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Effectiveness of the "lift the lip" technique for plaque control in 2- to 6-year-old children

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Abstract

Mechanical control can remove plaque using various methods and tools. Lack of visibility in some areas of the oral cavity can lead to a more significant accumulation of dental biofilm. The "lift the lip" technique was initially developed to detect children at high risk of caries development more quickly. The method involves gently moving the child's upper lip upwards using one hand's thumb, thumb, and forefinger so that all the upper front teeth are exposed while brushing the teeth with the other hand. The technique is used successfully in many countries, but its effectiveness has not yet been evaluated among children in Bulgaria.

The study aimed to evaluate the efficacy of the lip lift technique for plaque control in children aged 2 to 6 years.

The children in the study were randomly divided into two groups of 60 participants - experimental and control. Participants in the experimental group performed a tooth brushing technique combined with the "lift the lip" technique, and the control group followed only the brushing technique instructions. A modified oral hygiene index of Silness and Loe was used to check the oral hygiene status. Silness and Loe plaque index assessment was performed at the initial examination (baseline), after two weeks, and after one month.

The results show that the plaque index in the children of the experimental group significantly decreased two weeks after the start and remained at values below 0.5 until the end of the study. When comparing the plaque index values between the two groups, it was found that there was a significant decrease in two weeks and one month after the start of the study in the experimental group.

The data give us reason to conclude that the 'lift the lip' technique is effective and is recommended to be used by all parents of young children for quality plaque control.

This, in turn, could lead to and help in managing early childhood caries.

Keywords: Lift the lip technique, brushing technique, oral hygiene, plaque control, pediatric dentistry.

Introduction

Early childhood caries (ECC) is a significant health problem [1]. It is defined as the presence of one or more carious, missing, or obturated tooth surfaces of a child's primary tooth/teeth up to 71 months of age [2]. Early childhood caries is a multifactorial disease resulting from the interaction of cariogenic microorganisms, early supply of fermentable carbohydrates through inappropriate dietary practices, and social determinants [3-5]. Reducing the number of cariogenic microorganisms and establishing a balanced oral microenvironment can limit disease progression [2]. Therapeutic strategies targeting the biofilm disrupt the pathogenic niche and prevent the progression of ECC [2]. An essential part of controlling the disease is changing the behavior of the parents [6].

Mechanical control can remove plaque using various methods and tools [7]. Lack of visibility in some areas of the oral cavity can lead to a more significant accumulation of dental biofilm. The "lift the lip" technique was initially developed to detect children at high risk of caries development more quickly [8]. It is an oral health assessment tool used in infants and young children, is quick to perform, and is used to visually assess and identify early signs of carious lesions in upper anterior teeth [9]. It is suitable for babies to perform the procedure lying and for small children - sitting on the parent's lap in a "knees-on-knees" position [7]. The method aims to encourage parents to monitor their child's teeth regularly and improve oral hygiene brushing methods [9]. Mary Wilson created an entire program called "Lift the Lip," which aims to provide individual advice on oral health to emphasize the importance of assessing individual caries risk and the correct behavior of parents for their children's oral health [9]. The technique involves gently moving the child's upper lip upwards using the thumb, thumb, and forefinger of one hand so that all the upper front teeth are exposed while brushing the teeth with the other hand.

The technique is used successfully in many countries, but its effectiveness has not yet been evaluated among children in Bulgaria.

Aim: The study aimed to evaluate the efficacy of the lip lift technique for plaque control in children aged 2 to 6 years.

Materials and methods: 120 children aged 2 to 6 years and their parents participated in the study.

During our clinical research, 120 children aged 2 to 6 years were examined. Their distribution by gender and age is shown in Tables 1 and 2.

Table 1: Gender of the participants in the study

Gender Number	Male		Female	
	n	%	n	%
120 children	57	47.50	63	52.5

Table 2: Age if the participants in the study

Age	n	%
2 years old	18	15%
3 years old	29	24.2%
4 years old	27	22.5%
5 years old	29	24.2%
6 years old	17	14.2%
Total	120	100%

Before the start of the study, the parents signed an informed consent in which they were informed about the aims and objectives of the study. Criteria for the inclusion of participants were:

- Children up to 6 years of age with an average or high risk of caries development;
- Children without general diseases;
- Children with primary dentition, with primary incisors without evidence of physiological mobility, fractures, structural defects, and restorations such as crowns and fillings.

The children were randomly divided into two groups of 60 participants - experimental and control. Participants in the experimental group performed a tooth brushing technique combined with the “lift the lip” technique, and the control group followed only the brushing technique instructions.

Each child was examined by a specialist in pediatric dentistry using directed light, drying, and using a standard set of instruments (mirror, probe, and pincets). Dental status was recorded, and the condition of the oral mucosa, gingiva, tongue, and frenulums was assessed. The status data were filled in on a specially prepared medical card, and the carious lesions were classified according to the International Caries Detection and Assessment System (ICDAS II).

