**Supplementary material**

**Evaluation of pediatric dentists’ knowledge and approaches to tooth discoloration**

**Questionnaire**

1. What is your gender?

○ Female

○ Male

2. In which age range are you?

○ 23–30

○ 31–40

○ 41–50

○ ≥51

3. Which year did you graduate from the faculty of dentistry? …

4. Which year did you finish specialist training?

○ My specialist training continues

○ The year I finished my specialist training: …

5. What institution are you currently working for?

○ Private practice/polyclinic/hospital

○ State hospital/Oral and Dental Health Center

○ University

6. What are the systemic factors that can cause tooth discoloration? (You can tick one or more options)

○ Epidermolysis bullosa

○ Hyperbilirubinemia

○ Congenital erythropoietic porphyria

○ Pseudohypoparathyroidism

○ Phenylketonuria

○ Vitamin D-induced rickets

○ Premature birth and low natal weight

○ Osteogenesis imperfecta

○ Erythroblastosis fetalis

○ Thalassemia

○ Ehler-Danlos syndrome

7. What are the drugs that can cause tooth discoloration? (You can tick one or more options)

○ Penicillin

○ Clindamycin

○ Tetracycline

○ Minocycline

○ Ciprofloxacin

○ Metronidazole

○ Clarithromycin

8. Which conditions can cause tooth discoloration in the pre-eruption period? (You can tick one or more options)

○ Amelogenesis imperfecta

○ Dentinogenesis imperfecta

○ Dentin dysplasia

○ Fluorosis

○ Molar-Incisors hypomineralization

○ Tetracycline discoloration

○ Malnutrition

○ Food and beverages

○ Caries

○ Trauma

○ Root canal sealers and intracanal medicaments

○ Calcific metamorphosis

○ Internal resorption

9. Which conditions can cause tooth discoloration in the post-eruption period? (You can tick one or more options)

○ Amelogenesis imperfecta

○ Dentinogenesis imperfecta

○ Dentin dysplasia

○ Fluorosis

○ Molar-Incisors hypomineralization

○ Tetracycline discoloration

○ Malnutrition

○ Food and beverages

○ Caries

○ Trauma

○ Root canal sealers and intracanal medicaments

○ Calcific metamorphosis

○ Internal resorption

10. What anti-caries topical agents can cause temporary and/or permanent tooth discoloration? (You can tick one or more options)

