the school teachers did not receive first-aid training. Al-Obaida, (2010), reported that only 1.5% of school teachers had taken a course in dental emergencies, while 28.5% had experienced dental trauma in children at school.

A similar study by Young *et al.*, (2012) investigated the level of knowledge about emergency management of dental trauma among Hong Kong primary and secondary school teachers. They reported that 11.4% of the school teachers claimed that they had received information regarding the management of dental trauma from the first-aid training programme. This proves that dental trauma training, including dental emergency management, could improve school teachers’ awareness regarding dental trauma management.

Avulsed primary teeth should not be reimplanted (Ludgero *et al.*, 2012). Therefore, to carry out the most suitable emergency management it is necessary to distinguish between primary (milk) teeth and permanent teeth as each tooth should be managed differently (Ludgero *et al.*, 2012). It is evident from the literature that most school teachers lacked sufficient knowledge regarding primary and permanent dentitions and their time of transition (Altamimi *et al.*, 2020). They could not thus differentiate between primary and permanent teeth based on the child’s age (Young *et al.*, 2012; Pithon *et al.*, 2014; Altamimi *et al.*, 2020).

Most of the participants ( $n = 29/42$ , 69%) claimed that they could distinguish between primary and permanent teeth (Table 3.2.1). This should however be interpreted with caution as this was self-reported and could not be confirmed. Similar results were reported by Alluqmani and Omar, (2018) in primary schools in Saudi Arabia, where (63.5%) of teachers claimed they were able to distinguish between deciduous and permanent teeth, although no investigations were done to prove that statement.

### 4.3. Exposure to dental trauma

As shown in (Table 3.3.1), more than half of the participants ( $n = 23/42$ , 54.8%) stated that they had never witnessed dental trauma during school hours, while ( $n = 19/42$ , 45.2%) indicated that they had encountered dental trauma in a child. Even though this percentage is quite high, no statistically significant difference was reported in the present study between the knowledge level of school teachers who had witnessed dental trauma and those who did not. Nineteen percent of the participants encountered avulsion injuries, followed by soft tissues injuries ( $n = 7/42$ , 16.7%) such as abrasion and soft tissue lacerations (lips, gums, and tongue), and fractured teeth ( $n = 2/42$ , 4.8%) such as crown fractures, complicated crown fractures, and root fractures (Table 3.3.1).

Despite the anxiety combined with seeking emergency management for a child with dental trauma, ( $n = 13/42$ , 31%) of the respondents stated that they remained calm (Figure 3.3.1). The responses of participants who had witnessed dental trauma revealed that four of the participants sought help by calling a doctor or reporting the incident to a colleague with more experience in dental trauma. Eight of the participants were more concerned with bleeding control and cleaning of injury sites by using gauze. They then contacted the parents and advised them to take the child to the dentist for further treatment. A similar study by Raouf *et al.* (2012) in Iran reported that almost half of the school teachers (51.5%) said that they would contact the child's parents to take the child to the dentist, rather than perform any sort of early management.

The group of school teachers who had witnessed dental trauma in a child provided reasonable answers regarding the management of dental trauma compared to those who had never witnessed dental trauma (Figure 3.3.2). Based on these findings, however, we could not assume that witnessing dental trauma had a positive impact on school teachers' knowledge since most of the participants stated that they were not confident enough to take an active role in managing dental trauma and preferred to contact the parents or refer the child to a general dentist for treatment.

According to the South African Children's Act (2005), parental consent is not mandatory in trauma cases where emergency treatment is needed. Therefore, a child with dental trauma should be sent to the dentist immediately for proper treatment. Any delay in seeking emergency management might affect the long-term prognosis.



#### 4.4. Management of primary avulsed teeth

The responses of school teachers regarding the management of dental trauma in primary teeth are shown in (Table 3.4.1). As mentioned previously, avulsed primary teeth should not be reimplanted in order to prevent damage to the succeeding permanent teeth (McTigue, 2013). If the teacher is not able to distinguish between primary and permanent teeth, the child should be referred to the dentist immediately.

Based on the individual responses, most of the participants (37) reported that there was no need to put an avulsed primary tooth back into the mouth as it will eventually be replaced by a permanent tooth. Despite this, five of the participants stated that an avulsed primary tooth should be replaced to keep the space for the permanent successors and normal speech development. A similar result was reported by Young *et al.*, (2012) in Hong Kong, who assessed school teachers' knowledge regarding the emergency management of dental trauma in primary and secondary schools, where 74.6% of respondents stated that primary avulsed teeth should not be reimplanted. However, the sample size was much bigger (400 teachers) than the current study, and the question used by Young *et al.* was a leading question (close-ended) as the teachers did not provide any explanation for their answers.

#### 4.5. Management of permanent avulsed teeth

In the case of permanent tooth avulsion, reimplantation is the treatment of choice but cannot always be carried out immediately (Andersson *et al.*, 2012). The vast majority of the participants ( $n = 30/42$ , 71.4%) (Figure 3.5.1) agreed that an avulsed permanent tooth should be reimplanted immediately. Individual responses revealed that most of the participants (25) recommended reimplantation of an avulsed permanent tooth for function and aesthetic purposes and they believed that the loss of anterior permanent teeth may have a detrimental effect on an individual's self-esteem and confidence. However, close to 30% ( $n = 12/42$ ) of the participants (Figure 3.5.1) reported that they would not reimplant an avulsed permanent tooth because they did not know how to manage such a situation and might damage the surrounding vital tissues. This finding is consistent with a study carried out by Ludgero *et al.*, (2012) in Brazil on elementary school teachers regarding the management of tooth avulsion. The study represented an example of a case of tooth avulsion, followed by closed-ended questions on how the teacher would manage such a case. They found that 85.2% of the teachers did not know how to manage these

types of dental injuries and demonstrated a lack of knowledge regarding the benefits of early management of traumatic injuries (Ludgero *et al.*, 2012).

Five of the participants in the present study mentioned that the management of an avulsed tooth mainly depends on the condition of the tooth, as they believed that an avulsed tooth should only be put back if it was in a good condition (not badly damaged). Although the answers were correct, none of the participants mentioned the other factors that should be considered in the management of avulsion injuries, such as the viability of the periodontal ligaments (PDL) and extra-oral time, which indicates a lack of knowledge regarding the importance of early intervention in the long-term prognosis of an avulsed tooth.

The literature reported that the treatment of choice with the best long-term prognosis for an avulsed permanent tooth is replacing the tooth into the socket immediately but preferably within 20 minutes (Andreasen *et al.*, 2018). However, none of the participants were willing to put an avulsed tooth back into the socket by themselves. The vast majority of the respondents ( $n = 33/42$ , 78.6%) (Figure 3.6.3.3.1) stated that in the case of permanent tooth avulsion, they would save the tooth and take it along to the dentist, which is the second-best option. The individual responses indicated a lack of confidence, training, and expertise among school teachers regarding the early management of dental trauma.

#### **4.5.1. Management of the tooth surface immediately after an avulsion injury:**

Regarding the treatment of the root surface immediately after avulsion, sterile saline is the most preferred medium to remove any contaminants or dead cells (Andreasen *et al.*, 2018). It is however considered to be impractical as it is not readily available at the accident site. Thus, tap water could be used to clean the avulsed tooth but not to transport or store it (Udoye *et al.*, 2012). Tap water is hypotonic and not compatible with PDL cells, causing rapid cell lysis. The tooth should therefore not be stored in it (Udoye *et al.*, 2012). Individual responses revealed that over half of the participants (23) stated that they would use tap water to rinse an avulsed tooth in the case of contamination. It is noteworthy that two participants stated that they would rise the tooth with tap water and then place it in milk which indicates good knowledge regarding tooth cleaning and transport media. Two participants stated that they would place an avulsed tooth in milk for tooth cleaning, which indicated that teachers were unable to differentiate between a cleaning medium and a transport medium.

