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Effectiveness of Educational Intervention on Traumatic Dental Injuries (TDIs) Knowledge Among 12–13-Year-Old Students

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ABSTRACT

Background: : Traumatic dental injuries (TDIs) in pediatric populations poses a substantial public health challenge. Educational interventions aimed at improving knowledge about TDIs are crucial for achieving a more favorable prognosis when these injuries occur. The objective of this research was to assess how educational sessions on traumatic dental injuries influence the awareness levels of students aged 12 to 13 years in Semarang.
Methods: A pre-experimental research design utilizing a single-group pretest–posttest approach was applied in this investigation. Using a purposive sampling technique in July 2025, 93 seventh-graders between 12 and 13 years old attending SMP Negeri 9 Semarang were recruited as participants. Research data were gathered through two validated instruments: a TDIs experience questionnaire and a 10-item multiple-choice knowledge questionnaire, which demonstrated good reliability. The educational intervention covered the definition, prevention, and first-aid management of TDIs. Differences between baseline and post-intervention scores were evaluated statistically via the Wilcoxon signed-rank test.
Result: A total of 15,1% of the respondents reported a history of experiencing TDIs, with playing activities identified as the most common cause. Average comprehension scores rose substantially from 67.3 prior to the session to 83,1 afterward, demonstrating a statistically significant improvement (*p-value*<0,001).
Conclusion : Prior to the intervention, students' baseline knowledge regarding TDIs was insufficient. Delivering structured oral health education served as an impactful approach to markedly elevate students' understanding and vigilance regarding TDIs.

Keywords: Traumatic dental injuries ; Dental health education ; Health education ; Children's permanent teeth

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Introduction

A traumatic dental injury (TDIs) refers to physical damage sustained by the teeth, often involving surrounding hard and soft oral or perioral tissues.[1] Due to their high occurrence rate and adverse consequences on quality of life and economic productivity, TDIs are recognized as a pressing public health issue.[2] Anterior teeth are susceptible to trauma that impacts function and aesthetics. The severity of TDIs ranges from cracks or breaks in tooth enamel, pulp exposure, to complex fractures of the tooth crown and adjacent jawbone that require complex and costly rehabilitation.[3] TDIs often occurs in children and young adults.[4]

Occurrence rates of TDIs differ across age and sexes, with males generally experiencing greater frequency linked to higher engagement in hazardous physical activities.[5] Findings from a global meta-analysis indicate that 18,1% of 12-year-old children are affected by TDIs.[6] Epidemiological data from India report TDIs rates of 18% among children aged six years and under, compared to 12% in those older than six.[7] Within Indonesia, national figures estimate TDIs prevalence at roughly 11,4%.[8] Children aged 6–12 years are starting to spend most of their time outside the home and are actively involved in activities during school breaks. Within this demographic, TDIs occurrence reaches its highest point around ages 9 to 10, predominantly presenting as uncomplicated enamel-dentin crown fractures without pulp involvement.[9]

Although the risk of dental trauma during school activities is relatively high, awareness of and emergency management for dental trauma in local school settings are still not optimal.[8] Implementing preventive measures is essential to lowering the occurrence of TDIs, as targeted educational initiatives for children, parents, and educators can effectively boost awareness of risk factors, prevention, and emergency protocols.[10] Previous research on the application of the electronic-book educational media 'Traumatic Dental Injury to Children's Permanent Teeth' showed that it was effective in improving knowledge among elementary school teachers.[12] TDIs educational programs are recommended to include various teaching techniques and reinforcement media.[11] Accordingly, the present investigation sought to assess the impact of TDI-focused education on the comprehension levels of 12–13-year-old school children in Semarang.

Methods

This study was conducted in July 2025. The research utilized a pre-experimental design featuring a one-group pretest–posttest framework. This study involved an intervention in the form of educational sessions using the lecture method. The educational topics covered the definition of TDIs, preventive measures, and first-aid management in cases of TDIs. Ethical clearance for conducting this research was granted by the Health Research Ethics Committee, Faculty of Dentistry, Universitas Islam Sultan Agung (UNISSULA) (Reference No. 822/B.1-KEPK/SA-FKG/XII/2025). Eligible participants comprised seventh-grade students aged 12–13 years enrolled at SMP Negeri 9 Semarang who secured parental permission and completed all stages of the study, including the pre-test, educational session, and post-test. The subjects of this study were 93 students, The samples were selected using cluster sampling.

This study used a questionnaire consisting of 2 types of questionnaires, namely a questionnaire on traumatic dental injuries experiences and a questionnaire on knowledge of traumatic dental injuries totaling 10 multiple-choice questions that had previously been tested for validity using Pearson analysis and reliability testing using Cronbach Alpha analysis obtained a value of 0,762. Data on previous experiences of TDIs were presented in the form of frequency distribution tables. Participants' understanding of TDIs was evaluated through pre-intervention and post-intervention questionnaires, scored on a 0 to 100 scale. A score of >75% is classified as "good," 56–75% as "fair," and <56% as "poor." Data normality was verified via the Kolmogorov–Smirnov test, which indicated a non-normal distribution; consequently, pre- and post-intervention differences were

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analyzed using the non-parametric Wilcoxon signed-rank test.

