Submitted: 26 July, 2023 Accepted: 22 September, 2023 Online Published: 29 January, 2024 DOI:10.22514/jocpd.2024.027

ORIGINAL RESEARCH

Journal of Clinical Pediatric Dentistry

Effect of electronic book "Traumatic dental injury to children's permanent teeth" on primary school teacher's knowledge

Prida Sulistyarsi[1], Eva Fauziah[2,*], Sarworini B. Budiardjo[2]

[1]Pediatric Dentistry Postgraduate Program, Faculty of Dentistry, University of Indonesia, 10430 Jakarta, Indonesia
[2]Department of Pediatric Dentistry, Faculty of Dentistry, University of Indonesia, 10430 Jakarta, Indonesia

***Correspondence**
eva.fauziah@ui.ac.id
(Eva Fauziah)

Abstract

Most dental trauma in children aged 8–12 years occurs in schools. Teachers should properly and timely manage the emergency pertaining to traumatic dental injuries before paying visit to dental health center. Studies had revealed that the elementary school teachers carried poor knowledge of managing the dental trauma. Electronic books were the easily accessible digital and visual educational media for the users through internet-connected devices. This study compared the knowledge of primary school teachers before and after reading the innovative electronic book "Traumatic Dental Injury to Children's Permanent Teeth". The questionnaire was shared *via* a link, before and after reading this electronic book. The contents of electronic book included the kinds of trauma, management, and preventive measures as explained *via* appealing illustrations. The median score of knowledge before the intervention was 6 (poor), and afterwards it was 13 (good). Wilcoxon test on scores before and after reading this book resulted in statistically significant difference p-value ≤ 0.05. The electronic book "Traumatic Dental Injury to Children's Permanent Teeth" was innovative, and effective educational media having high impact of increasing the dental trauma knowledge among primary school teachers.

Keywords

Dental injuries; Electronic book "Traumatic dental injury to children's permanent teeth"; Teacher's knowledge

1. Introduction

Dental trauma was common in children and young adults of school which accounted for over half of the cases [1–3]. The International Dental Traumatology Association (IADT) reported that one in two children of 8–12 years experienced dental trauma. The trauma prevalence in permanent dentition period reached 15% [4, 5]. A study in Indonesia reported the prevalence of dental trauma and luxation in permanent dentition period as 17% for boys and 8% for girls [6].

Dental trauma might incur from traffic accidents, violence, fights or sports. Teachers in schools, were often the first responders upon dental trauma, and thus had crucial role in its management [7]. Increasing the teacher's knowledge of dental trauma was important. If not treated promptly and properly, the aesthetic and functional disturbances might affect social, economic, and psychological aspects, which could lower the life quality of children and parents [7–9].

Digital technology produced fast, effective and efficient information. The digital educational media was advantageous because of broad accessibility through mobile devices, which increased the availability of proper first-aid procedures for dental trauma at accident sites [7, 10]. Electronic books were a form of educational media utilizing digital technology [11]. Digital technology facilitated the individuals to learn anytime and anywhere. This electronic book was beneficial for attaining the current and updated information [12, 13]. It was important to educate elementary school teachers regarding proper first aid upon dental trauma incidence in children, as many such cases occurred in schools and had not received appropriate treatment [7]. Studies pertaining to dental trauma education, were imposed in Indonesia in the form of posters, and audio-visual, namely video animation [1, 14]. The education was required regarding permanent tooth trauma in children and corresponding first aid through digital media. The digital media easily provided instructions of encountering a dental trauma emergency at incident site [11]. Research on the differences in knowledge of elementary school teachers before and after reading the electronic book "Traumatic Dental Injury to Children's Permanent Teeth" had never been conducted in Indonesia. Therefore, this study investigated the influence of this educational book on elementary school teachers' knowledge regarding dental trauma in children.