○ Sodium fluoride agents

○ Stannous fluoride agents

○ Acidulated phosphate fluoride agents

○ Titanium tetrafluoride agents

○ Silver diamine fluoride agents

○ Casein-phosphopeptide-containing agents

11. What are the conditions that can cause brown tooth discoloration? (You can tick one or more options)

○ Inadequate oral hygiene

○ Fungi

○ Chromogenic bacteria

○ Sickle cell anemia

○ Congenital hyperbilirubinemia

○ Phenylketonuria

○ Erythroblastosis fetalis

○ Congenital erythropoietic porphyria

○ Thalassemia

○ Amelogenesis imperfecta

○ Ankylosis

○ Stannous fluoride agents

○ Titanium tetrafluoride agents

○ Casein-phosphopeptide-containing agents

○ Mouthwashes containing copper

○ Iron-containing products

○ Silver nitrate solutions

○ Mouthwashes containing potassium permanganate

○ Chlorhexidine mouthwash

○ Phenolic mouthwashes

○ Drinks containing tannin

12. What are the conditions that can cause green tooth discoloration? (You can tick one or more options)

○ Inadequate oral hygiene

○ Fungi

○ Chromogenic bacteria

○ Sickle cell anemia

○ Congenital hyperbilirubinemia

○ Phenylketonuria

○ Erythroblastosis fetalis

○ Congenital erythropoietic porphyria

○ Thalassemia

○ Amelogenesis imperfecta

○ Ankylosis

○ Stannous fluoride agents

○ Titanium tetrafluoride agents

○ Casein-phosphopeptide-containing agents

○ Mouthwashes containing copper

○ Iron-containing products

○ Silver nitrate solutions

○ Mouthwashes containing potassium permanganate

○ Chlorhexidine mouthwash

○ Phenolic mouthwashes

○ Drinks containing tannin

13. What are the conditions that can cause black tooth discoloration? (You can tick one or more options)

○ Inadequate oral hygiene

○ Fungi

○ Chromogenic bacteria

○ Sickle cell anemia

○ Congenital hyperbilirubinemia

○ Phenylketonuria

○ Erythroblastosis fetalis

○ Congenital erythropoietic porphyria

○ Thalassemia

○ Amelogenesis imperfecta

○ Ankylosis

○ Stannous fluoride agents

○ Titanium tetrafluoride agents

○ Casein-phosphopeptide-containing agents

○ Mouthwashes containing copper

○ Iron-containing products

○ Silver nitrate solutions

○ Mouthwashes containing potassium permanganate

○ Chlorhexidine mouthwash

○ Phenolic mouthwashes

○ Drinks containing tannin

14. What are the conditions that can cause yellow tooth discoloration? (You can tick one or more options)

o Inadequate oral hygiene

○ Fungi

○ Chromogenic bacteria

○ Sickle cell anemia

○ Congenital hyperbilirubinemia

○ Phenylketonuria

○ Erythroblastosis fetalis

○ Congenital erythropoietic porphyria

○ Thalassemia

○ Amelogenesis imperfecta

○ Ankylosis

○ Stannous fluoride agents

○ Titanium tetrafluoride agents

○ Casein-phosphopeptide-containing agents

○ Mouthwashes containing copper

○ Iron-containing products

○ Silver nitrate solutions

○ Mouthwashes containing potassium permanganate

○ Chlorhexidine mouthwash

○ Phenolic mouthwashes

○ Drinks containing tannin

15. What are the conditions that can cause orange tooth discoloration? (You can tick one or more options)

○ Inadequate oral hygiene

○ Fungi

○ Chromogenic bacteria

○ Sickle cell anemia

○ Congenital hyperbilirubinemia

○ Phenylketonuria

○ Erythroblastosis fetalis

○ Congenital erythropoietic porphyria

○ Thalassemia

○ Amelogenesis imperfecta

○ Ankylosis

○ Stannous fluoride agents

○ Titanium tetrafluoride agents

○ Casein-phosphopeptide-containing agents

○ Mouthwashes containing copper

○ Iron-containing products

○ Silver nitrate solutions

○ Mouthwashes containing potassium permanganate

○ Chlorhexidine mouthwash

○ Phenolic mouthwashes

○ Drinks containing tannin

16. What are vital tooth bleaching agents? (You can tick one or more options)

○ Hydrogen peroxide

○ Carbamide peroxide

○ Sodium perborate + distilled water

○ Sodium perborate + hydrogen peroxide

○ Other (Specify)…

17. What are devital tooth bleaching agents? (You can tick one or more options)

○ Hydrogen peroxide

○ Carbamide peroxide

○ Sodium perborate + distilled water

○ Sodium perborate + hydrogen peroxide

○ Other (Specify)…

18. What are the complications that can be seen after bleaching? (You can tick one or more options)

○ Postoperative hypersensitivity

○ Cervical external resorption

○ Increased enamel surface roughness

○ Decreased microhardness of enamel/dentin

○ Increased permeability of dentinal tubules

○ Pulp damage

○ Soft tissue damage

○ Coloring in restorative materials

○ Disconnection of restorative materials

19. What is the correct statement about the bleaching procedures on young permanent teeth? (You can tick one or more options)

○ Since the enamel permeability is higher in young permanent teeth than in adults, bleaching processes result in faster results.

○ Since enamel permeability is higher in young permanent teeth than in adults, bleaching agents with lower concentrations give more effective results.

○ Hypersensitivity after bleaching procedures in young permanent teeth is more common than in adults.

○ Safe to use carbamide peroxide on young permanent teeth.

