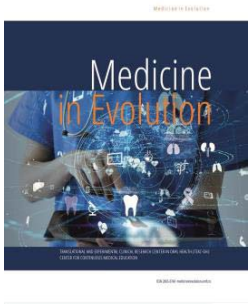
The role of dental plaque disclosing agent in oral hygiene improvement among a group of institutionalized children



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Abstract

Oral hygiene is precarious among institutionalized children, because free treatments are only available subject to certain conditions and because they cannot be supervised while they brush their teeth. Material and methods: the study includes 31 subjects who were clinically examined for the determination of the oral hygiene level, and who filled out a questionnaire regarding their attitude towards the disclosing agents. Results: The average value of the DIS index prior to the application of the disclosing agent was of 1.12, with a 1.34 mean value post-application (satisfactory hygiene). The hygiene level improved with the use of the correct technique and the disclosing agent, with values between 0.1-0.6 (good oral hygiene). Conclusion: There are clear results in terms of change in the children's behaviour related to dental hygiene, supplemented by the improvement of the oral hygiene level following the removal of the bacterial plaque deposits revealed by the disclosing agents.

Keywords: disclosing agents, oral hygiene, disadvantaged children

INTRODUCTION

The World Health Organization places great focus on prevention in dental medicine and supports educational programs mainly addressing children and elderly [1,2]. According to the researches in the field, the oral hygiene of institutionalized children is precarious, with a high prevalence of oral diseases [2-4]. This could also be triggered by the fact that these children only benefit from free dental treatments subject to certain conditions and that, furthermore, they cannot be supervised and helped each time they brush their teeth.

Auxiliary dental materials, such as plaque disclosing agents, if correctly used, help improve the results of these educational programs, motivating the patients and helping them adapt their brushing technique to suit their specific needs [1,5]. The use of the plaque disclosing agents is the easiest and fastest method for the clinician to identify the bacterial plaque and diagnose the patient's oral hygiene level [1,6]. Thus, the use of the plaque disclosing agent amongst institutionalized children is even more important than in the case of other individuals.

The present study adopts an approach to an oral health topic, relying on the advantages of the dental plaque disclosing agents, with clinical applicability in the field of dental materials, prevention and community dentistry. Thus, the aim of this study is to assess the importance of using the disclosing agent for the information, motivation and development of the skills required for a correct brushing technique among a group of institutionalized children.

MATERIAL AND METHODS

A number of 31 subjects (19.4% males), aged between 7 and 19, from the foster care home of "Sfanta Maria" Community Service Complex, Valenii de Munte, Prahova, were included in this cross-sectional study, in May 2019. The consent of the children's legal custodian was obtained, and the study was conducted in the medical office of the centre.

The oral clinical examination was carried out using mobile units equipped with suitable lighting systems, provided by Colgate-Palmolive, with single-use consultation kits and using the proper protection equipment. Dental areas with bacterial plaque deposits were examined three times, under different circumstances, i.e.: after the brushing of the teeth by the child via the usual technique, through inspection and palpation with the dental probe; after the application of the plaque disclosing agent, and the third one, following the roll technique brushing (the subject received guidance in this respect, with explanations and demonstrations on models, after the incorrectly brushed areas were revealed by staining). Solution-saturated plaque disclosing swabs were used. The plaque disclosing agent was applied as follows: each participant was requested to rinse their mouth with water, after which the plaque disclosing agent was applied via repeated rolling onto the examined dental surfaces, while holding the swab with the dental tweezers; the subject was then asked to rinse again with water so as to remove the excess dye, after which the plaque deposits were examined, with a score set for each dental area depending on the distribution of the soft deposits [5]. The participants' oral hygiene was assessed using the simplified plaque index (the DIS index), by summing up the codes corresponding to the six examined dental areas divided by 6. The 6 examined areas were as follows: the vestibular surface of the upper first molars, upper right central incisor and lower left central incisor and the lingual surfaces of the first lower molars. The codes used were as follows: 0 – lack of soft deposits; 1 - soft deposits do not cover more than ⅓ of the crown; 2 - soft deposits cover more than ⅓ of the tooth; 3 - soft deposits cover more than ⅔ of the tooth crown surface. The DIS index values were interpreted based on the following classes: excellent hygiene (index value equals 0); good

hygiene (0.1 to 0.6); satisfactory (values ranging between 0.7 and 1.8); dissatisfactory (values ranging between 1.9 and 3) [5].