Result

A total of 93 respondents participated in this study, with a nearly balanced age distribution, as presented in Table 1. Table 2 shows the experience of traumatic dental injuries (TDIs) among students involving both primary and permanent teeth, with 15,1% (N=14) of respondents reporting a history of TDI. 8,6% (N=8) respondents indicated that the most common cause of TDIs occurred during play activities. Furthermore, 7,5% (N=7) respondents reported being taken to a dentist more than day after the injury occurred. Table 3 shows a 15,8-point increase in the mean post-test score of students' TDIs knowledge. Statistical comparison via the Wilcoxon test demonstrated a highly significant improvement in students' TDI comprehension scores (*p-value* = 0,001), as detailed in Table 3.

Table 1. Respondent characteristics

Characteristics	N	Percentage (%)
Age		
12 years old	31	33,3%
13 years old	62	66,7%
Total	**93**	**100%**
Sex		
Male	46	49,5%
Female	47	50,5%
Total	**93**	**100%**

Table 2. Experience of Traumatic Dental Injuries

Variable	N	%
Experience of dental trauma		
Yes	14	15,1
No	79	84,9
Total	93	100
Causes of dental trauma that have been experienced		
While playing	8	8,6
While exercising	4	4,3
Other	2	2,2
Never experienced dental trauma	79	84,9
Total	93	100
Location of dental trauma ever experienced		
At home	8	8,6
At school	3	3,2
Other	3	3,2
Never experienced dental trauma	79	84,9
Total	93	100
Time to go to the dentist		
Immediately after the incident	6	6,5
More than 1 day after the incident	7	7,5
Never taken to the dentist	1	1,1
Never experienced dental trauma	79	84,9
Total	93	100

Table 3. Knowledge Score of Traumatic Dental Injuries

Average knowledge score		
	N	**Mean**
Pre-test score	93	67,3
Post-test score	93	83,1

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Continued Table 3. Knowledge Score of Traumatic Dental Injuries

Knowledge – Smirnov (Test of Normality)		
	N	***p-value***
Pre-test score	93	0,000
Post-test score	93	0,000
Wilcoxon Test		
	N	***p-value***
Pre -test vs Post test	93	0,001

Discussion

Findings from this investigation demonstrated a statistically significant elevation in participants' understanding of TDIs (*p-value*<0,001), as presented in Table 3. These outcomes align with prior work by Zhong and Zheng (2025), who similarly observed enhanced student comprehension of dental trauma after structured educational sessions. That study also used an intervention in the form of educational sessions delivered via lectures; however, in that study, a pre-test questionnaire was administered before the intervention, and the percentage of traumatic dental injuries was tracked for one month following the intervention, after which a post-test was conducted.[10] In the present study, the students' knowledge scores increased from a mean value of 67,3 to 83,1 after the educational intervention. These results are also in line with the study by Srilatha (2021), which found that dental trauma knowledge scores increased from a baseline mean of 7,68 ± 2,43 to 12,45 ± 2,61 after educational intervention among children aged 12–16 years.[13] The increase in knowledge scores in this study confirms the direct effectiveness of dental health education in raising children's awareness, which is consistent with previous literature reviews on TDI educational initiatives.[14-15]

However, there are several methodological limitations in this study. Employing a single-group pretest–posttest pre-experimental structure lacking a control group constrains internal validity, given that score gains could partially stem from testing familiarity or exposure to outside information sources.[16] Furthermore, data collection took place at only one school in Semarang involving 93 participants. Modest sample size that limits the broader applicability of these outcomes to wider populations.[17]

Both the International Association of Dental Traumatology and the American Academy of Pediatric Dentistry emphasize that clinical outcomes for dental trauma improve substantially when the general public understands proper emergency first-aid protocols. Consequently, educating schoolchildren represents a promising avenue for fostering greater awareness of appropriate dental trauma management.[18] When designing dental trauma outreach, delivery strategies ought to be adapted to the intended audience while incorporating core principles of injury prevention.[19] Accordingly, our educational module encompassed TDIs definitions, preventive strategies, and immediate first-aid procedures.

Educational methods that allow direct interaction with the instructor, such as lectures, seminars, and workshops, are considered effective approaches for improving knowledge and competence. Providing opportunities for participants to ask questions and engage in discussions can enhance the effectiveness of information transfer.[20]

Conclusions

Delivering targeted education on traumatic dental injuries (TDIs) proved effective in enhancing the comprehension levels of 12–13-year-old students. A significant increase in knowledge scores was observed after educational intervention covering the definition, prevention, and first-aid management of TDIs. Several participants reported prior TDIs occurrences, predominantly triggered during recreational

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play and delayed dental care following the traumatic event.