The fact that two participants indicated that mouth wash could be used for cleaning the tooth clearly indicates a lack of knowledge regarding the cleaning methods for avulsed teeth.

On the other hand, five of the participants stated that they would not clean an avulsed tooth but would just place it in a bag to be sent to the dentist or sent home to be cleaned by the mother.

The participants' responses revealed insufficient knowledge regarding the basic principles of dental trauma management.

## **4.6. Impact of knowledge on dental trauma management**

### **4.6.1. Knowledge vs age:**

In the current study, participants in the age group older than 45 years had a greater number of correct answers regarding the management of dental trauma (Figure 3.6.1.1). This revealed good knowledge among this group. However, according to the Fisher's exact test, most of the knowledge differences among the age groups were statistically insignificant, perhaps due to the small sample size. The only exception was the responses of the participants regarding the reimplantation of an avulsed permanent tooth. The Fisher's exact test showed a significant association between the age groups ( $p$  value= 0.018), even though, we could not assume that older teachers had better knowledge than younger ones. Similar results were reported by Pithon *et al.*, (2014) in Brazil to assess primary school teachers' knowledge about immediate management of dental trauma. They found that the association between the knowledge of school teachers and age was statistically insignificant. However, in contrast, a study by Alsdhan *et al.*, (2018) in Riyadh, Saudi Arabia, was conducted to assess school teachers' knowledge regarding dental trauma management. They reported that school teachers who were older than 40 years of age had a higher level of knowledge compared with teachers who were younger than 40 years of age, and they related that to more exposure to dental trauma accidents in schools.

### **4.6.2. Knowledge vs qualification level:**

Among the variables assessed in the present study, results showed that teachers who had university degrees had a higher frequency of correct answers compared to other qualifications such as high school degrees and diplomas (Figure 3.6.2.1). This result is consistent with a similar study conducted by Feldens *et al.*, (2010) in Brazil which identified the factors associated with the knowledge of teachers about dental trauma. This showed that the level of education might have a positive influence on the teachers' knowledge regarding the management of dental

trauma. However, in the present study, the association of educational level with knowledge was statistically insignificant. This indicated that a higher qualification level did not seem to result in increased knowledge of emergency management.

#### **4.6.3. Knowledge on trauma management:**

- **Transport media**

It is well known that the management of an avulsed permanent tooth is challenging and mainly depends on the viability of the periodontal ligaments left on the root surface prior to reimplantation (Gurunathan & Somasundaram, 2014). Ideally, an avulsed permanent tooth should be reimplanted immediately, with the best prognosis expected (Andersson *et al.*, 2012). A delay in providing emergency dental management for more than 30 minutes may jeopardize the long-term prognosis (Andersson *et al.*, 2012). Immediate referral to the dentist is mandatory, along with using an appropriate transport/ storage media and reducing the extra-oral time (Andersson *et al.*, 2012; Karayilmaz *et al.*, 2013; Namdev *et al.*, 2014). The transport media is basically used to preserve the viability of periodontal ligament fibres for extended periods (Andreasen *et al.*, 2018). Hank's Balanced Salt Solution (HBSS) has shown a superior ability in maintaining the viability of the periodontal ligament cells (Khinda *et al.*, 2017). However, it is not readily available at the site of trauma due to its high cost (Udoye *et al.*, 2012). Milk has been recommended by the International Association of Dental Traumatology (IADT) and the American Academy of Pediatric Dentistry (AAPD) as the most appropriate and most readily available transport media (Attarzadeh *et al.*, 2017). It has a compatible pH and osmolality with PDL cells and contains growth factors and essential nutrients for cells (Leelavathi *et al.*, 2016).

Most of the participants ( $n = 38/42$ , 90.5%) (Figure 3.6.3.1.1) stated that they had never heard of a transport media. Individual responses displayed that only 3 out of the 42 participants had revealed good knowledge as they mentioned milk as an appropriate transport media. Three of the participants in the present study mentioned that they would use water to save an avulsed tooth. Water is the least preferable transport/ storage media because the hypotonic environment induces rapid cell lysis and increased inflammation on reimplantation which may lead to dental complications later such as ankylosis or replacement root resorption (Udoye *et al.*, 2012). School teachers were not aware that preserving the viability of periodontal ligament cells is an important factor in the management of avulsion injuries. This is in line with the findings of a study conducted in Sudan by Mergany, *et al.*, (2016) where 97% of school teachers displayed

inadequate knowledge of storage/ transport media. In contrast, a similar study by Singh, *et al.*, (2015) in Mathura City reported that 87% of teachers gave the correct answers regarding storage/ transport media.

- **Tetanus vaccine:**

With regards, to the traumatic dental injuries, the tetanus vaccine should be considered in a situation where dental trauma results in soft tissue injuries, particularly when contaminated with dirt or soil (Moule, & Cohenca, 2016). In the present study, over half of the participants ( $n = 24/42$ , 57.1%) (Figure 3.6.3.2.1) stated that they were not aware of the importance of the tetanus vaccine in dental trauma. These findings are consistent with the study by Niviethitha *et al.*, (2018) conducted in India where 56.1% of school teachers were not aware of the importance of the tetanus vaccine in dental trauma. In the present study, participant responses revealed that just one school teacher displayed good knowledge regarding the importance of and indications for the tetanus vaccine in dental trauma. Three of the participants stated its importance only in cases where a metal object was the cause of trauma. Fourteen of the participants believed that it is necessary to strengthen the immune system and prevent infections, which indicated insufficient knowledge regarding the indications of the tetanus vaccine in dental trauma.

- **Immediate management post- dental trauma:**

In the current study, the teachers were questioned about dental trauma management. As immediate management post-trauma, ( $n = 33/42$ , 78%) of the participants (Figure 3.6.3.3.1) preferred to save the avulsed tooth and take it along to the dentist rather than perform any sort of early management themselves. This is similar to the study conducted by Balkhair *et al.*, (2020) in Jeddah City, where 70% of the participants agreed that prompt treatment is necessary to save an injured tooth. However, in contrast, a study by Mergany *et al.*, (2016) among Sudanese school teachers reported that more than half of the teachers were more concerned about bleeding control and sending the child home, than with saving the tooth or performing any kind of management.

Two of the present participants believed that it is not the teacher's responsibility to decide how to manage such accidents. They stated that they would contact the parents to take the child to the dentist. Five of the respondents believed that an avulsed permanent tooth should not be reimplanted due to the potential risk of tooth swallowing or aspiration. These findings indicated limited knowledge regarding the early management of avulsion injuries. These findings are

consistent with results reported by Mergany *et al.*, (2016) among Sudanese school teachers where 97% of school teachers displayed inadequate knowledge regarding tooth avulsion management.

- **Prevention:**

Regarding the prevention of dental trauma, ( $n = 26/42$ , 61.9%) of the respondents (Figure 3.6.3.4.1) stated that traumatic dental injuries could not be prevented, since accidents always happen during sporting activities in the school environment regardless of the measures that are taken to prevent them. However, ( $n = 16/42$ , 38%) of participants believed that traumatic dental injuries (TDIs) could be prevented. From individual responses, it was noted that eight of the participants mentioned mouth guards as one of the preventive measures that could be used for dental trauma prevention. Some of the teachers (6) recommended improving safety measures in the school environment to prevent traumatic dental injuries by providing good supervision during sporting activities and being informed about dental trauma, especially in children.