Finally, a questionnaire was applied, including questions on the children's perception and attitude towards the use of the dental plaque disclosing agent, and in the end, the participants received fluoride toothpastes and toothbrushes.

RESULTS

The mean age of the subjects was 13.26 years (SD±2.76) and 80.6% of them were females.

Clinical examination results

The clinical examination has revealed a prevalence of deciduous dentition for 20 of the subjects (64.5%), while the remaining 11 children have mixed dentition. Most of the children included in the study are right-handers (93.3%).

Two measurements of the plaque index were performed, in order to assess the clinical implications of the use of the plaque disclosing agent during the dental examination. The measurement relied on the values obtained following the examination of the plaque deposits by inspection and palpation with the dental probe, while the second examination consisted of the inspection of the bacterial plaque dental areas stained by the disclosing agent.

In the first case, where the bacterial plaque deposit dental areas were examined by inspection and palpation of the dental surfaces with the dental probe, the results obtained were lower as compared to the values derived from the second examination.

The average value of the plaque index as assessed prior to the application of the disclosing agent was of 1.12, with a 1.34 DIS mean value post-application, denoting satisfactory hygiene (Table I).

Table I. Mean, minimum and maximum values of the DIS index, depending on the method of evaluating oral hygiene, with or without the disclosing agent

DIS index	Mean	Standard deviation	Minimum	Maximum
Without stain	1.12	0.58	0.16	2.50
After dye	1.34	0.50	0.5	2.33

In the case of the plaque index assessed without staining, the lowest and, respectively, the highest value were identified in only one child. The most frequently calculated were of 0.75, 1, 1.5 and 1.66. None of the subjects had excellent oral hygiene upon the first 2 examinations.

For the index assessed after the application of the plaque disclosing agent, the most frequent score was of 1.33 (16.1%) and 1.66 (12.9%). 20 children had satisfactory hygiene, 8 had good oral hygiene and only 3 had a dissatisfactory level.

The relevance of the bacterial plaque disclosing agent in terms of motivating and changing the behaviour with regards to the oral hygiene technique was assessed. Thus, two measurements of the DIS index were performed. The first one relied on the scores obtained following the examination of the subjects after the usual brushing, and the second one relied on the scores obtained after the examination of the subjects who performed the brushing after being taught the correct technique (with explanations, demonstrations, and disclosing agent staining). Lower DIS index values were obtained in the case of the measurements performed after the application of the newly learnt technique. The mean value of the DIS index measured after the use of the usual brushing technique was 0.80 higher than the mean value obtained following the roll technique brushing (Table II).

Moreover, an improvement in the hygiene level was observed, with the use of the correct technique and the disclosing of the plaque, with an DIS index of 0.1-0.6, good oral hygiene. The results show an excellent oral hygiene level for 5 of the subjects.

Table II. Mean, minimum and maximum values of the DIS index, depending on the toothbrush method

DIS index	Mean	Standard deviation	Minimum	Maximum
Usual brushing technique	1.34	0.50	0.5	2.33
Rolling technique after disclosing agent	0.54	0.55	0	2.50

Table III shows the mean values of the plaque indexes according to the variables considered: gender, the child's hand dominance and type of dentition. It was observed that females, subjects with a left dominant hand and those with permanent dentition have lower tooth decay indexes and, hence, a higher oral hygiene index as compared to males, right-handers and the ones with mixed dentition, but the differences are not statistically significant.

