Journal of Health Sciences

RESEARCH ARTICLE Open Access

Longitudinal changes in the prevalence of dental fear and anxiety in 9–12-year-old children in clinical setting in Bosnia and Herzegovina

Elmedin Bajrić*, Amila Zukanović, Nina Marković, Amra Arslanagić, Selma Zukić, Lajla Hasić-Branković

Faculty of Dentistry with Clinics, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

ABSTRACT

Introduction: Dental fear and anxiety (DFA) is a ubiquitous entity among dental patients in terms of their prevalence and incidence. It is among the major clinical problems in dentistry. In addition, the differences in DFA prevalence were present considering the age and gender of patients and over time, but with some opposite reports. The aim of this study is to examine the prevalence of DFA presence in children concerning their age, gender, and over time.

Methods: The survey sample comprised 200 of 9–12-year-old children. The DFA presence was determined twice by the modified version of the CFSS-DS scale (CFSS-DS-mod scale) during a 6-months long period between the first and the subsequent dental appointment due to the need for restorative dental treatment. The scale was applied before the restorative treatment started on both occasions.

Results: The prevalence of DFA was 17.5% in the study sample and decreased over time. It was slightly higher in girls.

Conclusions: The DFA prevalence in 9–12-year-old children is decreasing over time. Latent manifestations of DFA presence should be considered for evaluation in the future.

Keywords: Children; dental fear and anxiety; the prevalence

INTRODUCTION

Dental fear and anxiety (DFA) is a ubiquitous entity among patients. The prevalence and the incidence of DFA are generally among the three biggest clinical problems in dentistry. The first two most common entities are caries and periodontal diseases, with a prevalence of around 46% within the population. DFA has a causal consequential relationship with these oral diseases. The data on the prevalence and frequency of DFA, modern dentistry seems to have a major problem in overcoming DFA, regardless of whether it is in the field of oral disease monitoring and controlling or therapy, outcomes, and treatment prognosis (1-4).

DFA affects all age and sex population groups and occurs from an early age. It shows higher prevalence and incidence in early childhood. The data show that around a quarter of children and adolescents expressed DFA, where prevalence thereafter declined over time, as pediatric patients become older, through adulthood to older age (3,4). Studies of DFA expression concerning sex showed conflicting results. Some authors have shown that there is no significant gender difference in DFA expression in different age groups, although others in this context found that DFA is more common in females (4). Changes in DFA prevalence over time are related to the patient's age, intellectual, cognitive, emotional, and other characteristics, in a way when patients become older they develop coping methods with stressful dental situations which enable them not to manifest DFA presence anymore (5).

There are various ways to measure the presence of DFA in children. Besides observing patient behavior and physiological parameters and signs of patient reactions in the dental office, psychometric scales are most commonly used. The reason for this is the fact that they are easy to implement for the patients, and they do not methodologically interfere with the evaluation of DFA presence as well. The Children's Fear Survey Schedule-Dental Subscale (CFSS-DS) is the most commonly used instrument for the evaluation of DFA presence in children and adolescents so far. The use of the Modified Version of the CFSS-DS Scale (CFSS-DS-Mod Scale) in children aged 9–12 years has recently been reported and has been shown to have good normative values. This scale has been used in clinical dental office settings (4,6).

The study was designed to examine the presence of DFA in children aged 9–12 concerning their age and gender, as well as changes in the presence of DFA over time.

*Corresponding author: Elmedin Bajrić, Faculty of Dentistry with Clinics, University of Sarajevo, 71000 Sarajevo, Bosnia and Herzegovina. E-mail: elmedinbajric@gmail.com

Submitted: 16 April 2022/Accepted: 31 August 2022

DOI: https://doi.org/10.17532/jhsci.2022.1799

UNIVERSITY OF SARAJEVO FACULTY OF HEALTH STUDIES

The study aimed to examine the longitudinal changes in the prevalence of DFA in 9–12-year-old children.

METHODS

The study was designed as controlled, longitudinal, clinical, epidemiological research, approved by the Ethics Committee of the Faculty of Dentistry, University of Sarajevo (7).