2. Materials and methods

2.1 Subjects

Study participants were the East Jakarta public elementary school teachers who were educated *via* the electronic book "Traumatic Dental Injury to Children's Permanent Teeth". The method of stratified random sampling was employed in this study. In each district of East Jakarta, an A accredited public elementary school was randomly selected for the study. In East Jakarta, there were 10 sub-districts each with a public elementary school. Participants had minimum of undergraduate education level of bachelor's or equivalent and could operate an internet connected device to access the questionnaire and electronic book. Total of 117 teachers met the inclusion criteria for this study.

2.2 Research instruments (questionnaire and electronic book)

The questionnaire and electronic book were written in Bahasa Indonesia and made available in digital form. The questionnaire included 14 multiple-choice questions developed through expert discussions. Before conducting the study, the researchers used Kuder-Richardson (Kr20) method to ensure the reliability of questionnaire among 30 teachers not included in the final sample. The reliability test stated that questionnaire was reliable with a value of 0.812 (classified in high category). So, questionnaire was valid as a knowledge assessment tool. Incorrect answers were scored as zero and correct answers as 1. The electronic book "Traumatic Dental Injury to Children's Permanent Teeth" consisted of 10 pages having information about permanent teething age, part of teeth, dental injuries and first aid management, supported by illustrative pictures.

2.3 Research method

One-group pretest-posttest design was employed to compare the intervention results. The questionnaire was necessary to be answered before and after reading the electronic book. Questionnaire was sent *via* WhatsApp and distributed by Google Forms to assess the elementary school teachers' knowledge. Teachers were given 5 minutes to answer the questionnaire. Teachers were then instructed to read the electronic book "Traumatic Dental Injury to Children's Permanent Teeth" on sent link in maximum of 7 minutes. Teachers answered the same questionnaire again in 5 minutes. The determination of time to fill questionnaire and read the electronic book was based on preliminary study to find the average time required during research. The scores percentage before and after reading the electronic book illustrated the effect of educational media "Traumatic Dental Injury to Children's Permanent Teeth" on teacher's knowledge.

2.4 Data analysis

The data were analyzed using IBM SPSS Statistics V.22 (IBM, Armonk, New York, USA). A paired *t*-test or Wilcoxon's signed rank test was employed based on the data distribution to determine the significant differences in knowledge scores (significance level was set at 5%) before and after intervention.

3. Results

A total of 117 from 141 teachers met the inclusion criteria and agreed to fill the questionnaire. The data distribution through univariate tests found that 91 (77.8%) female teachers and 26 (22.2%) male teachers had participated in the study. The participants average age was 41 years with teaching period of 15 years. 89% participants were undergraduates. Table 1 described the demographic characteristics of study sample (gender, age, number of teaching years, and education level of elementary school teachers).

TABLE 1. Demographic data and participants in the study sample.

Information	N (%)
Gender:	
Female	91 (78)
Male	26 (22)
Education level:	
Diploma IV	1 (1)
Bachelor's degree	116 (99)
Age (years):	
<25	5 (4)
25–35	34 (29)
>35–45	38 (32)
>45	40 (34)
Teaching experience (years):	
<10	42 (36)
>10	75 (64)
Position in school:	
Classroom teacher	88 (75)
Subject teacher	21 (18)
Physical education teacher	8 (7)

The increase in teachers' percentage of answering correctly occurred in all questions (Table 2), indicating an increase in knowledge of dental trauma after reading the electronic book "Traumatic Dental Injury to Children's Permanent Teeth". Three questions 4, 8 and 11 with correct answers had high percentage of improvement. The highest percent increase in answers score was seen in question 8, reaching to 86.3%.

Data analysis determined the significance of differences in knowledge scores before and after reading the electronic educational media. The data normality was tested using Kolmogorov-Smirnov method prior to the statistical test. Results of data normality test exhibited that the data distribution was not normal. So, Wilcoxon non-parametric test was employed to assess the significance of difference in total knowledge scores before and after reading the educational electronic book "Traumatic Dental Injury to Children's Permanent Teeth". Table 2 showed the data before and after reading the book, and the Wilcoxon test results. Table 3 illustrated the median value of 6 before reading and 13 after reading the electronic book. This

TABLE 2. Percentage of teachers' knowledge assessment scores of each question before and after reading the electronic book "Traumatic dental injury to children's permanent teeth".