20. What are the factors affecting the decision to tooth bleach in pediatric patient? (You can tick one or more options)

○ Child’s aesthetic expectations

○ The child’s psychological impact status

○ Parent’s aesthetic expectations

○ Economic status of the parent

○ Sociocultural status of the parent

○ Intensity of discoloration

○ Clinical facilities

○ Professional qualifications

21. Do you encounter tooth discoloration in your clinic?

○ Yes

○ No

22. If your answer to question 21 is yes; how often do you meet?

○ Every day

○ 2–3 times a week

○ 2–3 times a month

○ Rarely

23. If your answer to question 21 is yes; for what reasons do you encounter tooth discoloration? (You can tick one or more options)

○ Due to food and drink

○ Due to metallic ion exposure

○ Due to lack of oral hygiene

○ Due to drug use

○ Accompanied by syndromes

○ Due to fluorosis

○ Caries-related

○ Due to trauma

○ Due to root canal sealers and intracanal medicaments

24. If your answer to question 21 is yes; which teeth do you encounter with discoloration more?

○ Primary teeth

○ Permanent teeth

25. Do you treat discoloration of young permanent teeth in your clinic?

○ Yes

○ No

26. If your answer to question 25 is yes; how often do you treat?

○ Every day

○ Haftada 2–3 kez

○ 2–3 times a month

○ Rarely

27. If your answer to question 25 is yes; what treatments do you offer?

○ Vital bleaching

○ Devital bleaching

○ Microabrasion

○ Resin infiltration technique

○ Restoration with restorative materials

○ Restoration with veneer

○ Full-crown coverage

○ Other (specify)…

28. If your answer to question 25 is no; what is the reason?

○ I do not consider it necessary to treat permanent tooth discoloration in pediatric patients.

○ I have difficulty communicating with patients.

○ The patient/parent does not have a request in this regard.

○ I’m worried about the side effects of bleaching.

○ I do not find the use of bleaching agents safe.

○ I don’t have enough knowledge.

○ No financial return

○ Other (specify)…

29. Do you treat the discoloration of primary teeth in your clinic?

○ Yes

○ No

30. If your answer to question 29 is yes; how often do you treat?

○ Every day

○ Haftada 2–3 kez

○ 2–3 times a month

○ Rarely

31. If your answer to question 29 is yes; what treatments do you offer?

○ Vital bleaching

○ Devital bleaching

○ Microabrasion

○ Resin infiltration technique

○ Restoration with restorative materials

○ Restoration with veneer

○ Full-crown coverage

○ Other (specify)…

32. If your answer to question 29 is no; what is the reason?

○ I do not find it necessary to treat the discoloration of primary teeth.

○ I have difficulty communicating with patients.

○ The patient/parent does not have a request in this regard.

○ I’m worried about the side effects of bleaching.

○ I do not find the use of bleaching agents safe.

○ I am concerned that it may affect the permanent dentition.

○ I don’t have enough knowledge.

○ No financial return

○ Other (specify)…

The survey instrument was generated utilizing the digital platform [googleforms.com](file:///C:\Users\SEÇKİN\AppData\Local\Temp\3b1a4e1e-e661-45fc-8803-c4d9f051bd0e_confirmationoftheproofingofyourpaperjocpd2023070401.zip.d0e\googleforms.com)©. The initial iteration of the survey, distributed in the Turkish language to pediatric dentists in Turkey, is accessible at the following URL: <https://docs.google.com/forms/d/e/1FAIpQLSdw6a3HP_P4-GtnnK6MjNP_-Qq27hI1EG0MhEmoigBkJJLPGw/viewform?usp=sf_link>.

Supplementary Table 1. STROBE statement—checklist of items that should be included in reports of observational studies.