Collectively, these results underscore the vital role of school-based dental trauma education among school-aged children in improving awareness and preparedness for TDIs incidents. Initiatives centered on preventing and promptly managing dental injuries ought to be permanently embedded within school health promotion programs to foster sustained knowledge and ensure rapid, accurate responses during dental emergencies.

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References

1. Sulistiani, S., Ulliana, and Bagas, N. R. 2024. Aspects of Mother Knowledge Regarding Permanent Dental Trauma in Children. Int. J. Curr. Sci. Res. Rev. 7 (5): 2865-2872.
2. Agbor, A. S., Nfondang, N. M., Sonkeng, T. E., Kouamouo, J., Bengodo, C. M., Songo, B., and Pilipil, C. 2021. Etiology And Management Of Traumatic Dental Injuries In Children Less Than 12 Years Old In Yaoundé. Romanian J. Oral Rehabil. 13 (1): 7-2.
3. World Health Organization. 2023. Global oral health status report: towards universal health coverage for oral health by 2030. Regional summary of the African Region. Technical Report. World Health Organization.
4. Levin, L., Day, P. F., Hicks, L., O'Connell, A., Fouad, A. F., Bourguignon, C., and Abbott, P. V. 2020. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: General introduction. Dent. Traumatol. 36 (4): 309-313.
5. Akgun, O. M., Yildirim, C., Guven Polat, G., Altun, C., and Basak, F. 2025. Evaluation of traumatic dental injuries in pediatric patients: A cross sectional study. Ulus. Travma Acil Cerrahi Derg. 31: 698-704.
6. Petti, S., Glendor, U., and Andersson, L. 2018. World traumatic dental injury prevalence and incidence, a meta-analysis—One billion living people have had traumatic dental injuries. Dent. Traumatol. 34 (2): 71-86.
7. Raj, M. D. S. 2023. Prevalence of traumatic dental injuries in 7-13 years old school going children in rural and urban Tamil Nadu, India. J. Popul. Ther. Clin. Pharmacol. 30 (18): 2738-2749.
8. Mayasari, Y. and Setia Wibowo, R. D. 2022. Teachers' Knowledge About Dental Trauma and its Management in Primary Schools in Jakarta, Indonesia. J. Res. Soc. Sci. Econ. Manag. 1 (8): 1061–1071.
9. Slayton, R. L. and Palmer, E. A. 2019. Traumatic dental injuries in children: a clinical guide to management and prevention. Springer.
10. Zhong, X. and Zheng, P. 2025. Influence of children's dental trauma education from community dentists on the cognitive level of children and parents. J. Clin. Pediatr. Dent. 49 (4): 99-110.
11. Sulistyarsi, P., Fauziah, E., and Budiardjo, S. B. 2024. Effect of electronic book "Traumatic dental injury to children's permanent teeth" on primary school teacher's knowledge. J. Clin. Pediatr. Dent. 48 (3): 101–106.
12. Adnan, S., Lone, M. M., Khan, F. R., Hussain, S. M., and Nagi, S. E. 2018. Which is the most recommended medium for the storage and transport of avulsed teeth? A systematic review. Dent. Traumatol. 34 (2): 59-70.
13. Srilatha, Y., Shekar, Chandra, B. R., and Krupa, N. C. 2021. Effectiveness of school-based dental health education on knowledge and practices related to emergency management of dental trauma and tooth avulsion: An educational

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intervention study. Int. J. Acad. Med. 7 (1): 39-61.

14. Amzat, J., Salami, A. A., and Uwambaye, P. 2023. School-Based Interventions on Dental Trauma: A Scoping Review of Empirical Evidence. Children. 10 (5): 797.
15. Tewari, N., Goel, S., Srivastav, S., Mathur, V. P., Rahul, M., Haldar, P., Ritwik, P., and Bansal, K. 2023. Global status of knowledge of parents for emergency management of traumatic dental injuries: a systematic review and meta-analysis. Evid. Based Dent. 24 (2): 91.
16. Stratton, S. J. 2019. Quasi-experimental study designs. Prehosp. Disaster Med. 34 (6): 573–574.
17. Andrade, C. 2021. The limitations of sample size and generalization in research studies. Indian J. Psychol. Med. 43 (1): 89–90.
18. Grewal, N., Shangdiar, G. D., and Samita, G. 2015. Efficacy of a comprehensive dental education program regarding management of avulsed permanent teeth as a valid indicator of increased success rate of treatment of avulsion in a North Indian population. Contemp. Clin. Dent. 6 (4): 477–482.
19. Nowosielska, M., Bagińska, J., Kobus, A., and Kierklo, A. 2022. How to Educate the Public about Dental Trauma—A Scoping Review. Int. J. Environ. Res. Public Health. 19 (4): 2479.
20. Al-Sane, M., Bourisly, N., Almulla, T., and Andersson, L. 2011. Laypeople's preferred source of health information on the emergency management of tooth avulsion. Dent. Traumatol. 27 (6): 432-437.

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