No	Question	Time of Scoring	Correct Answer (%)	Improvement (%)
1	What is dental and oral trauma in children?	Before	43.6	52.1
		After	95.7	
2	Which events are classified as incidents of dental trauma in the statements below?	Before	59.8	30.8
		After	90.6	
3	What factors can cause dental trauma?	Before	33.3	49.6
		After	82.9	
4	In your opinion, what are the first-aid measures to take if a tooth is broken due to an impact?	Before	9.4	86.3
		After	95.7	
5	In your opinion, when is the right time to seek medical help when a dental trauma occurs?	Before	41.0	47.9
		After	88.9	
6	In your opinion, where should we seek proper medical help when dental and oral trauma occur in children?	Before	68.4	7.7
		After	76.1	
Case 1 for questions 7–8: An 11-year-old boy fell and broke his upper front tooth.				
7	Case 1: In your opinion, which tooth is missing?	Before	23.1	60.7
		After	83.8	
8	Case 1: In your opinion, can the missing teeth be replaced?	Before	11.1	84.6
		After	95.7	
Case 2 for questions 9–11: A 9-year-old boy was running. Suddenly, he tripped over a rock and fell, causing one of his front left upper teeth to fall out and his mouth filled with blood. The child was uninjured elsewhere, healthy, and conscious.				
9	Case 2: In your opinion, what first aid measures need to be taken for the loose tooth?	Before	40.2	47.0
		After	87.2	
10	Case 2: In your opinion, what is the right way to hold the loose tooth?	Before	64.1	32.5
		After	96.6	
11	Case 2: In your opinion, what is the right medium to store loose teeth?	Before	21.4	77.7
		After	99.1	
Case 3 for questions 12–14: A 10-year-old girl had an accident, that caused the position of upper front teeth into the gums and bleeding from the gums.				
12	Case 3: In the case above, what is the correct term for this condition?	Before	42.7	36.3
		After	79.5	
13	Case 3: In your opinion, which first aid answer is most appropriate for the above case?	Before	76.1	19.6
		After	95.7	
14	Which of the following is a way to prevent oral dental trauma?	Before	35.9	54.1
		After	90.6	

showed that teachers knowledge level before the reading was lacking with average correct answers of <8. The level after reading was good with average correct answers of >12 out of the total correct answers of 14 (100%). Wilcoxon test evaluated the statistical significance of differences in knowledge scores before and after reading the electronic book, with $p \leq 0.05$ (Table 3). Therefore, it was concluded that there was significant difference between the knowledge level of elementary school teachers before and after reading the electronic book "Traumatic Dental Injury to Children's Permanent Teeth".

TABLE 3. Elementary school teachers' knowledge level before and after reading the electronic book "Traumatic dental injury to children's permanent teeth".

Scoring Time	n	Knowledge score Median (min–max)	*p*-value
Before	117	6* (0–13)	0.001**
After	117	13* (4–14)	

**Knowledge level based on median: good with score 12–14; adequate with score 9–11; lack with score ≤8 [15].*
***Wilcoxon test, sig. $p \leq 0.05$.*

4. Discussion

This study determined the knowledge level of public elementary schools' teachers before and after reading the electronic book "Traumatic Dental Injury to Children's Permanent Teeth". The topic choice of childhood permanent tooth trauma was based on its frequent occurrence in 8–12 years age range. One in four children experienced trauma during the permanent dentition period with prevalence reaching 15% [4, 5]. In Indonesia, 17% boys and 8% girls were reported of dental trauma. It was noted that few among these patients received appropriate first aid [6]. Fractures and luxation were the frequent permanent tooth injuries in children and teenagers, and avulsion was a critical emergency requiring immediate treatment [3, 16]. The public elementary school teachers were the participants of this study because school children prone to permanent teeth trauma were at school for minimum 6 hours a day. Their safety and security were the school responsibility. Teachers were expected to be ready for handling the emergency as they were the first responders and provided assistance upon dental trauma in children [1, 17]. Providing education to elementary school teachers regarding dental trauma related first aid was important because many such cases occurred in schools and did not received proper treatment [14]. The researchers thus conducted the study on elementary school teachers as participants.

