

Factors Associated with Dental Trauma First-Aid Knowledge of Physical Education Teachers

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ABSTRACT

Introduction: dental trauma refers to injuries sustained by the hard tissues of the teeth and the supporting periodontal structures as a result of mechanical forces. Such injuries can occur suddenly and necessitate prompt treatment. This type of trauma is especially common among children aged 7 to 12 years, and timely intervention is crucial, as delays can lead to complications such as infections, abscesses, and pulp necrosis.

Method: this study was an analytical study with cross-sectional design. The target population comprised sports teachers in South Jakarta who were members of the DKI Jakarta Physical Education Teachers Group. The sample included teachers who fulfilled the specified inclusion criteria. These criteria were: active sports teachers currently instructing at elementary schools in South Jakarta, those willing to provide informed consent via Google Forms, and individuals who completed the questionnaire in Google Forms. The exclusion criteria consisted of teachers who signed the informed consent form but failed to complete the questionnaire. The total sample size for this study was 102 participants.

Result: Based on the results of comparative tests on level of knowledge with gender, the results showed p-value=0.148, experience of seeing dental trauma p-value=0.153, teaching experience p-value=0.164, participation in training p-value=0.163, and experience of dental trauma p-value=0.0015. Of the five factors, only experience of dental trauma was proven to significantly influence the level of sports teachers' knowledge of first aid for dental trauma.

Conclusion: the factor that is proven to influence the level of sports teachers' knowledge of first aid for dental trauma is personal experience of experiencing dental trauma.

KEYWORDS: dental trauma, first aid, teacher, injury

ARTICLE DETAILS

Published On:
28 January 2025

Available on:
<https://ijpbms.com/>

I. INTRODUCTION

Dental trauma refers to injuries sustained by the hard tissues of the teeth and the supporting periodontal structures as a result of mechanical forces. 1 Such injuries can occur suddenly and necessitate prompt treatment. 2 This type of trauma is especially common among children aged 7 to 12 years, and timely intervention is crucial, as delays can lead to complications such as infections, abscesses, and pulp necrosis. 3,4,5 Dental trauma frequently coincides with injuries to the lips, gums, tongue, and jaw. According to the American Academy of Pediatric Dentistry (AAPD), one of

the most common dental injuries is the avulsion of anterior teeth, which can have both physiological and psychological ramifications. Severe traumatic injuries may also damage the pulp and periodontal ligaments. 6,7

Traumatic dental injuries in children can happen both at home and at school, the latter being a location where children spend significant time engaging in physical activities. 9 Schools have one of the highest rates of traumatic dental injuries. 10 Common causes of these injuries in school settings include falls, collisions between peers, fights, and pushing. 11

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Dental trauma can be effectively managed by a dentist alongside the provision of immediate first aid at the time of the injury. In a school environment, teachers carry the responsibility for students and should have a foundational understanding of first aid for dental injuries. 9 A study conducted in 2017 by Attarzadeh H et al. revealed that many teachers possess inadequate knowledge of first aid for traumatic dental injuries. This underscores the urgent need for training on first aid for dental trauma to enhance teachers' competencies and responses in such situations. 6

First aid refers to the immediate assistance provided to an individual who is injured or unwell, offering basic medical care until professional help is available. The primary objectives of first aid are to prevent infection, minimize further injury, and avert death. 12,13 It serves as a temporary intervention that can be implemented at school prior to obtaining professional medical assistance. It is crucial that first aid training and knowledge become mandatory in all educational institutions. 14 As teachers spend considerable time with students, they frequently act as the first responders in the event of dental injuries, making their role vital in delivering first aid for these situations. Typically, teachers in both public and private schools receive First Aid training as part of their educational curriculum. However, public schools, which are government-managed, usually lack a designated school doctor, while private schools, operated by foundations, often have one available. In light of this context, the aim of this study is to identify the factors influencing sports teachers' knowledge of first aid for dental trauma, focusing specifically on sports teachers in South Jakarta. (Size 10 & Normal) An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

II. METHODS

This study was an analytical study with cross-sectional design. The target population comprised sports teachers in South Jakarta who were members of the DKI Jakarta Physical Education Teachers Group. The sample included teachers who fulfilled the specified inclusion criteria. These criteria were: active sports teachers currently instructing at elementary schools in South Jakarta, those willing to provide informed consent via Google Forms, and individuals who completed the questionnaire in Google Forms. The exclusion criteria consisted of teachers who signed the informed consent form but failed to complete the questionnaire. The total sample size for this study was 102 participants. Figures and Tables

Figures and tables must be centered in the column. Large figures and tables may span across both columns. Any table or figure that takes up more than 1 column width must be positioned either at the top or at the bottom of the page.