These findings indicate limited knowledge of teachers regarding the importance and the role of mouth guards in the prevention of dental trauma. The literature revealed that the majority of school teachers lacked knowledge on this topic (Bayrak *et al.*, 2012; Singh *et al.*, 2015). A similar study by Singh *et al.*, (2015) in India which was conducted to evaluate the knowledge and attitudes of school teachers about emergency management of traumatic dental injuries, reported that many school athletes and coaches had insufficient knowledge about mouth guards and were not concerned about preventing traumatic dental injuries. More information on dental trauma prevention should be provided to school teachers, coaches, and children. This includes the importance of mouth guards and the properties of the various types.

#### **4.7. Attitudes regarding dental trauma**

The results of the present study revealed that ( $n = 27/42$ , 64.3%) of the participants (Table 3.7.1) felt responsible for the early management of traumatic dental emergencies that occur in the school environment. They believed that early intervention could play a major role in the prognosis of dental trauma. Similar findings were reported by Attarzadeh *et al.*, (2017) in Yazd, Iran where more than 60% of teachers believed themselves to be responsible for managing dental injuries in school. A total of ( $n = 26/42$ , 62%) of the participants in the current study (Table 3.7.1) expressed an interest in receiving more information and training regarding the

management of traumatic dental injuries. This finding indicates that the participants were unsatisfied with their level of knowledge regarding the early management of dental trauma. This overwhelming interest among school teachers has also been demonstrated in other similar studies (Mergany *et al.*, 2016; Ivanda *et al.*, 2021; Gaffar *et al.*, 2021).

The school teachers' responses revealed a lack of knowledge and confidence regarding the early management of dental trauma, as more than half of the participants ( $n = 25/42$ , 59%) preferred to refer the child to a general dentist to carry out the procedure instead (Table 3.7.1).

Schools could be the most appropriate environment to initiate educational programmes regarding the prevention and management of dental injuries. In the present study, ( $n = 26/42$ , 61.9%) of participants (Table 3.7.1) mentioned that there is no protocol for emergency management of dental trauma at their schools. The rest of the respondents (16) stated that they had a protocol for the management of dental traumatic injuries, especially during sports events. They however did not mention the type of protocol that was in place.

Several studies reported insufficient knowledge of school teachers with regard to the emergency treatment of traumatic dental injuries (Zakirulla *et al.*, 2011; Young *et al.*, 2012; Gaffar *et al.*, 2021; Ivanda *et al.*, 2021). There is evidence to suggest that educational programmes regarding the management of dental trauma could improve the awareness of school teachers. In a previous study conducted by Niviethitha *et al.*, (2018) in India, school-based educational programmes distributed a questionnaire with regards to dental trauma management to school teachers in 15 randomly selected schools, followed by audio-visual (AV) aids as an educational tool. This included the use of a video representing evidence-based information regarding the management of dental emergencies. The questionnaire was re-administered to test the teachers' knowledge after they viewed the video. The majority of school teachers stated that AV aids were helpful, and the results showed a significant improvement in teachers' knowledge with a positive effect on their attitudes regarding the emergency management of dental trauma. Almost 99.7% of teachers reported improved confidence in handling traumatic dental injuries. This type of educational video might be an effective tool to improve school teachers' knowledge regarding dental trauma management.

Al-Asfour *et al.*, (2008) reported that a brief lecture given to school teachers could assist in upgrading their level of knowledge. By providing brief information on first-aid management after

dental trauma, an improvement in school teachers' awareness regarding the early management of traumatic dental injuries was noted (Al-Asfour *et al.*, 2008).

A study by Lieger *et al.*, (2009) in Bern was conducted to assess the impact of an educational campaign regarding the management of traumatic dental injuries on the knowledge of school teachers, 5 years after an educational poster campaign about emergency management of traumatic dental injuries. The findings revealed an improvement in school teachers' knowledge regarding the management of traumatic dental emergencies in the area where the poster had been distributed compared to an area where the poster had not been distributed (Lieger *et al.*, 2009). These findings reinforce the need for continuous educational programmes regarding dental emergencies to improve teachers' knowledge and heighten awareness of this topic.





## CHAPTER 5

### LIMITATIONS, CONCLUSIONS, AND RECOMMENDATIONS

#### 5.1. Limitations

Due to the limitation of school access due to COVID-19 regulations this study was conducted using an online questionnaire. The response rate of this questionnaire survey was rather low. The quality of the responses could not be verified through an interview, therefore, we could not probe the responses and had to accept them as is. Some responses were very brief and could not be clarified.

The data collected may not fully represent the knowledge levels of primary and secondary school teachers in the entire city and the findings can therefore not be generalised. Further studies with larger sample sizes are thus needed.

#### 5.2. Conclusion

In conclusion, the long-term prognosis of traumatic dental injuries mainly depends on the knowledge and skills of the dentist as well as emergency management at the site of the traumatic accident. This means that parents, teachers, and coaches must also have basic knowledge of emergency management of traumatic dental injuries.

Among the school teachers surveyed, it was observed that knowledge of emergency management of traumatic dental injuries was significantly lacking. Anecdotal evidence suggests that first aid training and management of dental trauma are not included in the teaching curriculum. From survey made by the researcher, the knowledge of the school teachers was insufficient regarding the prevention of traumatic dental injuries, the importance of the tetanus vaccine, and the use of transport media in dental trauma. The positive findings were that the majority of the respondents felt responsible for the emergency management of dental trauma that occurs within the school environment and expressed an interest in receiving more information and training related to the management of traumatic dental injuries. A pamphlet that includes the basic information with regards to the management of dental trauma was designed by the researcher (see Appendix 4) and will be distributed among schools in Cape Town in an attempt to improve the knowledge of school teachers regarding emergency management of dental trauma. In doing so, it is hoped that the prognosis of trauma cases will be improved.

### 5.3. Recommendations

#### Department of Education:

- The Department of Education should be alerted to the need to educate school teachers regarding dental trauma management to reduce the long-term complications of traumatic dental injuries. This could be achieved through educational campaigns that include basic information regarding the management of dental emergencies.
- The Department of Education should ratify a policy for mandatory use of mouth guards during sports activities, especially in the school environment.
- The importance of the tetanus vaccine and its indication in cases of dental trauma should be included in mandatory first-aid training.

#### School teachers/ principals:

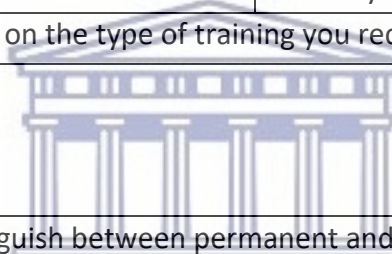
- Since school teachers would most probably be the first to witness traumatic accidents in the school environment, educational programmes highlighting appropriate first aid for TDIs including posters, lectures, pamphlets (Appendix 4), and audio-visual aids are recommended for implementation at all schools. These types of educational programmes might have a positive influence on school teachers' knowledge and their attitudes towards emergency dental management.
- Improving safety measures through mandating the use of safety equipment such as mouth guards, face shields, and helmets during sporting activities such as boxing, hockey, and rugby.
- Detailed information with regards to dental trauma prevention and the importance of mouth guards should be provided to the coaches and players in primary and secondary schools in the form of posters, pamphlets, or videos. This should include the types of mouth guards available, their properties, and their indications.
- The coach's role in dental trauma management must be emphasized, and they should receive training on how to provide early management of traumatic dental injuries.
- An emergency protocol should be in place at every school. This should include instructions on what should be done in the case of dental trauma, who to contact first, and where to take the child who experienced dental trauma.