Teachers could gather, process, and apply the appropriate information. According to the National Education Standards, a teacher in Indonesia was a professional educator requiring bachelor's degree or diploma IV, master's competence (pedagogic, professional, social and moral), educator certificate, and be in good psychological and physical condition to apply various methods and strategies, and use learning media [18]. The description of data percentage regarding gender, teaching length, and teaching experience had been mentioned in the results. Literature mentioned the relationship between gender groups and length of teaching experience on elementary school teachers' knowledge of dental trauma in children. It stated that there was no significant difference in the knowledge between sex groups and length of teaching experience [19, 20]. Therefore, the sample in this study was homogenous.

The study was conducted on 117 teachers meeting the inclusion criteria from 10 public elementary schools. The stratified random sampling method was employed in selecting the study locations to represent East Jakarta districts. This sampling method was used on the units in population having auxiliary variables such as region and others determining the stratification [21]. The educational media employed in this study was the digital visual media in the form of electronic book. The users could easily access this information for performing emergency aid in trauma conditions. Knowledge about dental trauma and first aid required to become practical knowledge for everyone so that they could manage emergency procedures to cater trauma conditions at the scene [22]. The information technology was important to the education world so that the developed digitalization could generate fast, effective, efficient, and accurate information [12]. Electronic books were the products of digital technology for mediating the information in a way that it encouraged the reader to learn a process anytime and anywhere, and conducive practice that. Digital technology provided space for designing educational information media that could be adapted to cater the needs of certain groups [13, 23].

The electronic book "Traumatic Dental Injury to Children's Permanent Teeth" was based on trustworthy content with understandable illustrations using text and images. The making of this electronic book was carried out through series of processes like starting with determining the book material, number of pages, and number of illustrations. The electronic book consisted of 10 pages including text, colored images, and content regarding definition, causes, consequences, prevention, and first aid for child's permanent teeth trauma. The composed content was then tested for validity and declared valid and acceptable to readers. An electronic book by definition was a digital book consisting of text, images, and possibly sound. It was published in digital form and could be read on computers or other electronics such as Android, smartphones or tablets [24].

A questionnaire had been employed in this study to assess the teacher's knowledge before and after reading the electronic book "Traumatic Dental Injury to Children's Permanent Teeth". All the information in electronic book had been addressed through 14 questions in the survey. The validity and reliability tests were conducted to ensure that this questionnaire was valid and reliable. To collect the data, questionnaire provided a set of structured questions with potential responses that might be used to get complete picture of the issue. Key features included the assessment of questionnaire's quality, keeping a focus on the substance or direction of the question, and applying pilot study to evaluate the developed questionnaire [25]. The questionnaire of this study was validated in several stages, *i.e.*, first qualitatively with dentists and elementary school teachers, then quantitatively with test measurements, and internal consistency reliability *via* Kuder Richardson (Kr20). A systematic review of teacher's knowledge and attitude towards first treatment of dental trauma stated that several methods could be used for validation, including face validity, pilot testing, content validity (instrument evaluation by experts), and measurement using Cronbach's alpha [9]. Knowledge assessment was carried out by categorizing it on quantitative scale, namely "good knowledge" if the score or value was 76–100%, "adequate knowledge" with 57–75%, and "lack of knowledge" with 56% [15]. The benefits expected in this study could add insight through electronic book regarding first aid guidelines for permanent teeth trauma in children. This was in line with the American Academy of Pediatric Dentistry (AAPD), which stated that dentists must collaborate in providing education to public regarding prevention and first aid for trauma in oral and maxillofacial regions [26]. The correlation between actions taken at the scene and treatment outcomes stressed the need to promote prevention and first aid practices in dental trauma. This explained the significance of providing dental trauma education and developing educational media for reducing short- and long-term post-traumatic effects, and raising awareness of first aid to victims [7, 10].