Subjects in the study were randomly selected patients aged 9–12 years, who visited the Clinic/Department of Pediatric and Preventive Dentistry, Faculty of Dentistry, University of Sarajevo.

The age range was chosen based on their cognitive development and the way they perceive DFA as well as the way of managing dental stressors and the expression of behavioral problems in the dental office (8,9).

To avoid selection bias, patients with psychological or psychiatric illnesses were excluded from the study, as well as patients with dental emergencies, as determined by pre-treatment history and clinical examination of the patient.

Furthermore, to avoid treatment bias, it is important to point out that all respondents were aware of the purpose of the visit to the dentist, and that all actions and interventions related to this study were performed in the same space for all respondents.

Respondents and their parents were introduced to the purpose and content of the research. Parents were asked to fill out and sign an informed consent to participate. Children were additionally required participation consent. The sample consisted of 200 subjects of both sexes, as established by calculating the sample size at the 95% confidence interval.

Subjects were children who, according to a previously established treatment plan, needed to come to the dental office at least twice for the treatment of carious dentinal lesion of medium depth (ICDAS score 5) (10). This type of intervention is a medium-strength dental stressor, which itself could be a factor in the development of DFA (8).

In the first visit, before the treatment, the 9–12-year-old respondents independently answered questions from the CFSS-DS-mod scale. This scale consists of 17 questions and answers are ranked on a Likert scale from 1 to 5. The cutoff score for DFA in pediatric subjects was 37, including a population of subjects with subclinical (latent) manifestations of DFA (6,11).

The same procedure for testing the presence of DFA was repeated after 6 months. To avoid observers' bias, the answers and results of the testing obtained from the first visit were unknown to the observers at this point. The records collected in the study were statistically analyzed and presented as follows:

- The total number and number according to age and gender as well as the average age of study participants of test and retest sample were shown descriptively in the tables;
- The prevalence of the presence of DFA is represented in percentages;
- Analysis of the results distribution was determined using the Kolmogorov–Smirnov test;
- The existence of statistically significant differences between and within the examined groups for dependent and independent samples was determined using the Kruskal–Wallis, Mann–Whitney, and Wilcoxon signed-rank tests.
- All statistical analyzes were performed at the significance level $p \leq 0.05$ and conducted using SPSS IBM Statistics v. 23 software for Windows operating system.

RESULTS

Descriptive characteristics of the sample and the results obtained on the CFSS-DS-mode scale of the test groups are given in Tables 1 and 2.

The study sample consisted of an equal number of children according to their sex, where higher CFSS-DS-mod scale scores were obtained by girls.

After 6 months, 183 of the original 200 subjects participated in the retest, with a drop-out rate of 8.5%. Descriptive characteristics of the retest sample and the results obtained on the CFSS-DS-mode scale are presented in Tables 3 and 4.

The boys in the retest sample were in a slightly higher portion. The higher CFSS-DS-mod scale scores in the girls remained.

The prevalence of DFA of 17.5% was determined in the test sample, which included the subclinical existence of DFA in subjects with the cutoff score of 37.

No statistically significant differences were found in the subjects of the test group regarding their age, or their gender. However, in the retest group, differences were found concerning gender, where girls had higher scores (Wilcoxon signed-rank test, $Z = -1.984$, $p = 0.047$).

Table 5 shows the descriptive values of the results on the children's version of the CFSS-DS mode scale test and sample retest. After a 6-month period, DFA prevalence in the retest sample decreased to 8.20%.

Examination of statistically significant differences using the Wilcoxon signed-rank test on the CFSS-DS-mode scale compared to the elapsed time of 6 months between the two measurements showed that they existed ($Z = -3.465$, $p = 0.001$). The values of the results have decreased over time.

Further analyzes using the Wilcoxon signed rank test showed that statistically significant decrease in the results on the children's version of the CFSS-DS-mod scale between the test and retest groups over time occurred in 12 years old ($Z = 2{,}107$, $p = 0.035$) and male subjects ($Z = -2{,}206$, $p = 0.027$) and subjects as well ($Z = -2.238$, $p = 0.025$).

