

PARENTAL EXPECTATIONS AND CHILDREN'S SELF-REPORTED PAIN IN THE ATRAUMATIC RESTORATIVE TREATMENT APPROACH

ОЧЕКУВАЊАТА НА РОДИТЕЛИТЕ И БОЛКАТА ШТО САМИТЕ ДЕЦА ЈА ИЗРАЗУВАА ПРИ ПРИСТАПОТ СО АТРАУМАТСКИ РЕСТАВРАТИВЕН ТРЕТМАН

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Abstract

The aim of this study was to assess parent's expectations and children's self-reported pain in Atraumatic Restorative Treatment approach. One hundred ART restorations were performed in children aged 3 to 8 years in school settings by a pediatric dentist according to ART guidelines. The Wong Baker facial scale was used to assess each child's self-reported pain. This scale measures the patient's pain by choosing between six different faces, each expressing a different facial emotion. The first image shows a pleasantly smiling face, followed by less happy emotions until the last image shows a very unhappy face covered in tears. The operator performing the treatment employed the scale right after each restorative treatment and parents/guardians were asked for the expectations of approach prior to the treatment. Statistical analysis showed that 81% of the children did not experience pain throughout ART approach, and only 3% of the parents expected the treatment to go very poorly. Children with a mean age of 6.0 years had no pain during atraumatic restorative treatment (ART) and parental expectations for the treatment were very decent.

Key word: ART, Wong-Baker Facial Scale, pain, anxiety, discomfort.

Апстракт

Целта на оваа студија беше да се оценат очекувањата на родителите од пристапот со атрауматски реставративен третман (ART) и болката што ја изразуваа самите деца при ART-пристапот. Направени беа сто ART-реставрации кај деца на возраст од 3 до 8 години во училишна средина од страна на детски стоматолог според упатствата за ART. За оценување на болката што секоје од децата ја изразуваше се користеше скалата со гримаси на Вонг и Бејкер. Оваа скала ја мери болката на пациентот така што самиот пациент избира една од шест слики со различни гримаси, од кои секоја изразува различна емоција. Првата слика прикажува пријатно, насмевнато лице, а по неа следуваат слики со лица со помалку пријатни емоции, при што последната прикажува едно многу несреќно лице облеано со солзи. Операторот што го вршеше третманот ја применуваше скалата веднаш по секој реставративен третман, а пред третманот родителите/старателите беа прашани какви им се очекувањата од пристапот. Статистичката анализа покажа дека 81% од децата не искусија болка во текот на ART-пристапот, а дека само 3% од родителите очекуваа дека третманот ќе помине многу лошо. Децата со средна возраст од 6,0 години немаа болка во текот на атрауматскиот реставративен третман (ART), а очекувањата на родителите во врска со третманот беа многу коректни. **Клучни зборови:** ART, скала со гримаси на Вонг и Бејкер, болка, анксиозност, непријатност.

Introduction

Dental anxiety is one of the main problems affecting children, which compromises giving dental care, leading to impaired quality of life. The reasons for dental anxiety are as follows: smells (eugenol and cut dentine), sights (needles, air - turbine drills), sounds (drilling) and sensations (high-frequency vibrations)¹.

According to the definition of pain, it represents an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage^{2,3}. Anyways, even though the feeling of pain is connected to tissue damage, it's not necessary dependent on tissue damage³.

The conventional method of treating dental caries is based on using electric drills to remove decayed areas of

teeth before filling. During the procedure, local anesthetic is typically used for preventing pain. In many cases, because of the discomfort associated with conventional cavity preparation, it can result in avoiding dental care.

Unlike the conventional restorative treatment, the Atraumatic Restorative Treatment approach can be applied in different settings and is suitable for people with different profiles by providing restorations of good quality that are acceptable for excellent survival rate⁴. Recent systematic review reported that ART using high-viscosity glass-ionomer cement can safely be used to treat and prevent carious lesions in primary and permanent posterior teeth⁴.