- A “tooth rescue kit” should be made available with step-by-step instructions to facilitate the management of avulsion injuries.
- A school protocol including evidence-based information regarding early management of dental trauma, transport media, tetanus vaccines, and trauma prevention methods would be beneficial and might change the attitudes of school teachers regarding dental trauma management and reduce the long-term complications. The protocol should include the following (refer to Appendix 4):
  - Clean the site of the injury using sterile saline or tap water.
  - Control bleeding with sterile gauze.
  - In the case of traumatic dental injuries which involve soft tissues, particularly when contaminated with dirt or soil, the child should be referred for a tetanus vaccine.
  - Look for the tooth and hold it by the crown. Do not touch the root.
  - Gently rinse the tooth for 10 seconds under cold tap water. Do not scrub the root surface.
  - Place the avulsed tooth back into its socket.
  - Get the child to bite on gauze (to hold the tooth in position).
  - Refer the child to the dentist for further treatment.
  - The tooth should be replaced gently. If there is resistance it could indicate a fracture or a collapsed socket. The tooth should then rather be placed in cold milk and the child should be referred to the dentist immediately (within 30 minutes).

**Public education campaigns:**

- Educational programmes are effective tools that could be used to increase public awareness regarding the early management of dental trauma through mass media, campaigns, or lectures.
- Developing interaction and fostering good relationships between general dentists and schools will improve the emergency management of traumatic dental injuries.

**Appendix 1: Questionnaire: Knowledge, attitudes, and beliefs of school teachers regarding the management of traumatic dental injuries.**

<b>A. Socio-demographic:</b>				
(1)	Gender			
	<input type="checkbox"/> Male	<input type="checkbox"/> Female		
(2)	Age:			
	<input type="checkbox"/> <=35	<input type="checkbox"/> 36-45	<input type="checkbox"/> >45	
(3)	Highest Qualification achieved?			
	<input type="checkbox"/> High school	<input type="checkbox"/> Diploma	<input type="checkbox"/> University degree	<input type="checkbox"/> Other
<b>B. Knowledge:</b>				
(4)	Have you received any first-aid training?			
	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	(4a) If yes, when?			
	<input type="checkbox"/> 1-5 years ago	<input type="checkbox"/> 6-10 years ago	<input type="checkbox"/> More than 10 years ago	<input type="checkbox"/> Not applicable
	(4b) If yes, please elaborate on the type of training you received.			
				
(5)	Would you be able to distinguish between permanent and primary (milk) teeth?			
	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
(6)	Do you think primary (baby/ milk) teeth should be put back into the mouth after being knocked out?			
	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	(6a) Explain your answer.			
(7)	Do you think permanent teeth should be put back in the mouth after being knocked out?			
	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	(7a) Explain your answer.			

(8)	What would you do if the tooth is knocked out of the socket?				
	<input type="checkbox"/> Place the tooth back into the socket	<input type="checkbox"/> Remove the tooth from the child's mouth	<input type="checkbox"/> Discard the tooth	<input type="checkbox"/> Save the tooth and take it along to the dentist	<input type="checkbox"/> Other
	(8a) Explain your answer in nr 8 above.				
(9)	If a tooth was knocked out of the mouth and fell on the ground, how would you clean it?				
(10)	Have you heard of a transport media/ liquid for a knocked-out tooth?				
	<input type="checkbox"/> Yes	<input type="checkbox"/> No			
	(10a) If yes, which one?				
(11)	Do you think it is necessary to refer a child for a Tetanus vaccine after a dental traumatic injury?				
	<input type="checkbox"/> Yes	<input type="checkbox"/> No			
	(11a) Explain your answer.				
(12)	Do you believe that it is the teacher's responsibility to manage dental injuries when the child is in your care?				
	<input type="checkbox"/> Yes	<input type="checkbox"/> No			
(13)	Do you have a protocol in place for dental injuries at the school or during sports events?				
	<input type="checkbox"/> Yes	<input type="checkbox"/> No			
<b>C. Behaviour:</b>					
(14)	Have you ever witnessed dental trauma?				
	<input type="checkbox"/> Yes	<input type="checkbox"/> No			

	(14a) If yes, which type of dental trauma?			
	<input type="checkbox"/> Tooth fracture	<input type="checkbox"/> Knocked out tooth	<input type="checkbox"/> Soft tissues trauma (bruises, bleeding)	<input type="checkbox"/> Other
	(14b) How did you react / what was your reaction towards the trauma?			
	<input type="checkbox"/> Shocked	<input type="checkbox"/> Scared	<input type="checkbox"/> Panicked	<input type="checkbox"/> Calm
	<input type="checkbox"/> Other			
	(14c) What did you do immediately after witnessing the trauma?			
	<b>D. Attitudes:</b>			
(15)	Which health care provider do you think is the best for dental trauma management?			
	<input type="checkbox"/> General physician	<input type="checkbox"/> Pediatrician	<input type="checkbox"/> Pediatric dentist	<input type="checkbox"/> General dentist
	<input type="checkbox"/> Other			
(16)	Do you think dental injuries can be prevented?			
	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	(16a) If yes, how?			
(17)	Would you be interested in getting training on how to manage dental injuries?			
	<input type="checkbox"/> Yes	<input type="checkbox"/> No		

## Appendix 2: Ethical Clearance Letter from Biomedical science Research Ethics Committee (BMREC).



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10 June 2021

Dr H Ali  
Paediatric Dentistry  
Faculty of Dentistry

**Ethics Reference Number:** BM19/7/8

**Project Title:** Knowledge, attitudes and beliefs of schoolteachers regarding the management of traumatic dental injuries.

**Approval Period:** 08 June 2021 – 08 June 2024

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

**Please remember to submit a progress report annually by 30 November for the duration of the project.**

*Permission to conduct the study must be submitted to BMREC for record-keeping.*

The Committee must be informed of any serious adverse event and/or termination of the study.

A handwritten signature in black ink, appearing to read 'Josias'.

*Ms Patricia Josias  
Research Ethics Committee Officer  
University of the Western Cape*

*NHREC Registration Number: BMREC-130416-050*

Director: Research Development  
University of the Western Cape  
Private Bag X 17  
Bellville 7535  
Republic of South Africa  
Tel: +27 21 959 4111  
Email: research-ethics@uwc.ac.za

FROM HOPE TO ACTION THROUGH KNOWLEDGE.

## Appendix 3: Research Approval Letter: Department of Education.



Directorate: Research

[Audrey.wyngaard@westerncape.gov.za](mailto:Audrey.wyngaard@westerncape.gov.za)  
tel: +27 021 467 9272  
Fax: 0865902282  
Private Bag x9114, Cape Town, 8000  
[wced.wcape.gov.za](http://wced.wcape.gov.za)

**REFERENCE:** 20190930-9740  
**ENQUIRIES:** Dr A T Wyngaard

Dr Hiba Ali  
Private Bag X1  
Tygerberg  
7505

**Dear Dr Hiba Ali**

### **RESEARCH PROPOSAL: KNOWLEDGE, ATTITUDES AND BELIEFS OF SCHOOL TEACHERS REGARDING THE MANAGEMENT OF TRAUMATIC DENTAL INJURIES**

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **14 January 2020 till 30 September 2021**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

The Director: Research Services  
Western Cape Education Department  
Private Bag X9114  
CAPE TOWN  
8000

We wish you success in your research.