DISCUSSION

In studies published by other authors in the past 40 years on subjects aged 3–18 years, the average prevalence of DFA was 23.9%, measured using three types of psychometric scales, where the subclinical presence of DFA was not considered (4).

Younger respondents showed a stronger DFA presence. Furthermore, gender differences were not dominant, but in some studies, females were singled out in terms of a stronger DFA presence (4).

The results of this study correspond to the above, except in the absence of age differences in the presence of DFA in the subjects.

TABLE 1. Descriptive characteristics from the sample of the test groups

	9 years		10 years		11 years		12 years		In total	
	n (%)		n (%)		n (%)		n (%)		n=200	
Age	58 (29)		44 (22)		53 (26.5)		45 (22.5)		$\bar{x}$=10.43; SD=1.13	
	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)
Gender	29 (14.5)	29 (14.5)	27 (13.5)	17 (8.5)	22 (11)	31 (15.5)	22 (11)	23 (11.5)	100 (50)	100 (50)

TABLE 2. Descriptive values of the results on the CFSS-DS-mode scale concerning the age and sex of the test groups

CFSS-DS- mod test	n	Range	Minimum	Maximum	Mean	Std. Deviation
years_9	58	39.00	17.00	56.00	27.0862	8.85217
years_10	44	59.00	17.00	76.00	28.2273	12.87844
years_11	53	31.00	17.00	48.00	26.4906	7.14041
years_12	45	40.00	19.00	59.00	28.6000	7.53296
Males	100	38.00	17.00	55.00	26.5500	8.21476
Females	100	59.00	17.00	76.00	28.4900	10.05992

TABLE 3. Descriptive characteristics of the retest group sample

	9 years		10 years		11 years		12 years		In total	
	n (%)		n (%)		n (%)		n (%)		N=183	
Age	52 (28.4)		37 (20.2)		49 (26.8)		45 (24.6)		$\bar{x}$=10.48; SD=1.15	
	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)	m (%)	f (%)
Sex	27 (14.75)	25 (13.7)	23 (12.6)	14 (7.6)	22 (12)	27 (14.75)	22 (12)	23 (12.6)	94 (51.35)	89 (48.65)

TABLE 4. Descriptive values of the results on the CFSS-DS-mode scale concerning the age and sex of the retest group

CFSS-DS- mod retest	N	Range	Minimum	Maximum	Mean	Std. Deviation
years_9	52	27.00	17.00	44.00	24.2885	6.86091
years_10	37	26.00	17.00	43.00	25.0000	6.24055
years_11	49	40.00	17.00	57.00	25.4694	7.93227
years_12	45	55.00	17.00	72.00	26.7111	9.77153
Males	94	55.00	17.00	72.00	24.6489	8.30171
Females	89	33.00	17.00	50.00	26.0787	7.28358

TABLE 5. Descriptive values of test and retest results on the CFSS-DS-mode scale

Scales	n	range	minimum	maximum	M	SD	With DFA	Without DFA
CFSS-DS-mod test	200	59.00	17.00	76.00	27.52	9.21	17.50%	82.50%
CFSS-DS-mod retest	183	55.00	17.00	72.00	25.34	7.83	8.20%	91.80%

It should be underlined, in addition to the manifest, the latent presence of DFA was also considered in our study.

Our study further showed that the prevalence of DFA presence and average scores obtained on the CFSS-DS-mod scale decreased significantly over time. Several longitudinal studies have been conducted, where the prevalence of DFA presence also decreased over time (12-14). Oosterink et al. conducted research examining the prevalence of different fears in a population-based study that provides a logical sequence of possible explanations for the character of DFA over time (3). Observing the course of DFA prevalence over time, the authors showed that the prevalence is highest in youth, then there is a decrease in prevalence, with the appearance of a second maximum around 50 years of age, which is finally followed by a second decline in DFA prevalence toward older age groups. The decline in DFA prevalence can be explained by cognitive and emotional development, through the formation and application of ways to deal with dental stressors in the dental office (5).