The statistical study results explained that all questions had significant increase in the percentage of correct answers. Previous studies explained an increase in knowledge scores

after providing necessary education [1, 14]. The percentage of right answers increased for first three questions which asked about the definitions, knowledge of events, and causes of trauma. This showed how teacher knowledge had increased with reading the electronic books used in classroom. Furthermore, knowledge had reportedly increased after receiving relevant education [1, 27]. Questions 4 to 13 began with a case statement wherein the questions were relevant to the case. For questions 4 and 5, the first case statement was related to fractured or broken teeth. For questions 6 to 11, the second case statement was referred to avulsion. The third case statement was responded in questions 12 and 13 regarding teeth-shifting positions. The correct answers percentage increased the most for fourth question in case 2. This question acquired new significance in the study topic because of this electronic book when teachers noticed that fractured tooth fragments could still be kept and put back into place. Another study also found that treating fractured teeth entailed the detection of broken teeth and informing the respondents [28, 29]. Question 11 had the highest increase in second case. In the case of avulsion, most teachers did not know that loose teeth could be reattached and stored in milk or saline storage media. This was an important concern and stressed that trauma related education was imperative. Literature also indicated that teacher's knowledge was lacking regarding the handling of dental trauma, especially avulsions [14, 29].

The allocation of reading time to electronic book was based on the preliminary test taken by elementary school teachers who were not the study participants and had read for an average of 7 minutes. In the theory of memory stages put forward by Lutz and Huitt, a stimulus was captured by the five senses to produce information that lasted for few seconds, and information processing became extensive, prolonged and powerful with the retention of more data [30, 31].

The statistical analysis results of Wilcoxon test showed a value of $p = 0.001$, obtained by comparing the teacher's knowledge scores before and after reading the electronic book "Traumatic Dental Injury to Children's Permanent Teeth". There was thus a significant difference between the knowledge level of elementary school teachers before and after reading this electronic book. The median total score was increased from 6 to 13 after reading electronic book. This was in line with the research on teacher's knowledge level attained through various educational methods, which stated an increase in teacher's knowledge after obtaining education [1, 14, 28]. The median total score before reading the educational electronic book was 6, reflecting that the teacher's knowledge of first aid for permanent teeth trauma in the children was lacking. Results of this study were consistent with the similar studies performed in various countries, which stated that teacher's initial knowledge of first aid for trauma was low [9, 14, 19]. In a meta-analysis, it was stated that teachers' percentage receiving education about dental trauma was only 9%. One of the reasons for minimal education related to dental trauma and first aid for teachers was the lack of attention from local authorities [9].

Results of this study indicated that the electronic book "Traumatic Dental Injury to Children's Permanent Teeth" was an effective educational media. It increased the teachers' knowledge pertaining to the understanding of children's permanent tooth trauma and providing necessary first aid. It could thus be used as a guidebook of appropriate oral dental health education media for elementary school teachers. This study focused on the development of new educational digital media in the form of electronic book "Traumatic Dental Injury to Children's Permanent Teeth" with an assessment of knowledge level of elementary school teachers. It was speculated that knowledge of children's permanent teeth trauma through this educational media could also be known to those other than elementary school teachers.

5. Conclusions

Findings of this study demonstrated that the electronic book "Traumatic Dental Injury to Children's Permanent Teeth" was a promising medium for dental and oral health education. The study exhibited an increase in the knowledge of public elementary school teachers before and after reading the electronic book "Traumatic Dental Injury to Children's Permanent Teeth". The mentioned electronic book was therefore an effective educational medium to increase the elementary school teacher's knowledge about child permanent tooth trauma.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

AUTHOR CONTRIBUTIONS

PS, EF and SBB—designed the research study. PS—performed the research, analyzed the data, and wrote the manuscript. EF and SBB—supervised the implementation of research and contributed to editorial changes in the manuscript (review and editing). All authors declare that they contributed to a critical review of intellectual content and approval of the final manuscript to be published.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The research project was approved by Ethical Committee of Faculty of Dentistry, University of Indonesia No.111/Ethical Approval/FKGUI/XI/2022; Protocol number: 051471022.