Kind regards.  
Signed: Dr Audrey T Wyngaard  
Directorate: Research  
DATE: 03 March 2021

Lower Parliament Street, Cape Town, 8001  
tel: +27 21 467 9272 fax: 0865902282  
Safe Schools: 0800 45 46 47

Private Bag X9114, Cape Town, 8000  
Employment and salary enquiries: 0861 92 33 22  
[www.westerncape.gov.za](http://www.westerncape.gov.za)



## Appendix 4: Pamphlet: Early Management of Traumatic Dental Injuries.

If a permanent tooth is completely knocked out of the mouth:

1. Look for the tooth and hold it by the crown. Do not touch the root.
2. Gently rinse the tooth for 10 seconds under cold tap water. Do not scrub the root surface or use soap.
3. Place the tooth back in its socket and get the child to bite on gauze/handkerchief (to hold the tooth in position).
4. The tooth should be placed gently, if there is resistance it could mean a fracture or collapsed socket, place the tooth in cold milk. If milk was not available put the tooth in a container with the child's saliva. Not in water.
5. Refer the child to the dentist immediately (within 30 minutes).



### Dental trauma prevention

- Mouth guards play a major role in dental trauma prevention.
- Wearing of mouth guards should be compulsory during sports activities that involve the risk of falls, collisions, or contact with hard surfaces or equipment.
- Custom-made mouthguards are the most highly recommended, as they provide the best retention, comfort, ease of speech, ease of breathing as well as good protection of the teeth and gingiva.

- Boil-and-bite mouth guards are the second alternative and most used type. It is relatively cheap.



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## The Early Management Of Traumatic Dental Injuries



- Children of school-going age are very often predisposed to traumatic dental injuries, due to their immature motor coordination and daily activities such as running, and sporting and recreational activities.

- The most important first step is not to panic. Most cases of dental trauma are successfully resolved. Take a deep breath, assess the situation, and call the dentist.



Soft tissue injuries include cuts, punctures, bruises, and lacerations of gums, cheeks, lips, and tongue.

**Instructions:**

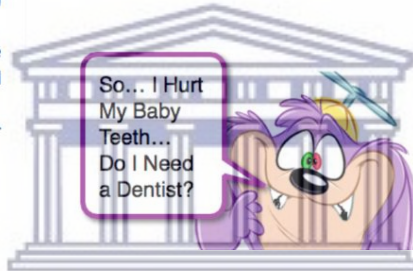
- Comfort the child
- In the case of dental injuries that involve soft tissues, particularly when contaminated with dirt or soil, the child should be referred for a tetanus injection.
- Rinse the site of injury with tap water.
- Control bleeding by directly applying pressure with a clean gauze pad.
- Hold ice or a cold compress over the affected area to reduce swelling and pain.
- Contact the dentist for further management.



## Baby Teeth

This will be under the age of 7 years for front teeth and by the age of 7, the permanent teeth should have erupted.

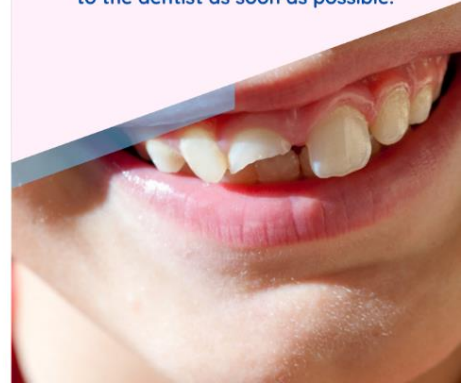
- ▶ If a baby tooth has chipped, **contact the dentist** for an evaluation.
- ▶ If a baby tooth completely comes out, **DO NOT** put the tooth back in its socket as it may cause damage to the permanent tooth.



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## Permanent teeth

- If a permanent tooth is chipped or fractured, it can likely be repaired either by reattaching the broken fragment or by placing a tooth-colored filling.
- Call the dentist immediately- fast action can save the tooth and reduce the need for extensive dental treatment.
- Rinse the mouth with tap water.
- If the broken tooth fragment can be found, it is important to take it along to the dentist as soon as possible.



## REFERENCES

- Abbott, P. V. (2016). Prevention and management of external inflammatory resorption following trauma to teeth. *Australian Dental Journal*, 61, 82-94. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1111/adj.12400>. [Accessed: 29 February 2022].
- Adekoya-Sofowora, C.A., Bruimah, R. & Ogunbodede, E., 2005. Traumatic dental injuries experience in suburban Nigerian adolescents. *The Internet Journal of Dental Science*, 3 (1), 1-6.
- Aggarwal, V., Logani, A., & Shah, N. (2009). Complicated crown fractures—management and treatment options. *International Endodontic Journal*, 42(8), 740-753. Available from: Doi:10.1111/j.1365-2591.2009.01588.x
- Al-Asfour, A., Andersson, L. & Al-Jame, Q. (2008). School teachers' knowledge of tooth avulsion and dental first aid before and after receiving information about avulsed teeth and replantation., *Dental Traumatology*, 24 (1), 43–49. Available from: Doi: 10.1111/j.1600-9657.2006.00476.x.
- Alluqmani, F. A., & Omar, O. M. (2018). Assessment of schoolteachers' knowledge about management of traumatic dental injuries in Al-Madinah City, Saudi Arabia. *European Journal of Dentistry*, 12(2), 171-175. Available from: Doi: 10.4103/ejd.ejd\_38\_18.
- Al-Majed, I., Murray, J.J. & Maguire, A. (2001). Prevalence of dental trauma in 5–6-and 12–14-year-old boys in Riyadh, Saudi Arabia. *Dental Traumatology*, 17(4), 153-158. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1034/j.1600-9657.2001.170403.x>.
- Al-Obaida, M. (2010). Knowledge and management of traumatic dental injuries in a group of Saudi primary schools' teachers. *Dental Traumatology*, 26(4), 338-341. Available from: Doi:10.1111/j.1600-9657.2010.00894.x.
- Alsadhan, S.A., Alsayari, N.F. & Abuabat, M.F. (2018). Teachers' knowledge concerning dental trauma and its management in primary schools in Riyadh, Saudi Arabia. *International Dental Journal*, 68 (5), 306-313. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1111/idj.12385>.

Altamimi, Y. S., Siddiqui, A. A., At-Tamimi, S., Al-Ateeq, N. F., Al-Zuayzi, A. A., Alsayegh, M. A., ... & Khan, S. (2019). Knowledge of Primary School Teachers Regarding Dental Trauma Management in Hail Region, Saudi Arabia. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada* [online]. Available from: <https://www.scielo.br/j/pboci/a/MNF8qW5YFQ49wYSdv7t3sbB/?lang=en>. ISSN 1983-4632. [Accessed: 13 Jan 2022].

Andersson, L., Andreasen, J. O., Day, P., Heithersay, G., Trope, M., DiAngelis, A. J., & Tsukiboshi, M. (2012). International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dental Traumatology*, 28 (2), 88-96. Available from: Doi: 10.1111/j.1600-9657.2012.01125.x.

Andreasen, J. O., Andreasen, F. M., & Andersson, L. (Eds.). Textbook and color atlas of traumatic injuries to the teeth. Edition: Fifth edition. Hoboken, NJ: Wiley-Blackwell. 2019. eBook., Database: eBook Collection (EBSCOhost).