The ART restoration implies elimination of soft, completely demineralized carious tooth tissue with hand instruments. Next step in the procedure is restoration of the cavity with an adhesive dental material which simultaneously seals any remaining pits and fissures that may pose a risk^{5,6}.

If we interpret the 'atraumatic' component of the ART approach, we can point that this procedure causes minimum or no trauma to the patient (reducing pain, discomfort and anxiety) and at same time is 'atraumatic' to the tooth (conserving healthy tooth structures and reducing trauma to the pulp)^{7,8}.

Because the "atraumatic" component of ART makes it a clinically acceptable restorative technique among children, anxious patients, and individuals with special needs, it is generally considered less traumatic, less painful, and friendlier than traditional restorative treatment⁹.

Various instruments have been developed to measure and grade pain in order to determine the degree of pain during dental treatment¹⁰. Face scales proved to be most popular way of children's self-assessment of pain¹⁰. Young children, more or less, have difficulty expressing their emotions, including describing pain levels, Wong-Baker FACES Pain Rating Scale (Wong-Baker) was specially developed to grade pain and it is considered the best scale to measure pain in the medical field¹¹. After analyzing different assessment scales for evaluation of pediatric pain, Chambers et al.¹⁰ came to the conclusion that the majority of children and parents favored the Wong and Baker scale.

The objective of the research was to assess parent's expectations and children's self-reported pain in Atraumatic Restorative Treatment approach.

Material and methods

The research was approved by the Research Ethics Committee of the Faculty of Dentistry, Ss. Cyril and Methodius University in Skopje (N #02-264383), and

the Research Ethics Committee of Dental Chamber of Kosovo, Republic of Kosovo (N #07). The parents/guardians of each child provided a signed informed consent form. Of course, the children's voluntary consent was also required. Identification codes were used for better protection of participants' personal information and only the researchers had access to the information collected.

The research was conducted from September 2020 to December 2021 and carried out in the four municipalities of the Republic of Kosovo: Ferizaj, Mitrovica, Drenica and Vushtri.

In total, 280 children, aged 3 to 8 years, took part in the study. The inclusion criteria were as follows: collaborative children with good general health, children with high caries risk in primary dentition, approachable to ART hand instruments. The exclusion criteria were: teeth under the pulpal exposure, presence of pain, presence of abscess, or fistula, absence of access to tooth caries. The screening led to the final selection of 100 children. Out of all 280 potential participants, 180 children were rejected, 160 of them did not meet the inclusion criteria, and 20 refused to participate.

Brief questionnaire was prepared, in accordance WHO¹² and AAPD¹³ with modifications, and information was obtained from each parent/guardian regarding socio-demographic data, general health, dental history, dietary behavior, oral hygiene, exposure to fluoride and parent's expectations for the ART procedure. The following resources were used for the purpose of the examinations: mouth mirrors and standard explorers. Caries status evaluation was achieved using the dmft index by the WHO¹² criteria, and the Silness and Loe index¹⁴ was used for assessing plaque levels of teeth.

Four to five children were treated per day, following the ART guidelines by Frencken¹⁵. The occlusal surface of the primary tooth was opened and excavated with hand instrument only (SSWhite/Duflex, Rio de Janeiro, Brazil). The cleaned cavity was filled with high viscosity glass ionomer cement – GC Fuji IX GP (EU, Leuven, Belgium).

The treatments were performed in empty classroom of their local schools by one pediatric dentist accompanied by two assistants. The evaluation of restorations was performed after 3, 6, 9, 12 month with the ART restoration criteria¹⁵.

The Wong-Baker Facial Scale was used with consent to estimate each child's self-reported pain. The Wong-Baker FACES Pain Rating Scale (Wong Baker) is composed of six illustrations indicating different levels of pain from "no pain" to "severe pain"¹¹.

This scale is used in such a way that the operator at the end of the treatment shows the illustrations to the children, but without referring to the word 'pain'. Then the children



Figure 1. The Wong-Baker FACES Pain Rating Scale

were instructed to point to the image that best represented their feelings about the treatment they had just received.