III. RESULTS

Based on table 1, it shows that 86 respondents (84.3%) were aged 20-40 years and 17 respondents (16.7%) were aged 41-60 years. From 83 respondents (81.4%) were male and 19 respondents (18.6%) were female. A half respondent 56.9% had attended first aid training for emergencies at school, while 44 respondents (43.1%) had never attended training. (Table 1)

Table 1. Frequency Distribution of Respondent Characteristics

	n	%
Respondent Age (n=102)		
20-40 years	85	83.3
41-60 years	17	16.7
Gender (n=102)		
Male	83	81.4
Female	19	18.6
First Aid Training (n=102)		
Yes	58	56.9
No	44	43.1
If you have attended first aid training, was there any material covering the management of dental trauma? (n=58)		
Yes	22	37.9
No	36	62.1

Based on the results of comparative tests on level of knowledge with gender, the results showed p-value=0.148, experience of seeing dental trauma p-value=0.153, teaching experience p-value=0.164, participation in training p-value=0.163, and experience of dental trauma p-value - 0.0015. Of the five factors, only experience of dental trauma was proven to significantly influence the level of sports teachers' knowledge of first aid for dental trauma (Table 2)

Table 2. Analysis of Factors Influencing Sports Teachers' Knowledge Level of First Aid for Dental Trauma (n=102)

	Knowledge Level		p-value*
	Bad	Good	
Gender (n=102)			
Male	73(88%)	10(12%)	0.148*
Female	14(73.7%)	5(26.3%)	
Have you ever seen students experiencing dental trauma at school?			
Yes	35(79.5%)	9(20.5%)	0.153***
No	52(89.7%)	6*10.3%)	
Experienced as PE teacher (n=102)			
<10 years	58(89.2%)	7(10.8%)	0.164**
10-20 years	22(81.5%)	5(18.55)	

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20-30 years	2(50%)	2(50%)	
>30 years	5(83.3%)	1(16.7%)	
First Aid Training (n=102)			
Yes	47(81%)	11(19%)	0.163***
No	40(90.9%)	4(9.1%)	
Experienced dental trauma (n=102)			
Yes	40(76.9%)	12(23.1%)	0.015***
No	47(94%)	3(6%)	

*Fisher's Exact test, p-value>0.05, CI 95%

**Pearson chi-square, p-value >0.05, CI 95%

***Chi-square test, p-value ≤ 0.05, CI 95%

IV. DISCUSSION

The findings of the study indicated a significant age distribution among respondents, with 85 individuals (83.3%) falling within the 20 to 40-year age range. This observation was consistent with a study conducted by Mitakshara Nirwan et al. (2016), which reported that 118 primary school teachers in South Jaipur, representing 42% of a total sample of 278, were aged between 31 and 40 years, while 91 respondents (32.4%) were aged 20 to 30 years.¹⁵ A further analysis by Tadesse and Jemeber demonstrated that older teachers and those with greater experience tended to possess superior knowledge of first-aid procedures.¹⁶

The majority of respondents in this study were male, comprising 83 individuals (81.4%). This finding aligns with the research of Kalaskar et al. (2016), which revealed that 181 sports teachers (91.8%) out of a total sample of 197 were male.¹⁷ Additionally, a study by Kaya and Ayker identified significant differences in knowledge and first aid practices between genders, indicating that female teachers demonstrated higher levels of knowledge and skills in first aid compared to their male counterparts.¹⁸ This aligns with findings by Taklual et al., who noted that gender differences influence the effectiveness of first-aid training programs, suggesting that female teachers may exhibit greater receptiveness to such training initiatives.¹⁹ In contrast, some studies report no significant differences in first-aid knowledge based on gender. For example, research conducted by Ghyadh and Al-Jourani concluded that there was no significant relationship between teachers' first aid knowledge and their demographic characteristics, including gender.²⁰ This suggests that while certain studies highlight gender disparities, other research indicates that knowledge levels may be similarly low across genders, potentially due to the absence of comprehensive first aid training programs in educational institutions.