Antunes, L. A. A., Rodrigues, A. S., Martins, A. M. D. C., Cardoso, E. S., Homsy, N., & Antunes, L. S. (2016). Traumatic dental injury in permanent teeth: knowledge and management in a group of Brazilian school teachers. *Dental Traumatology*, 32(4), 269-273. Available from: Doi: 10.1111/edt.12249.

Attarzadeh, H., Kebriaei, F., Sadri, L., Foroughi, E., & Taghian, M. (2017). Knowledge and attitudes of elementary schoolteachers on dental trauma and its management in Yazd, Iran. *Journal of Dentistry*, 18 (3), 212–218.

Bakland, L. K., & Andreasen, J. O. (2004). Dental traumatology: essential diagnosis and treatment planning. *Endodontic Topics*, 7(1), 14-34. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1111/j.1601-1546.2004.00059.x>. [Accessed: 14 July 2021].

Bastone, E. B., Freer, T. J., & McNamara, J. R. (2000). Epidemiology of dental trauma: a review of the literature. *Australian Dental Journal*, 45 (1), 2-9.

Bayrak, S., Sen Tunc, E., & Sari, E. (2012). Evaluation of elementary school teachers' knowledge and attitudes about immediate emergency management of traumatic dental injuries. *Oral Health and Preventive Dentistry*, 10 (3), 253-258.

Blinkhorn, F. A. (2000). The aetiology of dento-alveolar injuries and factors influencing attendance for emergency care of adolescents in the North West of England. *Dental Traumatology*, 16 (4), 162-165.

Bourguignon, C., Cohenca, N., Lauridsen, E., Flores, M. T., O'Connell, A. C., Day, P. F., & Levin, L. (2020). International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 1. Fractures and luxations. *Dental Traumatology*, 36(4), 314-330. Available from: Doi: 10.1111/edt.12578.

Cagetti, M. G., Marcoli, P. A., Berengo, M., Cascone, P., Cordone, L., Defabianis, P., & Zampogna, S. (2019). Italian guidelines for the prevention and management of dental trauma in children. *Italian Journal of Pediatrics*, 45(1), 1-14. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1186/s13052-019-0734-7>.

Cunha, R. F., Pugliesi, D. M. C., & De Mello Vieira, A. E. (2001). Oral trauma in Brazilian patients aged 0–3 years. *Dental traumatology*, 17 (5), 210–212.

Denscombe, M. (2014). *The Good Research Guide: For Small-scale Research Projects*. Maidenhead, Berkshire: McGraw-Hill Education (Open UP Study Skills). Available at: <https://searchebshostcom.ezproxy.uwc.ac.za/login.aspx?direct=true&db=nlebk&AN=937947&site=ehost-live&scope=site>. [Accessed: 21 August 2022].

El-Kenany, M. H., Awad, S. M., & Hegazy, S. A. (2016). Prevalence and risk factors of traumatic dental injuries to permanent anterior teeth among 8–12 years old school children in Egypt. *Pediatric Dental Journal*, 26(2), 67-73. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1016/j.pdj2016.02.002>.

Eslamipour, F., Iranmanesh, P. & Borzabadi-Farahani, A. (2016). A cross-sectional study of dental trauma and associated factors among 9-to 14-year-old schoolchildren in Isfahan, Iran. *Oral Health and Preventive Dentistry*, 14 (5), 451-457. Available from: Doi: 10.3290/j.ohpd.a36522.

Feldens, E. G., Feldens, C. A., Kramer, P. F., Da Silva, K. G., Munari, C. C., & Brei, V. A. (2010). Understanding school teacher's knowledge regarding dental trauma: a basis for future interventions. *Dental Traumatology*, 26(2), 158-163. Available from: Doi: 10.1111/j.1600-9657.2009.00863.x.

Feliciano, K. M. P. D. C., & Caldas Jr, A. D. F. (2006). A systematic review of the diagnostic classifications of traumatic dental injuries. *Dental Traumatology*, 22(2), 71-76. Available from: Doi: 10.1111/j.1600-9657.2006.00342.x.

Francisco, S. S., Souza Filho, F. J., Pinheiro, E. T., Murrer, R. D., & Jesus, A. S. (2013). Prevalence of traumatic dental injuries and associated factors among Brazilian schoolchildren. *Oral Health and Preventive Dentistry*, 11 (1), 31-38. Available from: <https://doi.org/10.3290/j.ohpd.a29373>.

Fujita, Y., Shiono, Y. & Maki, K. (2014). Knowledge of emergency management of avulsed tooth among Japanese dental students. *Bio Medical Central Oral Health*, 14 (1), 1-6. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1186/1472-6831-14-34>.

Gaffar, B., AlHumaid, J., Ashraf Nazir, M., & Alonaizan, F. (2021). Traumatic dental injuries in the Eastern Region of Saudi Arabia: Factors influencing teachers' management practices. *Dental Traumatology*, 37(1),65–72. Available from: <https://doiorg.ezproxy.uwc.ac.za/10.1111/edt.12598>.

Glendor, U. (2008). 'Epidemiology of traumatic dental injuries - A 12-year review of the literature', *Dental Traumatology*, 24(6), 603–611. Available from: Available from: Doi: 10.1111/j.1600-9657.2008.00696.x.

Glendor, U. L. F. (2009). Aetiology and risk factors related to traumatic dental injuries—a review of the literature. *Dental Traumatology*, 25(1), 19-31. Available from: Doi: 10.1111/j.1600-9657.2008.00694.x.

Goettems, M. L., Torriani, D. D., Hallal, P. C., Correa, M. B., & Demarco, F. F. (2014). Dental trauma: prevalence and risk factors in schoolchildren. *Community Dentistry and Oral Epidemiology*, 42(6), 581-590. Available from: Doi: 10.1111/cdoe.12113.

Goswami, M., Chaitra, T. R., Chaudhary, S., Manuja, N., & Sinha, A. (2011). Strategies for periodontal ligament cell viability: An overview. *Journal of Conservative Dentistry*, 14(3), 215-220. Available from: Doi: 10.4103/0972-0707.8578.

Goswami, M., Rahman, B., & Singh, S. (2020). Outcomes of luxation injuries to primary teeth-a systematic review. *Journal of Oral Biology and Craniofacial Research*, 10(2), 227-232. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1016/j.jobcr.2019.12.001>.

Gupta S, Kumar-Jindal S, Bansal M, & Singla A. (2011). Prevalence of traumatic dental injuries and role of incisal overjet and inadequate lip coverage as risk factors among 4-15 years old government school children in Baddi- Barotiwala Area, Himachal Pradesh, India. *Medicina Oral, Patología Oral y Cirugía Bucal*, 16(7),e960-5. Available from: [http://dx.doi.org/doi:10.4317/med\\_oral.17265](http://dx.doi.org/doi:10.4317/med_oral.17265).

Gurbuz, T., & Tan, H. (2010). Oral health status in epileptic children. *Pediatrics International*, 52(2), 279-283. Available from: Doi: 10.1111/j.1442-200X.2009.02965.x.

Hargreaves, J. A., Cleaton-Jones, P. E., Roberts, G. J., Williams, S., & Matejka, J. (1999). Trauma to primary teeth of South African pre-school children. *Dental Traumatology*, 15(2), 73-76.

Hasan, A.A., Qudeimat, M.A. & Andersson, L. (2010). Prevalence of traumatic dental injuries in preschool children in Kuwait—a screening study. *Dental traumatology*, 26(4), 346-350. Available from: Doi: 10.1111/j.1600-9657.2010.00891.x.