Statistical methods

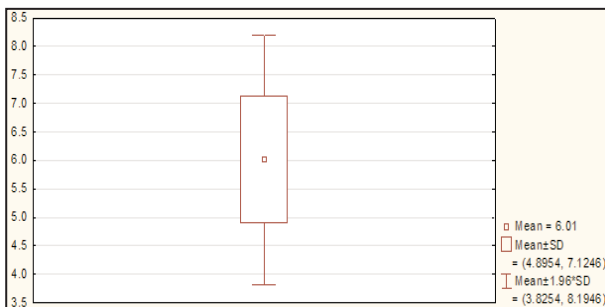
Statistical programs SPSS 20.0 were used for the statistical analysis. The results of the research were analyzed using the following statistical methods: percentages, mean, standard deviation, Me and interquartile range (IQR) and test for difference between arithmetic means.

Results

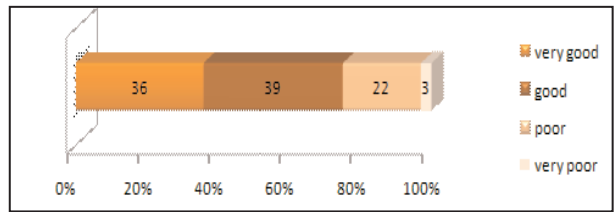
The research covers 100 children with an average age of 6.0 ± 1.1 years, in the range of minimum 3 and maximum 8 years, 50% of patients were younger than 6 years for Median IQR=6 (5-7) (Graphic 1). According to gender, 44.0% of them were boys, 56.0% were girls, and the percentage difference between genders is statistically insignificant for $p > 0.05$ (Difference test, $p = .0897$).

Graphic 2 shows the expectation of parents for dental treatment: 39.0% of the parents think that the response of their children would be good, 36.0% very good, 22.0% that it would be poor, and 3.0% that it would be very poor. The percentage difference between good and very good versus poor and very poor is statistically significant for $p < 0.05$ (Difference test, $p = 0.02$).

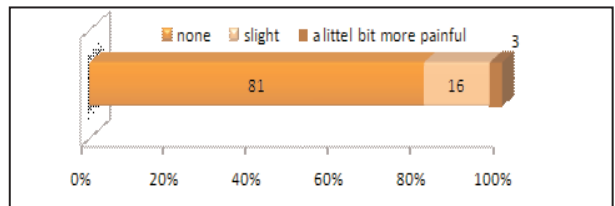
Graphic 3 represent children's self-assessment of pain: in 81.0% of the children no pain has been observed, in 16.0% of them slight pain has been observed, and in three children a slightly heavier pain



Graphic 1. Average age of patients



Graphic 2. The expectation of parents for dental treatment



Graphic 3. Children's self-assessment of pain

has been observed; the percentage difference between no pain and the other cases is statistically significant for $p < 0.05$ (Difference test, $p = 0.0000$).

Discussion

Atraumatic Restorative Treatment approach can be widely used to treat cavitated caries lesions in children, and one of the many positive aspects of the approach is the "atraumatic" component¹⁶.

This can be seen from a variety of aspects, including tooth tissue preservation and patient comfort. Using mainly hand devices to open and clean, the cavity maintains the tooth structure better than the traditional technique, which suggests using a drill⁸. It must also be emphasized that ART approach has the potential to be more pleasant for patients as the bur's noise and vibration are eliminated. The fact that local anesthetic is rarely administered in the procedure adds to the "atraumatic" impact¹⁷.

The pioneer of the ART approach, Frencken¹⁸, recommended that when a dentine cavity needs to be restored in a child or anyone else, ART should be the primary therapeutic option. If ART or any other child-friendly therapy is unusable in treating a particular condition, the therapist should proceed to conventional treatments.

Many studies were conducted in order to research pain, anxiety and discomfort related to ART approach, and the results showed that the approach is more patient-friendly compared to other restorative treatments. However, they change in relation to the methodology used to assess the level of pain.