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|  | | Item No. | Recommendation | Page No. | Relevant text from manuscript |
| Title and abstract | | | | | |
|  | | 1 | (a) Indicate the study’s design with a commonly used term in the title or the abstract | 1 | Title: “Evaluation of Pediatric Dentists’ Knowledge and Approaches to Tooth Discoloration”  Abstract: “Methods: A 33-questioned survey created online was emailed to pediatric dentists between March and December 2021.” |
| (b) Provide in the abstract an informative and balanced summary of what was done and what was found | 1 | Of the pediatric dentists who participated in this study, 16.3% had high knowledge, 79.8% had medium knowledge, and 3.9% had insufficient understanding of tooth discoloration. The group with the highest average level of knowledge was working in private practice (*p* ≤ 0.05). |
| Introduction | | | | | |
|  | Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported | 2 | Better patient outcomes are associated with increased knowledge and success in this indispensable part of aesthetic dentistry [27, 28]. The fact that there is scarcity of studies in the literature on the general view of tooth discoloration of pediatric dentists constitutes the original value of this study. Therefore, the present study aimed to measure the knowledge levels of pediatric dentists about the etiologies, clinical features and treatment of tooth discoloration. |
| Objectives | 3 | State specific objectives, including any prespecified hypotheses | 2 | The null hypotheses postulated for this investigation are as follows: A statistically significant correlation cannot be established between the variables of age, gender, duration post-graduation, duration of specialization, and workplace characteristics among pediatric dentists and their levels of knowledge about tooth discoloration (1). There is no statistically significant relationship exists between the frequency of encountering tooth discoloration, the frequency of corresponding treatment, the predominant dentition type of cases, and the level of subject-specific knowledge among pediatric dentists (2). |
| Methods | | | | | |
|  | Study design | 4 | Present key elements of study design early in the paper | 2 | Pediatric dentists working at private or public institutions in XXX were included in this study. The authors modified a previously used and validated questionnaire from a similar study to create a new questionnaire [29]. |
| Setting | 5 | Describe the setting, locations and relevant dates, including periods of recruitment, exposure, follow-up and data collection | 2 | This cross-sectional survey study was conducted between March and December 2021 with the participation of pediatric dentists working across XXX. This study was approved by the XXX University Non-Interventional Clinical Research Ethics Committee (decision date: 12/30/2020; issue no XXX) and was conducted by the 2008 Principles of the Declaration of Helsinki. The consent of the participants was obtained with an informational form attached to the beginning of the questionnaire.  The developed questionnaire consisted of three sections containing a total of 33 questions. The first part consisted of 6 questions regarding the demographic characteristics of the participants. The second part had 14 questions measuring the participants’ knowledge levels regarding tooth discoloration and the treatment. The last part included 13 multiple-choice questions to determine the clinical approaches of the participants. The questionnaire form was created online, and a link to the questionnaire was sent to pediatric dentists via e-mail and social media. |
| Participants | 6 | (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up  Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants | 2 | This study is a cross-sectional survey study.  Being a pediatric dentist, agreeing to participate in the study, and fully answering the questions in the questionnaire were assigned as eligibility criteria. |
| (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed  Case-control study—For matched studies, give matching criteria and the number of controls per  case | 2 | The consent form included information regarding the purpose of the study, the security of personal data, the necessary permissions, and voluntary research participation. No names or other forms of identifying information were recorded for privacy reasons. |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders and effect modifiers.  Give diagnostic criteria, if applicable |  |  |
| Data sources/measurement | 8\* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | 2 | To determine levels of knowledge, 14 questions in the second part of the questionnaire had 180 answer options, 70 of which were correct. A score of 70 points indicated complete knowledge, 47–70 points indicated high knowledge, 24–46 points marked moderate knowledge, 0–23 points indicated insufficient knowledge and 0 points indicated unawareness. |
| Bias | 9 | Describe any efforts to address potential sources of bias |  |  |
| Study size | 10 | Explain how the study size was arrived at | 2 | A power analysis (G-Power 3.1.9.7) was performed to determine the study’s sample size. This analysis determined that the number of participants required to reach a 95% power level at an effect size of 0.4 and a 5% error rate was at least 124. |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why |  | The study is specifically aimed at dentists working in Turkey and specializing in pediatric dentistry. It was handled in the same way as in similar studies. |