The study's findings highlight a significant lack of emergency first aid training among respondents, with a staggering 56.9% reporting that they had never participated in such training. This is consistent with Fadzilinda Baharin's 2019 research, where it was found that only 65.8% of a

sample of 120 primary school teachers in Malaysia had undergone first aid training.²¹ When focusing specifically on first aid training related to dental trauma management, the current study indicated that merely 37.9% of respondents had received such training. This aligns with the research conducted by Hajjar Attarzadeh et al. in 2016, which reported that only 12.5% of a sample of 281 primary school teachers in Iran had received training on dental trauma management. The scarcity of training has been linked to a subsequent deficiency in teachers' knowledge regarding first aid for dental trauma.¹ Given that dental trauma ranks as the fifth most prevalent acute or chronic condition among children worldwide, enhancing training and education on dental trauma first aid is imperative. This assertion is further supported by Shara Ghadimi et al. (2014), whose study demonstrated that educational interventions, such as the use of informative posters on emergency dental trauma management, substantially improved the knowledge base of primary school health teachers in Iran.

Based on the results of the first question, 66 respondents (64.7%) believed that a broken tooth was a primary tooth. This finding is inconsistent with the research conducted by Nestor Tzimpoulas et al. (2019), in which 185 teachers identified a broken tooth as a permanent tooth.⁷ According to Arthur J. Nowak in the book *Pediatric Dentistry* (2019), the upper front teeth begin to erupt between the ages of 7 and 8. In this case, the child is 9 years old, which indicates that the upper front primary teeth have already erupted and permanent teeth have started to emerge. This finding demonstrates that sports teachers lack knowledge regarding the distinction between primary and permanent teeth, as well as the sequence of tooth eruption.¹⁶

The data derived from the second question indicates that a notable majority of respondents, specifically 62 (60.8%), preferred to contact the parents to facilitate the child's visit to the dentist. In contrast, a minority of 18 respondents (17.6%) chose to locate the broken tooth fragment and send the child directly to the dental clinic. These results are consistent with findings from a study conducted by Hajjar Attarzadeh et al. (2017), which reported that 43.8% of 281 primary school teachers in Iran also opted to notify parents about dental consultations following similar incidents.²² The preservation of a broken tooth fragment, provided it remains intact, is crucial, as it may allow for potential reattachment by the dentist. To ensure the viability of the fragment until professional care is accessible, it should be stored in an appropriate medium, such as milk, saline solution, or Hank's balanced salt solution, which all serve to maintain the necessary hydration.

Furthermore, regarding the third question, the investigation revealed that 59 respondents (57.8%) advocated for controlling oral bleeding by encouraging the child to bite down on a handkerchief. This observation is corroborated by the research conducted by Yazeed Saud et

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al. (2019), underlining the necessity of promptly addressing bleeding, particularly when it results from trauma. Oral bleeding can provoke significant anxiety in the patient and may lead to weakness stemming from substantial blood loss, thereby necessitating immediate intervention. In cases of tooth avulsion, bleeding can be effectively managed by having the child apply pressure with sterile gauze, a handkerchief, or other clean materials for a duration of approximately five minutes. Once the child is calmed, it is important to locate the missing tooth, ensuring the root is not touched, and to rinse it gently if dirtied. Ideally, the tooth should be repositioned into its socket and stabilized with sterile gauze, or similar materials, to maintain its placement. In instances where reimplantation is impractical, the tooth should be securely preserved in a suitable medium, such as milk, Hanks' balanced salt solution, saline solution, or even in the child's saliva, by having them spit into a container to ensure continued hydration.⁹

Based on the findings from the fourth question, 42 respondents (41.2%) indicated that they would seek treatment for dental trauma primarily at the school health program (UKS/UKGS). This result is inconsistent with a study conducted by Salwa et al. in 2018, which revealed that 68.5% of 1,041 primary school teachers in Iran preferred to consult a dentist as their first option for such treatment. This discrepancy suggests that the Iranian teachers recognized dentists as the most qualified professionals to manage dental trauma effectively. Furthermore, it is important to note that most School Health Units or School Dental Care facilities are inadequately equipped and lack the necessary resources to address dental trauma cases appropriately.

In relation to the fifth question, 58 respondents (56.9%) reported that they would not inquire about a child's tetanus vaccination status. This finding contrasts with research conducted by Manal et al. in 2017, which indicated that a majority of primary school teachers in the United Arab Emirates (59%) out of a total sample of 292 would inquire about the tetanus vaccination status of a child with dental trauma. Tetanus is a significant infectious disease often encountered during procedures such as tooth extraction and the reimplantation of an avulsed tooth. The causative agent, *Clostridium tetani*, is an anaerobic, Gram-negative bacterium commonly found in soil. Tetanus has an incubation period ranging from 2 to 5 days, and the risk of infection is particularly relevant in cases of tooth avulsion if the displaced tooth comes into contact with contaminated surfaces.^{17,15}

In reviewing the responses to the sixth question, it was revealed that 41 sports teachers (40.2%) indicated they would opt to discard an avulsed tooth. This finding aligns with the research conducted by Majdiyan et al., which reported that only 26.7% of 378 teachers in Pontianak were aware that an avulsed tooth could be rinsed with running water if it came into contact with the ground. The recommended protocol for handling an avulsed tooth

involves rinsing it gently with running water for approximately 10 seconds before replanting it in the alveolar socket.