ACKNOWLEDGMENT

The researcher would like to thank all of the participants who were willing to take part in this research.

FUNDING

HIBAH PUTI (Grant No. NKB-233/UN2.RST/HKP.05.00/2022), University of Indonesia.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

[1] Katthika VK, Fauziah E, Budiardjo SB. Animated video for increasing primary school teachers' knowledge regarding first aid management of dental avulsion. Brazilian Dental Science. 2020; 23: 1–7.

[2] Alsadhan SA, Alsayari NF, Abuabat MF. Teachers' knowledge concerning dental trauma and its management in primary schools in Riyadh, Saudi Arabia. International Dental Journal. 2018; 68: 306–313.

[3] Bourguignon C, Cohenca N, Lauridsen E, Flores MT, O'Connell AC, Day PF, *et al*. International association of dental traumatology guidelines for the management of traumatic dental injuries: 1. fractures and luxations. Dental Traumatology. 2020; 36: 314–330.

[4] Ak TA, Ozdas DO, Zorlu S, Karataban PK. Dental traumatology in pediatric dentistry. In Gözler S (ed.) Trauma in dentistry (pp. 55–82). 1st edn. IntechOpen: London, UK. 2019.

[5] Slayton RL, Palmer EA. Traumatic dental injuries in children: a clinical guide to management and prevention. 1st edn. Springer: Berlin, Germany. 2020.

[6] Septahapsari AI. Distribution frequency of traumatic permanent anterior teeth on children aged 8 12 years study in State Elementary School District of Joharbaru Central Jakarta [master's thesis]. Fakultas Kedokteran Gigi Universitas: University of Indonesia. 2014.

[7] Andreasen JO, Andreasen FM, Andersson L. Textbook and color atlas of traumatic injuries to the teeth. 5th edn. Wiley-Blackwell: Hoboken. 2019.

[8] Benkirane L, Targhaline N, Hamza M, El Arabi S. Prevalence and predisposing factors associated with facial and dentoalveolar trauma among children and adolescents aged between 06 months and 15 years having consulted casablanca dental emergency department. Journal of Pediatric Dentistry. 2021; 7: 9–16.

[9] Trabelsi K, Shephard RJ, Zlitni S, Boukhris O, Ammar A, Khacharem A, *et al*. Dental trauma first-aid knowledge and attitudes of physical education teachers: a systematic review and meta-analysis of the literature with meta-regressions. Education Sciences. 2019; 9: 251.

[10] Magdalena Nowosielska, Joanna Baginska, Agnieszka Kobus, Kierklo A. How to educate the public about dental trauma—a scoping review. International Journal of Environmental Research and Public Health. 2022; 19: 2479.

[11] Budi MEP. Online: creating a digital parenting plan e-booklet about how to prevent gadget addiction in childhood. Journal of Islamic Educational Counseling. 2021; 2.

[12] Suherdi D, Rezky SF, Kom, S, Kom M, Apdilah D, Sinuraya J, *et al*. The importance of digital literacy during a pandemic. Cattleya Darmaya Fortuna: Sumatera Utara. 2021.

[13] Dumaris E, Silalahi EA. Digital literacy education: theory, practice, and application: PT. Global Eksekutif Teknologi. 2022. Available at: https://www.google.co.id/books/edition/Literasi_Digital_Berbasis_Pendidikan/2d55EAAAQBAJ?hl=id&gbpv=1&dq=Literasi+Digital+Berbasis+Pendidikan:+Teori,+Praktek+dan+Penerapannya:+PT.+Global+Eksekutif+Teknologi+2022&pg=PP2&printsec=frontcover (Accessed: 19 August 2022).