The Wong-Baker Facial Scale was used to assess each child's self-reported pain in the present study. This scale measures the pain of the patient by selecting between six distinct faces, each expressing a different

facial emotion. The first image shows a pleasant smiling face, which is followed by less happy emotions until the last image, which shows a very unhappy face covered in tears. The operator performing the treatment employed the scale right after each restorative treatment.

The result of the present investigation showed that 81% of the children (aged 3 to 8) did not experience pain throughout ART approach, and only 3% of the parents anticipated the treatment to go very poorly. De Menezes Abreu et al.¹⁹ also used the Wong-Baker Facial Scale for measuring children's pain and concluded that children (aged 4 to 7) felt less pain when the ART approach was used.

Possible factors that contributed to our results, aside from the atraumatic effect of the approach, are that the children were introduced and assessed in their classroom on the first visit and were also given additional oral health instruction, particularly oral hygiene/teeth brushing and sugar consumption, and were informed about the course of treatment. The fact that the parents were informed by telephone that the children should be prepared for the course of treatment at the next visit also had an effect on the satisfactory treatment. It is important to note that the treatments were carried out during school hours accompanied by the parents and the teacher.

In China, 93% of 5-year-olds reported no pain during ART procedure, and 86% were willing to receive ART during the next visit²⁰. A multi-country research was conducted in Ecuador, Panama, and Uruguay. In this comparative study, children aged 7 to 9 reported the pain during the ART process, however this was far less common than pain associated with amalgam restoration²¹. Ishan et al.²² came to conclusion that children had higher level of anxiety before ART treatment than during and after the treatment. The report by Mickenautsch S and Rudolph MJ²³ is in favor of the ART procedure. They observed changes in the expressions of the patients undergoing ART treatment. Their expression went from fearful to more relaxed as the treatment progressed.

Goud et al.²⁴ used the Modified Venhame as well as heart rate monitor to assess the discomfort during dental treatment, and concluded that ART caused less discomfort compared to rotatory instruments. In the same line of conclusion was the study conducted on 6-year old children in Indonesia²⁵.

According to Frencken²⁶, the ART approach is beneficial not just for improving the patient's experience of dental treatment, but at same time it can potentially reduce health costs and patient morbidity due to minimal possible need for general anesthesia and sedation. All this leads to the conclusion that ART is the best alternative and most suitable for younger children.

Conclusion

Children with a mean age of 6.0 years reported no pain during atraumatic restorative treatment (ART), and parental expectations of the treatment were very good.

Reference

1. Walsh LJ. Anxiety prevention: Implementing the 4 S principle in conservative dentistry. *Auxilliary*. 2007;17(5):24-26.
2. IASP Announces Revised Definition of Pain. International Association for the Study of Pain (IASP) [Internet]. [cited 2022 Feb 1]. Available from: <https://www.iasp-pain.org/publications/iasp-news/iasp-announces-revised-definition-of-pain>.
3. Raja SN, Carr DB, Cohen M, Finnerup NB, Flor H, Gibson S, et.al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. *Pain*. 2020; 161(9):1976-1982.
4. de Amorim RG, Frencken JE, Raggio DP, Chen X, Hu X, Leal SC. Survival percentages of atraumatic restorative treatment (ART) restorations and sealants in posterior teeth: an updated systematic review and meta-analysis. *Clin Oral Investig*. 2018;22(8):2703-2725.
5. Frencken JE, van Amerongen WE. The Atraumatic Restorative Treatment approach. In: Fejerskov O, Kidd E, editors. *Dental caries: the disease and its clinical management*. 2nd ed. Oxford:Blackwell Munksgaard; 2008. p. 427-442.
6. Frencken JE. The art and science of Minimal Intervention Dentistry and Atraumatic Restorative Treatment. United Kingdom: Stephen Hancocks; 2018. Chapter 5, The evolution of ART; p. 96-97.
7. Tascón J. Atraumatic restorative treatment to control dental caries: history, characteristics, and contributions of the technique. *Revista Panamericana de Salud Publica/Pan American Journal of Public Health* 2005;17(2):110-115.
8. Van Amerongen WE, Rahimtoola S. Is ART really atraumatic? *Community Dent Oral Epidemiol*. 1999;27(6):431-435.
9. Leal SC, Abreu DM, Frencken JE. Dental anxiety and pain related to ART. *J Appl Oral Sci*. 2009;17 Suppl(spe):84-8.
10. Chambers CT, Giesbrecht K, Craig KD, Bennett SM, Huntsman E. A comparison of faces scales for the measurement of pediatric pain: children's and parents' ratings. *Pain*. 1999;83(1):25-35
11. Home - Wong-Baker FACES Foundation [Internet]. [cited 2021 Nov 8]. Available from: <https://wongbakerfaces.org/>