Holan, G., & McTigue, D. J. (2019). Introduction to dental trauma: Managing traumatic injuries in the primary dentition. *Pediatric Dentistry (sixth edition)*, 227-243. [online]. Available from: <https://doi.org/10.1016/B978-0-323-60826-8.00016-x>.

Ilija, E., Metcalfe, K., & Heffernan, M. (2014). Prevalence of dental trauma and use of mouthguards in rugby union players. *Australian Dental Journal*, 59(4), 473-481. Available from: Doi: 10.1111/adj.12223.

Ivanda, S., Gavic, L., Galic, T. & Tadin, A. (2021). School teachers' knowledge and experience about emergency management of traumatic dental injuries: A questionnaire-based online cross-sectional survey. *Dental traumatology*, 37(4), 589-600. Available from: <https://doi.org.ezproxy.uwc.ac.za/10.1111/edt.12669>. [Accessed: 14 February 2021].

Jones, S.G. and Nunn, J.H. (1995). The dental health of 3-year-old children in east Cumbria 1993. *Community Dental Health*, 12(3), 161-166.

Juneja, P., Kulkarni, S. & Raje, S., (2018). Prevalence of traumatic dental injuries and their relation with predisposing factors among 8–15 years old school children of Indore city, India. *Clujul Medical*, 91(3), 328–335. Available from: Doi: 10.15386/cjmed-898. [Accessed:31 July 2021].

- Karayilmaz, H., Kirzioglu, Z., & Gungor, O. E. (2013). Aetiology, treatment patterns and long-term outcomes of tooth avulsion in children and adolescents. *Pakistan Journal of Medical Sciences*, 29(2), 464–468. Available from: Doi: 10.12669/pjms.292.3283. [Accessed: 13 April 2022].
- Khinda, V. I., Kaur, G., Brar, G. S., Kallar, S., & Khurana, H. (2017). Clinical and practical implications of storage media used for tooth avulsion. *International Journal of Clinical Pediatric Dentistry*, 10(2), 158–165. Available from: Doi: 10.5005/jp-journals-10005-1427. [Accessed: 1 June 2020].
- Kumar, A., Mangla, R., Dua, P., Madan, M., Saini, S., & Kesar, N. (2017). Knowledge, attitude, and practice of elementary school teachers toward emergency management of dental trauma in Sirmaur District, Himachal Pradesh: A questionnaire study. *Indian Journal of Dental Sciences*, 9(3), 194–197. Available from: Doi: 10.4103/IJDS.IJDS\_24\_17. [Accessed: 7 August 2021].
- Kurnaz S, & Bayraktar C. (2021). School Teachers' Knowledge and Attitudes about the Emergency Management of Traumatic Dental Injuries in Turkey. *Community Dental Health*, 38(3), 215-219. Available from: Doi: 10.1922/cdh\_00375kurnaz05. PMID: 34029019.
- Laloo, R. (2003). Risk factors for major injuries to the face and teeth. *Dental Traumatology*, 19(1), 12-14.
- Leelavathi, L., Karthick, R., Sankari, S. L., & Babu, N. A. (2016). Avulsed tooth—A review. *Biomedical and Pharmacology Journal*, 9(2), 847-850. Available from: <http://biomedpharmajournal.org/?p=8159>.
- 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. *Dental Traumatology*, 25(4), 406-412. Available from: Doi:10.1111/j.1600-9657.2009.00798.x. [Accessed: 3 April, 2020].
- Lin, S., Pilosof, N., Karawani, M., Wigler, R., Kaufman, A. Y., & Teich, S. T. (2016). Occurrence and timing of complications following traumatic dental injuries: A retrospective study in a dental trauma department. *Journal of Clinical and Experimental Dentistry*, 8(4), e429–e436. Available from: Doi: 10.4317/jced.53022. [Accessed: 1 October 2021].



- Locker, D. (2005). Prevalence of traumatic dental injury in grade 8 children in six Ontario communities. *Canadian journal of public health*, 96(1), 73-76. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1007/BF03404023>. [Accessed: 1 January 2022].
- Loo, T. J., Gurunathan, D., & Somasundaram, S. (2014). Knowledge and attitude of parents with regard to avulsed permanent tooth of their children and their emergency management-Chennai. *Journal of Indian Society of Pedodontics and Preventive Dentistry*, 32 (2), 97-107. Available from: Doi: 10.4103/0970-4388.130781 [ Accessed: 17April 2022].
- Isadhan, S. A., Alsayari, N. F., & Abuabat, M. F. (2018). Teachers' knowledge concerning dental trauma and its management in primary schools in Riyadh, Saudi Arabia. *International Dental Journal*, 68(5), 306-313. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1111/idj.12385>. [Accessed: 13 October 2021].
- Ludgero, A.D.L., Santos, T.D.S., Fernandes, A., De Melo, D., Peixoto, A., Dourado, A. & Gomes, A., (2012). Knowledge regarding emergency management of avulsed teeth among elementary school teachers in Jaboatao dos Guararapes, Pernambuco, Brazil. *Indian Journal of Dental Research*, 23(5), 585-585. Available from: Doi: 10.4103/0970-9290.107331.
- Mahal, N. K., Singh, N., Thomas, A. M., & Kakkar, N. (2013). Effect of three different storage media on survival of periodontal ligament cells using collagenase–dispase assay. *International Endodontic Journal*, 46(4), 365-370. Available from: Doi: 10.1111/j.1365-2591.2012.02129.x.
- McTigue, D. J. (2013). Overview of trauma management for primary and young permanent teeth. *Dental Clinics*, 57(1), 39-57. Available from: Doi: 10.1016/j.cden.2012.09.005; PMID: 23174609.
- Mehta, S., & Verma, J. (2021). Systematic Review on Relation Between Surface Treatment and Outcome of Delayed Replantation of Permanent Anterior Avulsed Teeth. *Journal of Clinical and Diagnostic Research*. 15(6), ZE01-ZE04. Available from: Doi: 10.7860/JCDR/2021/48763:14962.
- Mergany, N.N., Ibrahim, Y. & Abuaffan, A.H. (2016). Knowledge and attitude of Sudanese school health teachers regarding first aid management of dental trauma. Research Article, *Dental, Oral and Craniofacial Research*, 2(2): 242-246. Available from: Doi: 10.15761/DOCR.1000155.
- Moule, A., & Cohenca, N. (2016). Emergency assessment and treatment planning for traumatic dental injuries. *Australian Dental Journal*, 61(1 Suppl), 21–38. Available from: Doi: 10.1111/adj.12396.

Naidoo, S., Sheiham, A., & Tsakos, G. (2009). Traumatic dental injuries of permanent incisors in 11-to 13-year-old South African schoolchildren. *Dental Traumatology*, 25(2), 224-228. Available from: Doi: 10.1111/j.1600-9657.2008.00749.x.

Namdev, R., Jindal, A., Bhargava, S., Bakshi, L., Verma, R., & Beniwal, D. (2014). Awareness of emergency management of dental trauma. *Contemporary Clinical Dentistry*, 5(4), 507-513. Available from: Doi: 10.4103/0976-237X.142820.

Newsome, P. R. H., Tran, D. C., & Cooke, M. S. (2001). The role of the mouthguard in the prevention of sports-related dental injuries. *International Journal of Pediatric Dentistry*, 11(6), 396-404. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1046/j.0960-7439.2001.00304.x>.

Nirwan, M., Syed, A. A., Chaturvedi, S., Goenka, P., & Sharma, S. (2016). Awareness in primary school teachers regarding traumatic dental injuries in children and their emergency management: A survey in South Jaipur. [online] *International Journal of Clinical Pediatric Dentistry*, 9(1), 62-66. Available from: Doi: 10.5005/jp-journals-10005-1335. [Accessed: 22 April 2022].