| Statistical methods | 12 | (a) Describe all statistical methods, including those used to control for confounding | 2 | The statistical analysis was performed on the IBM Statistical Package for the Social Sciences 22 (IBM, Armonk, NY, USA) software. Descriptive statistics were used to evaluate the data. Chi-square tests were used to analyze the relationships between age, gender, and knowledge regarding tooth discoloration. Statistical significance was determined as *p* < 0.05 for all tests. (Page 2) |
| (b) Describe any methods used to examine subgroups and interactions |
| (c) Explain how missing data were addressed |
| (d) Cohort study—If applicable, explain how loss to follow-up was addressed  Case-control study—If applicable, explain how matching of cases and controls was addressed Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy | | |
| (e) Describe any sensitivity analyses | | |
| Results | | | | | |
|  | Participants | 13\* | (a) Report numbers of individuals at each stage of study—*e.g.*, numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed |  | Participants who agreed to answer all of the questions were included in the study (n = 129). |
| (b) Give reasons for non-participation at each stage | To be a participant, it was obligatory to have answered all the questions. |
| (c) Consider use of a flow diagram | | |
| Descriptive data | 14\* | (a) Give characteristics of study participants (*e.g*., demographic, clinical, social) and information on exposures and potential confounders |  | In the first part of the study, the responses to questions regarding sociodemographic information indicated that 88.4% (n = 114) of the participating dentists were female, 11.6% (n = 15) were male, and the majority (n = 85, 65.4%) were in the age range of 23–30 years. Of all the participants, 68 (52.7%) had more than five years of professional experience. Furthermore, 31 (39.5%) of the 51 participants who had completed specialty education had less than five years of specialization experience. Finally, 70.5% (n = 91) of the participants worked at state universities (Table 1). |
| (b) Indicate number of participants with missing data for each variable of interest |  | None |
| (c) Cohort study—Summarise follow-up time (*e.g.*, average and total amount) |  |
| Outcome data | 15\* | Cohort study—Report numbers of outcome events or summary measures over time | | |
| Case-control study—Report numbers in each exposure category, or summary measures of exposure | | |
| Cross-sectional study—Report numbers of outcome events or summary measures | 3 | The relationship between the scores corresponding to the knowledge levels of the pediatric dentists questioned in the second part of the questionnaire and their sociodemographic characteristics is shown in Tables 1 and 2. |
| Main results | 16 | (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (*e.g.*, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | | |
| (b) Report category boundaries when continuous variables were categorized | | |
| (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time  period | | |
| Other analyses | 17 | Report other analyses done—*e.g.*, analyses of subgroups and interactions, and sensitivity analyses |  |  |
| Discussion | | | | | |
|  | Key results | 18 | Summarise key results with reference to study objectives | 8 | Pediatric dentists in Turkey possess a moderate level of knowledge of tooth discoloration. No relationship was found between the time passed after graduation, the duration of working as a specialist, the workplace, and the level of knowledge on this subject. Nonetheless, it is the category of pediatric dentists who encounter and manage tooth discoloration with the greatest frequency that demonstrates the highest mean proficiency in this particular domain. There is a necessity to include pediatric dentists in more education programs on tooth discoloration during and after specialization training. |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias |  | One of the limitations of the study is that the questions are only directed to pediatric dentists working in Turkey who agree to answer the questionnaire. It is ordinary for young pediatric dentists working at state universities and constantly involved in similar studies to be more willing to fill out an online questionnaire. In addition, due to the limited number of questions that can be asked in survey studies, other questions may be asked in future research that will reveal other aspects that could not be explored in this research. |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence |  | When the literature on tooth discoloration was searched, no national or international study was found to have measured the knowledge of pediatric dentists in this subject area. Increasing undergraduate and graduate education on tooth discoloration and treatment is essential in eliminating the lack of expertise in this area. |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results |  | Since it contains comprehensive questions evaluating the approaches of pediatric dentists to tooth discoloration, it is thought that there are valid and generalizable study results that can guide future studies. |
| Other information | | | | | |
|  | Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based |  | There is no source of financing. |

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note:An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at <https://www.strobe-statement.org/>.