Table III. Mean values of dental plaque index related to characteristics of the subjects

DIS index	No staining Mean (SD)	With disclosing agent Mean (SD)	After rolling technique and dental plaque agent Mean (SD)
Female	1.01 (0.58)	1.33 (0.55)	0.45 (0.43)
Male	1.58 (0.33)	1.37 (0.29)	0.93 (0.79)
Right handed	1.13 (0.60)	1.38 (0.49)	0.56 (0.55)
Left handed	0.97 (0.46)	0.99 (0.59)	0.36 (0.42)
Permanent dentition	0.82 (0.43)	1.15 (0.42)	0.47 (0.59)
Mixed dentition	1.67 (0.38)	1.68 (0.47)	0.68 (0.42)

Results obtained following the application of the questionnaire

The subjects were asked whether they enjoyed the application of the plaque disclosing agent, and most answered positively (96.8%), only one of them replying negatively. This result shows that the plaque disclosing agent used fulfils the taste, smell, colour criteria, so that it generates a pleasant experience when used.

Regarding the use of the staining in order to highlight the areas where the hygiene was not correctly performed, 28 children replied affirmatively (90.3%).

Most children managed to identify the bacterial plaque deposits with the help of the disclosing agent, focusing on the stained dental areas.

Children manifested interest in the use of this dental material. This was actually highlighted by the participants' answers to the questionnaire: when asked if they are willing to use the staining agent again, they all replied affirmatively.

DISCUSSIONS

The values of the second bacterial plaque measurement were different from the first one. The contrasting colour of the bacterial plaque as compared to the dental surfaces, obtained following the use of the plaque disclosing agent, facilitated the examination, the bacterial plaque being easy to detect and quantify. Moreover, the plaque staining was extremely useful to motivate and raise awareness among the subjects on their dental hygiene level.

The choice of the brushing technique took into account the age of the children, their vague knowledge on the correct brushing technique, as well as the fact that the children are most often not supervised, helped or checked during daily dental brushing, considering that this is a group of institutionalized children. The roll brushing technique was chosen because it is efficient and recommended for children and people with a healthy periodontal tissues [5]. It should be mentioned that the subjects' periodontal assessment was not performed as part of this study, as this will constitute the subject of a future study.

The values of the oral hygiene index, measured following the dental brushing performed after the staining with the plaque disclosing agent were lower as compared to those of the index measured in the same individuals following their common brushing technique.

The results of this study, even though it was carried out on a restricted number of subjects, are also confirmed by other researches in the field.

In our country as well, it was highlighted that the oral hygiene of children in foster care homes is dissatisfactory [2,3,4]. In 2018, a longitudinal study monitored the evolution of the oral hygiene level in a group of children residing in a foster care home; a decrease in the values of the plaque indexes was noticed starting the very first month, a halving of the mean plaque index being observed after 4 months [7].

The literature currently includes both studies demonstrating the usefulness of the staining agent among patients, and studies stating that the oral hygiene level, despite being obviously enhanced, can also be influenced by other factors, thus minimizing the role of the disclosing agent [8]. The efficient removal of the bacterial plaque is associated to the level of oral hygiene knowledge, age of the subjects, motivation, frequency and duration of the brushing [8].

The use of the plaque disclosing agents is the easiest and fastest method for the clinician to identify the bacterial plaque and assess the patient's oral hygiene level [6,9,10,11].

The children were delighted with the plaque disclosing agent, which they found to be useful, even though, prior to the study, none of them had heard of such an ancillary material that can be used as part of the oral hygiene routine.

CONCLUSIONS

In so far, the plaque disclosing agents used have shown their usefulness. There are clear results in terms of the change in the children's behaviour with regards to dental hygiene, supplemented by the improvement of the oral hygiene level following the adequate removal of the bacterial plaque deposits revealed by the disclosing agents.

The dental plaque index values reveal a need for educational programs and the application of preventive and curative procedures among children, with a special focus on the institutionalized ones. If correctly used, plaque disclosing agents help improve the results of the educational programs, motivating the participants and helping them adapt their brushing technique to suit their specific needs.

The children's perception on the importance of the plaque disclosing agent is a positive one, stating that they would like to reuse it. Hence, the idea of recommending to the managers of this foster care home to either purchase, or obtain via sponsorships, dental plaque disclosing agents, as an auxiliary oral hygiene means for these children, as well as the return to this community with informative materials meant to educate them on oral hygiene and to reassess their oral hygiene level are encouraged.

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