This decline in the prevalence could also be explained by the theory of latent inhibition (15). The theory was based on the following model: When a person (patient, child) had contact with a dental stressor, there was a great potential for the development of DFA, whose intensity and expression differed on an individual basis. In the cases where new dental treatments occurred afterward, which tended to avoid exposure to the same or similar stress factors or to decrease their intensity, the strength, and severity of the DFA appearance in these patients were often subsequently weakened. This mechanism was similar to Pavlov's conditioned learning mechanism, and could also be used in patients who had not yet experienced DFA appearance because it avoided exposure to dental stressors (15). On the contrary, other findings showed a slight increase in DFA prevalence over time in younger children, where coping mechanisms were not yet fully established (16-18).

Although psychometric scales were most commonly used for the evaluation of DFA presence, they still have their limitations. One of the most obvious is the fact that they are means for a subjective way of evaluation of observed phenomena. Thus, their normative values should be determined and improved with other kinds of evaluation of

the DFA presence. Nevertheless, the CFSS-DS-mod scale showed good normative values accordingly, although there is always a need for improvements (6,11).

Children and adolescents with DFA presence could interfere with the conduction of planned dental treatments due to the expression of behavior problems in the dental office. There are various ways for managing their behavior based on the fact of controlling the expected or experienced dental pain. Pain control management in dentistry is crucial nowadays and results in reducing and/or decreasing the expression of the presence of DFA in dental patients. Pharmacological ways can lead to conscious sedation methods, as a form of successful pain and behavior control management in certain categories of patients with DFA presence (19,20).

COVID-19 pandemics brought new perspectives to every aspect of human life and into dental practice as well. Children and adolescents with the DFA presence were especially endangered with the fact that usual dental treatments were not undertaken for a longer time during this period. The well-known vicious circle of not solving the problems in oral health in persons who have DFA can only lead to the intensifying of DFA itself and consequent worsening of oral health. Furthermore, new COVID-19 protocols in dental offices did not especially consider the DFA phenomenon in the patients, but consequently added new possible stressful factors in the dental office. These facts should be seriously considered in the future in a way to satisfy the health safety of the patients with the need to decrease the DFA presence (21).

CONCLUSIONS

There is no difference in the presence of DFA in the relation to age in subjects aged 9–12 years, although girls show a slightly higher presence of DFA.

DFA is present in a significant number of pediatric subjects and its prevalence declines over time. Reducing the prevalence of DFA in children may be related to their emotional and cognitive development.

The DFA presence examination should also consider subclinical manifestations. The pediatric patients with the DFA presence should be considered in the future not only to improve the management of this phenomenon in the dental office but also to systematically deal with the risks of causing oral health problems in the first place.

CONFLICT OF INTERESTS

The authors declare no competing interest, neither interest of any other kind.

ACKNOWLEDGMENTS

This research study could not be accomplished in this form without great human efforts of the stuff of Clinic for Preventive and Pediatric Dentistry of Faculty of Dentistry with Clinics of Sarajevo University.