Regarding the findings from the seventh question, 52 sports teachers (51%) selected paper tissue as the medium for transporting the avulsed tooth to a dental professional. It is critical to prioritize the preservation of the periodontal ligament cells in instances of tooth avulsion, as these cells play a pivotal role in determining the prognosis of the tooth's reattachment. In situations where replantation is not feasible, the avulsed tooth must be stored appropriately to maintain its viability. The International Association of Dental Traumatology (IADT) advises that whenever possible, the avulsed tooth should be replanted into its socket. The patient should then be instructed to bite down on gauze, a handkerchief, or similar material. In the event that the patient is unconscious, it is imperative to utilize a suitable storage medium readily available at the scene to avert dehydration of the tooth's root surface.⁹

The survey results from the eighth question revealed that a substantial majority of sports teachers, comprising 43 respondents (42.2%), identified antiseptic solution as the most effective medium for the storage of an avulsed tooth. In stark contrast, a mere 2 respondents (2%) opted for milk as the optimal storage medium among the 102 surveyed sports teachers. This finding aligns with the research conducted by Basim Almulhim in 2021, which indicated that only 11.9% of 615 primary school teachers in Saudi Arabia recognized milk as the appropriate medium for preserving a tooth prior to dental intervention. According to J.O. Andreasen in "Traumatic Injuries to the Teeth" (4th edition, 2007), suitable storage media for an avulsed tooth include milk, saline solution, and saliva. Notably, a tooth immersed in milk can be preserved for a duration of 2-3 hours, whereas saline solution maintains viability for up to 1 hour, and saliva accommodates preservation for only 30 minutes. It is important to note that tap water is not an ideal medium for this purpose due to its hypotonic nature, which may lead to necrosis of the periodontal ligament cells. Nevertheless, in the absence of preferable options, tap water is a better alternative than allowing the tooth to desiccate.^{5,9}

The findings from the ninth question indicated that 40 respondents (39.2%) advocated for the immediate replantation of an avulsed tooth, while 30 respondents (31.4%) believed that replantation could be deferred for a period of up to 30 minutes post-hemorrhage. This suggests a noteworthy improvement compared to a study conducted by Khalifa et al. (2022), which reported that only 5% (20 out of 398) of teachers in Dammam acknowledged the necessity for prompt replantation. As articulated by Edward Ellis in "Contemporary Oral and Maxillofacial Surgery" (2019), the prognosis and success rate of an avulsed tooth replantation are heavily influenced by the elapsed time since the tooth was displaced from its socket. Therefore, a more immediate

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replantation correlates with enhanced success rates and improved prognostic outcomes.^{10,15}

The findings of this study concerning the knowledge levels of sports teachers indicate that 79 respondents (77.5%) had low knowledge, while 23 respondents (22.5%) had moderate knowledge. These results align with the research conducted by Marcano et al. (2018), which highlighted a deficiency in first aid knowledge related to dental trauma among teachers in Colombia. Similarly, Azeredo (2015) reported that 205 teachers in Brazil had limited understanding of dental trauma management. This lack of knowledge may be attributed to a substantial proportion of the sample having never engaged in training programs focused on first aid for dental trauma. Consequently, to improve the understanding of first aid procedures for dental trauma, it is imperative to implement targeted training and educational initiatives for primary school sports teachers.

V. CONCLUSION

Based on the finding of the study, it can be concluded that the majority of sports teachers in DKI Jakarta are aged 20-40 years (83.3%) and are male (81.4%). The majority of sports teachers in DKI Jakarta have taken part in emergency training (56.9%), however of the total respondents who took part in the training, only 22 teachers had taken part in training with first aid material for dental trauma. Based on the results of research regarding the description of elementary school sports teachers' knowledge regarding first aid for dental trauma in DKI Jakarta, the factor that is proven to influence the level of sports teachers' knowledge of first aid for dental trauma is personal experience of experiencing dental trauma. In light of these results, it is strongly recommended that systematic training on the management of dental trauma be implemented for sports teachers in DKI Jakarta. It is imperative to ensure active participation in these training sessions and to assess comprehension through post-tests. Additionally, enhancing the facilities in the School Health Program is essential, which can be achieved through partnerships with local dental practitioners from nearby health centers. Such initiatives would significantly contribute to improving the preparedness of sports teachers in addressing dental emergencies effectively.

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