Niviethitha, S., Bhawarlal, C., Ramkumar, H., Dhakshanamoorthy, S., & Shanmugam, H. (2018). Effectiveness of an audio-visual aid on the knowledge of school teachers regarding the emergency management of dental injuries. *Dental Traumatology*, 34(4), 290-296. Available from: Doi: 10.1111/edt.12405.

Pacheco, L. F., Filho, P. F. G., Letra, A., Menezes, R., Villoria, G. E. M., & Ferreira, S. M. (2003). Evaluation of the knowledge of the treatment of avulsions in elementary school teachers in Rio de Janeiro, Brazil. *Dental Traumatology*, 19(2), 76-78. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1034/j.1600-9657.2003.00109.x>. [Accessed: 24 March 2022].

Pagadala, S., & Tadikonda, D. C. (2015). An overview of classification of dental trauma. *International Archives of Integrated Medicine*, 9, 157-164. Available from: <https://imsear.searo.who.int/handle/123456789/164960>. [Accessed: 2 September 2021].

Parker, K., Marlow, B., Patel, N., & Gill, D. S. (2017). A review of mouthguards: effectiveness, types, characteristics, and indications for use. *British Dental Journal*, 222 (8), 629-633. Available from: Doi: <https://doi-org.ezproxy.uwc.ac.za/10.1038/sj.bdj.2017.365>. [Accessed: 21 April 2022].

Pithon, M. M., Santos, R. L. D., Magalhães, P. H. B., & Coqueiro, R. D. S. (2014). Brazilian primary school teachers' knowledge about immediate management of dental trauma. *Dental Press Journal of Orthodontics*, 19(5), 110-115. Available from: <https://doi.org/10.1590/2176-9451.19.5.110-115.oar>.

Poi, W. R., Sonoda, C. K., Martins, C. M., Melo, M. E., Pellizzer, E. P., Mendonça, M. R. D., & Panzarini, S. R. (2013). Storage media for avulsed teeth: a literature review. *Brazilian Dental Journal*, 24(5), 437- 445. Available from: <https://doi.org/10.1590/0103-6440201302297>.

Rajab, L. D., Baqain, Z. H., Ghazaleh, S. B., Sonbol, H. N., & Hamdan, M. A. (2013). Traumatic dental injuries among 12-year-old schoolchildren in Jordan: prevalence, risk factors, and treatment need. *Oral Health and Preventive Dentistry*, 11(2), 105-12. Available from: Doi: 10.3290/j.ohpd.a29362; PMID: 23534038.

Raof, 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. *Dental Traumatology*, 28(6), 441-447. Available from: Doi: 10.1111/j.1600-9657.2011.01085.x.

Ritwik, P., Massey, C., & Hagan, J. (2015). Epidemiology and outcomes of dental trauma cases from an urban pediatric emergency department. *Dental Traumatology*, 31(2), 97-102. Available from: Doi: 10.1111/edt.12148.

Sabuncuoglu, O., Taser, H., & Berkem, M. (2005). Relationship between traumatic dental injuries and attention-deficit/hyperactivity disorder in children and adolescents: proposal of an explanatory model. *Dental Traumatology*, 21(5), 249-253. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1111/j.1600-9657.2005.00317.x>. [Accessed: 30 August 2020].

Sandalli, N., Cildir, S., & Guler, N. (2005). Clinical investigation of traumatic injuries in Yeditepe University, Turkey during the last 3 years. *Dental Traumatology*, 21(4), 188-194. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1111/j.1600-9657.2005.00309.x>. [Accessed: 18 July 2021].

Sheroan, M. M., & Roberts, M. W. (2004). Management of complex dentoalveolar trauma with multiple avulsions: a case report. *Dental Traumatology*, 20 (4), 222-225. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1111/j.1600-9657.2004.00226.x>. [Accessed: 09 July 2021].

Sigurdsson, A. (2013). Evidence-based review of prevention of dental injuries. *Pediatric dentistry*, 35 (2), 184-190.

Singh, M., Ingle, N. A., Kaur, N., & Yadav, P. (2015). Evaluation of knowledge and attitude of schoolteachers about emergency management of traumatic dental injury. *Journal of International Society of Preventive & Community Dentistry*, 5(2), 108-113. Available from: Doi: 10.4103/2231-0762.155735.

Stecksen-Blicks, C., & Holm, A. K. (1995). Dental caries, tooth trauma, malocclusion, fluoride usage, toothbrushing and dietary habits in 4-year-old Swedish children: changes between 1967 and 1992. *International Journal of Pediatric Dentistry*, 5(3), 143-148. Available from: Doi: 10.1111/j.1365-263X.1995.tb00297.x.

Tahririan, D., Entezam, Z., & Safarzadeh, S. (2022). Evaluation of teachers' knowledge about dental injuries in primary schoolchildren in the city of Isfahan. *Dental Research Journal*, 19(1), 42. Available from: Doi: 10.4103/1735-3327.346400. [Accessed: 01-Jun-2022].

Tewari, N., Bansal, K., & Mathur, V. P. (2019). Dental trauma in children: a quick overview on management. *The Indian Journal of Pediatrics*, 86(11), 1043-1047. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1007/s12098-019-02984-7>. [Accessed: 13 June 2021].

The Children's Act. (ACT NO. 38 OF 2005). Available from: [https://www.westerncape.gov.za/Text/2010/12/childrens.act.final\\_regulations26\\_jan\\_2010.pdf?msckid=b637ac3dceaf11ecb62ec5abf356c94a](https://www.westerncape.gov.za/Text/2010/12/childrens.act.final_regulations26_jan_2010.pdf?msckid=b637ac3dceaf11ecb62ec5abf356c94a).

Trope, M. (2011). Avulsion of permanent teeth: theory to practice. *Dental Traumatology*, 27(4), 281-294. Available from: <https://doi-org.ezproxy.uwc.ac.za/10.1111/j.1600-9657.2011.01003.x>. [Accessed: 03 June 2021].

Udoye, C. I., Jafarzadeh, H., & Abbott, P. V. (2012). Transport media for avulsed teeth: a review. *Australian Endodontic Journal*, 38(3), 129-136. Available from: Doi:10.1111/j.1747-4477.2012.00356.x.

Ulusoy, A. T., Önder, H., Çetin, B., & Kaya, Ş. (2012). Knowledge of medical hospital emergency physicians about the first-aid management of traumatic tooth avulsion. *International Journal of Paediatric Dentistry*, 22(3), 211-216. Available from: Doi: 10.1111/j.1365-263X.2011.01178.x.

Young, C., Wong, K.Y. & Cheung, L.K., 2012. Emergency management of dental trauma: knowledge of Hong Kong primary and secondary school teachers. *Hong Kong Medical Journal*, 18(5), 362- 370.

Yu, C. Y., & Abbott, P. V. (2016). Responses of the pulp, periradicular and soft tissues following trauma to the permanent teeth. *Australian Dental Journal*, 61(1 Suppl), 39-58. Available from: Doi: 10.1111/adj.12397.

Zakirulla, M., Togoo, R. A., Yaseen, S. M., Al-Shehri, D. A., Al-Ghamdi, A. S., Al-Hafed, M. S. A., & Meer, A. (2011). Knowledge and attitude of Saudi Arabian schoolteachers with regards to emergency management of dental trauma. *Int. International Journal of Clinical Dental Science*, 2(2).