REFERENCES

1. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: A systematic analysis for the global burden of disease study 2017. Lancet 2017;392(10159):1789-858. https://doi.org/10.1016/S0140-6736(18)32279-7
2. Frencken JE, Sharma P, Stenhouse L, Green D, Laverty D, Dietrich T. Global epidemiology of dental caries and severe periodontitis-a comprehensive review. J Clin Periodontol 2017;44 (Suppl 18):S94-105. https://doi.org/10.1111/jcpe.12677
3. Oosterink FM, De Jongh A, Hoogstraten J. Prevalence of dental fear and phobia relative to other fear and phobia subtypes. Eur J Oral Sci 2009;117(2):135-43. https://doi.org/10.1111/j.1600-0722.2008.00602.x
4. Grisolia BM, Dos Santos AP, Dhyppolito IM, Buchanan H, Hill K, Oliveira BH. Prevalence of dental anxiety in children and adolescents globally: A systematic review with meta-analyses. Int J Paediatr Dent 2021;31(2):168-83. https://doi.org/10.1111/ipd.12712
5. Bajrić E, Kobašlija S, Huseinbegović A, Marković N, Selimović-Dragaš M, Muratbegović AA. Factors that determine child behavior during dental treatment. Balk J Dent Med 2016;20(2):69-77. https://doi.org/10.1515/bjdm-2016-0011
6. Bajrić E, Kobašlija S, Jurić H, Huseinbegović A, Zukanović A. The reliability and validity of the three modified versions of the children's fear survey schedule-dental subscale of 9-12-year old children in a clinical setting in Bosnia and Herzegovina. Acta Med Acad 2018;47(1):1-10. https://doi.org/10.5644/ama2006-124.209
7. World Medical Association. World medical association declaration of Helsinki: Ethical principles for medical research involving human subjects. JAMA 2013;310(20):2191-4. https://doi.org/10.1001/jama.2013.281053
8. Milgrom P, Weinstein P, Getz T. Treating Fearful Dental Patient. A Patient Management Handbook. 2nd ed. Seattle: University of Washington; 1995.
9. Welbury R, Duggal MS, Hosey MT. Paediatric Dentistry. 5th ed. England: Oxford University Press; 2018.
10. Shivakumar K, Prasad S, Chandu G. International caries detection and assessment system: A new paradigm in the detection of dental caries. J Conserv Dent 2009;12(1):10-6. https://doi.org/10.4103/0972-0707.53335
11. Bajric E, Huseinbegovic A, Zukanovic A, Markovic N, Arslanagic A, Selimovic-Dragas M, et al. Dental fear and anxiety in 9-12 years old children in clinical setting in Bosnia and Herzegovina: Normative values and types of informant. Acta Inform Med 2022;30(1):41-7. https://doi.org/10.5455/aim.2022.30.41-47
12. Klaassen MA, Veerkamp JS, Hoogstraten J. Changes in children's dental fear: A longitudinal study. Eur Arch Paediatr Dent 2008;9 (Suppl. 1):29-35. https://doi.org/10.1007/BF03262653
13. Tickle M, Jones C, Buchannan K, Milsom KM, Blinkhorn AS, Humphris GM. A prospective study of dental anxiety in a cohort of children followed from 5 to 9 years of age. Int J Paediatr Dent 2009;19(4):225-32. https://doi.org/10.1111/j.1365-263X.2009.00976.x
14. Majstorovic M, Veerkamp JS. Developmental changes in dental anxiety in a normative population of Dutch children. Eur J Paediatr Dent 2005;6(1):30-4.
15. Davey GC. Dental phobias and anesthetics: Evidence for conditioning processes in the acquisition and modulation of learned fear. Behav Res Ther 1989;27(1):51-8. https://doi.org/10.1016/0005-7967(89)90119-8
16. Luoto A, Tolvanen M, Rantavuori K, Pohjola V, Karlsson L, Lahti S. Individual changes in dental fear among children and parents: A longitudinal study. Acta Odontol Scand 2014;72(8):942-7. https://doi.org/10.3109/00016357.2014.923582
17. Luoto A, Tolvanen M, Pohjola V, Rantavuori K, Karlsson L, Lahti S. A longitudinal study of changes and associations in dental fear in parent/adolescent dyads. Int J Paediatr Dent 2017;27(6):506-13. https://doi.org/10.1111/ipd.12289
18. Dahlander A, Soares F, Grindefjord M, Dahllöf G. Factors associated with dental fear and anxiety in children aged 7 to 9 years. Dent J (Basel) 2019;7(3):68. https://doi.org/10.3390/dj7030068
19. Fiorillo L. Conscious sedation in dentistry. Medicina (Kaunas) 2019;55(12):778. https://doi.org/10.3390/medicina55120778
20. De Stefano R, Bruno A, Muscatello MR, Cedro C, Cervino G, Fiorillo L. Fear and anxiety managing methods during dental treatments: A systematic review of recent data. Minerva Stomatol 2019;68(6):317-31. https://doi.org/10.23736/S0026-4970.19.04288-2
21. De Stefano R, Gorassini F, Bocchieri S, Sambataro S, Simeone M, Stumpo C, et al. Anxious patients and new COVID-19 dental office protocol. Minerva Psychiatry 2021;62(3):172-8. https://doi.org/10.23736/S2724-6612.20.02103-2