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12. Petersen PE, Baez RJ, World Health Organization. Oral health surveys: basic methods. 5th ed. World Health Organization;2013 [Internet]. [cited 2019 Feb 1]. Available from: <https://apps.who.int/iris/handle/10665/97035>
 13. AAPD. Pediatric Medical History [Internet]. [cited 2019 Feb 9]. Available from: <https://www.aapd.org/research/oral-health-policies--recommendations/pediatric-medical-history/>
 14. Methods and indices - Oral Health Country/Area Profile Project [Internet]. [cited 2019 Oct 16]. Available from: <https://capp.mau.se/methods-and-indices/>
 15. Frencken JE. The art and science of Minimal Intervention Dentistry and Atraumatic Restorative Treatment. United Kingdom: Stephen Hancocks; 2018. Chapter 8, ART restorations; p 149-155.
 16. Jiang M, Fan Y, Li KY, Lo ECM, Chu CH, Wong MCM. Factors affecting success rate of atraumatic restorative treatment (ART) restorations in children: A systematic review and meta-analysis. *J Dent*. 2021;104:103526.
 17. Carvalho TS, Ribeiro TR, Bönecker M, Pinheiro EC, Colares V. The atraumatic restorative treatment approach: an "atraumatic" alternative. *Med Oral Patol Oral Cir Bucal*. 2009;14(12):e668-73.
 18. Frencken JE. The art and science of Minimal Intervention Dentistry and Atraumatic Restorative Treatment. United Kingdom: Stephen Hancocks; 2018. Chapter 11, Application of ART in oral health care; p195-196.
 19. de Menezes Abreu DM, Leal SC, Frencken JE. Self-report of pain in children treated according to the atraumatic restorative treatment and the conventional restorative treatment--a pilot study. *J Clin Pediatr Dent*. 2009;34(2):151-5.
 20. Lo EC, Holmgren CJ. Provision of Atraumatic Restorative Treatment (ART) restorations to Chinese pre-school children--a 30-month evaluation. *Int J Paediatr Dent*. 2001;11(1):3-10.
 21. Estupiñán-Day S, Tellez M, Kaur S, Milner T, Solari A. Managing dental caries with atraumatic restorative treatment in children: successful experience in three Latin American countries. *Rev Panam Salud Publica*. 2013;33(4):237-43.
 22. Ishan, Shivlingesh KK, Agarwal V, Gupta BD, Anand R, Sharma A, et al. Anxiety Levels among Five-Year-Old Children Undergoing ART Restoration- A Cross-Sectional Study. *J Clin Diagn Res*. 2017;11(4):ZC45-ZC48.
 23. Mickenautsch S, Rudolph MJ. Undergraduate training in the atraumatic restorative treatment (ART) approach--an activity report. *SADJ*. 2002;57(9):355-7.
 24. Goud RS, Nagesh L, Shoba F, Raju HG. Assessment of Discomfort Experienced by School Children While Performing 'ART' and 'MCP'-An Experimental Study. *J Dent (Tehran)*. 2012;9(4):229-37.
 25. Schriks MC, van Amerongen WE. Atraumatic perspectives of ART: psychological and physiological aspects of treatment with and without rotary instruments. *Community Dent Oral Epidemiol*. 2003;31(1):15-20
 26. Frencken JE. The art and science of Minimal Intervention Dentistry and Atraumatic Restorative Treatment. United Kingdom: Stephen Hancocks; 2018. Chapter 11, Application of ART in oral health care; 207 p.