[14] Enikawati M, Fauziah E, Budiardjo SB. Effect of first aid management of dental avulsion posters on primary school teachers' knowledge. Pesquisa Brasileira em Odontopediatria e Clínica Integrada. 2020; 20: e0061.

[15] Imas Masturoh, T Nauri Anggita. Methodology of health research. Center for Health Human Resources Education: Jakarta. 2018.

[16] Fouad AF, Abbott PV, Tsilingaridis G, Cohenca N, Lauridsen E, Bourguignon C, *et al*. International association of dental traumatology guidelines for the management of traumatic dental injuries: 2. avulsion of permanent teeth. Dental Traumatology. 2020; 36: 331–342.

[17] Fuady R, Mutalib AA. Audio-visual media in learning. Journal of K6 Education and Management. 2018; 1: 1–6.

[18] Abdussamad Z, Rosita E, Alfianto AG, Pramana C, Kristianto B, Wicaksono KE, *et al*. Health promotion: innovation and implementation program. Media Sains Indonesia: Bandung. 2021.

[19] Makdis N. E-Books in the digital age. Al-Maktabah. 2020; 19: 77–84.

[20] Hendriani A, Nuryani P, Ibrahim T. Critical literacy pedagogy: its history, philosophy, and development in the educational environment. Pedagogia. 2018; 16: 44–59.

[21] Septian EDJ, Muchsin M, Kuntoro K, Martini S. Textbook of health promotion media development: K-Media. Universitas Ahmad Dahlan: Yogyakarta. 2019.

[22] Asosiasi Penyelenggara Jasa Internet Indonesia. APJII in Indonesia Digital Outlook 2022. 2022. Available at: https://apjii.or.id/berita/detail/apjii-di-indonesia-digital-outloook-2022_857 (Accessed: 19 August 2022).

[23] Simamora NRH, Kep M. Nursing education textbook. Penerbit Buku Kedokeran EGC: Jakarta. 2009.

[24] Intika T. Development of media booklet science for kids as learning resources in elementary schools. Jurnal Riset Pendidikan Dasar. 2018; 1: 10–17.

[25] Reddy LV, Bhattacharjee R, Misch E, Sokoya M, Ducic Y. Dental injuries and management. Facial Plastic Surgery. 2019; 35: 607–613.

[26] Council O. Guideline on the management of acute dental trauma. Dental Traumatology. 2011; 32: 202–212.

[27] Mayasari Y, Wibowo RDS. Teachers' knowledge about dental trauma and its management in primary schools in Jakarta, Indonesia. Journal Research of Social, Science, Economics, and Management. 2022; 1: 1061–1071.

[28] Al Sari S, Kowash M, Hussein I, Al-Halabi M. An educational initiative for dubai school nurses and physical education teachers on the management of traumatic dental injuries. The Journal of School Nursing. 2019; 35: 359–366.

[29] Tzimpoulas N, Markou M, Zioutis V, Tzanetakis GN. A questionnaire-based survey for the evaluation of the knowledge level of primary school teachers on first-aid management of traumatic dental injuries in Athens, Greece. Dental Traumatology. 2020; 36: 41–50.

[30] Mampouw H, Lukito A. Student's understanding of graph based on information-processing. International Journal of Active Learning. 2016; 1: 12–19.

[31] Raoof M, Shokouhinejad N, Izadi A, Nourzadeh M, Afkham A, Forghani FR, *et al*. Long-term effect of an educational intervention regarding dental trauma first aid: a phase II study. Dental Traumatology. 2014; 30: 296–301.

How to cite this article: Prida Sulistyarsi, Eva Fauziah, Sarworini B. Budiardjo. Effect of electronic book "Traumatic dental injury to children's permanent teeth" on primary school teacher's knowledge. Journal of Clinical Pediatric Dentistry. 2024. doi: 10.22514/jocpd.2024.027.