A modified oral hygiene index of Silness and Löe was used to check the oral hygiene status. For this purpose, each representative tooth was dried (with air) and examined for plaque visually and by scraping with a probe in the cervical third of the vestibular surface of the representative teeth. The thickness of the dental plaque on the vestibular surfaces of teeth 53, 52, 51, 61, 62, and 63 was assessed.

Accumulated Plaque Score Codes:

- 0 - No scraping plaque;
- 1 - Presence of some plaque on and around the free gingival margin on the vestibular surface, visible after scraping with a probe;
- 2 - Moderate accumulation of plaque on and around the free gingival margin on the vestibular surface, visible and without scraping;
- 3 - Abundance of plaque in the gingival sulcus and on and around the free gingival margin on the vestibular surface.

Calculation of the index: one of the scores from 0 to 3 is written for each representative tooth. The sum of the scores was divided by the number of representative teeth. According to the obtained result, we determined the level of oral hygiene of each child according to the following scale:

- 0 – excellent hygiene;
- 0.1 – 0.9 – good hygiene;
- 1.0 – 1.9 – unsatisfactory hygiene;
- 2.0 – 3.0 – poor hygiene.

Baseline values were recorded in the patient's medical record.

At the end of the first visit, each parent was instructed and trained to perform oral hygiene at home - every day, two times per day, for 2 minutes - mornings after breakfast and evenings before bed. The same toothbrush and toothpaste were given to all participants - Elgydium Kids (Pierre Fabre) soft children's toothbrush and Elgydium Kids (Pierre Fabre) toothpaste for caries protection (berry flavor). Participants were instructed to use a pea-sized amount of paste. The parents of the children in the control group were trained to follow the Fones brushing technique. In the experimental group, a toothbrushingFones technique was combined with the lift-the-lip technique. The training was conducted in the dental office on a phantom model of dental jaws and brushes.

Silness and Loe plaque index assessment was performed at the initial examination (baseline), after two weeks, and after one month.

Statistical data analysis was performed using SPSS version 20.0 software (IBM Corp., New York, USA). Statistical significance was set at a value of $p<0.05$.

Results

The following table shows the distribution of children according to the average value of the dmft index from each group.

Table 3: Average dmft index values of the children

dmft / Groups	n	mean ± SD	Ind T-test
Control group	60	2.17 ± 2.29	T= 0.628; p=0.168
Experimental group	60	2.38 ± 2.57	

The results show that the children in the study have an average number of 2 carious lesions. No significant differences were observed in the index severity in the children of the two groups. The observed low values of the index are because many of the children we examined are under four years of age and less often have carious lesions.

The following table shows the distribution of children relative to the average value of the dmft index by age.

Table 4: Average value of dmft index by age

dmft / Children	n	mean ± SD	Ind T-test
2 and 3 years old	47	0.64 ± 1.25	T=7.010; p=0.000
4, 5 and 6 years olsd	73	3.33 ± 2.42	

The table shows that the caries index is significantly lower in children under four years of age than in older children. The dmft index rises with age, again proving the need for early caries prevention.

The mean values of the oral hygiene index at the beginning of the study are shown in Table 5.

Table 5: Average value of the plaque index (Silness and Loe)

PLI / Groups	n	mean ± SD	Ind T-test
Control group	60	1,58 ± 0,60	T= -,519; p=0,605
Experimental group	60	1,64 ± 0,53	

The data show that the average values of the plaque index (Silness and Loe) fluctuate between 1.58 and 1.64, and when comparing the individual groups, no significant differences were observed ($p>0.05$). The obtained results determine that the examined children have unsatisfactory oral hygiene.

Table 6: Shows the dynamics of the plaque index in the control group during the study.

Table 6: Comparative analysis of the mean values of the plaque index of children from the control group

PLI / Control group	n	mean ± SD	Paired Samples Test
Baseline[1]	60	1.58 ± 0.60	$T_{1,2}$ = 4.149, p = 0,000
After 2 weeks[2]	60	1,10 ± 0.53	$T_{2,3}$ = 0.864, p = 0,391
After 1 month[3]	60	1,02 ± 0.48	$T_{1,3}$ = 5.638, p = 0,000

The data in the table show the dynamics of the plaque index of Silness and Loe in the children of the control group for one month. It can be seen that there was a significant reduction in plaque accumulation two weeks after the start of the study. The results remained stable after another two weeks – the plaque index in the control group was 1.02 at the end of the study.

Table 7: Tracks the change in the plaque index in the experimental group participants during one month.

PLI / Experimental group	n	mean ± SD	Paired Sample Test
Baseline[1]	60	1.64 ± 0.53	$T_{1,2}$ = 15.032, p = 0,000
After 2 weeks[2]	60	0.43 ± 0.34	$T_{2,3}$ = -0.728, p = 0,469
After 1 month[3]	60	0.48 ± 0.42	$T_{1,3}$ = 14.601, p = 0,000

Table 7: Comparative analysis of average values of the plaque index of the children from the experimental group

The results show that the plaque index in the children of the experimental group significantly decreased two weeks after the start and remained at values below 0.5 until the end of the study. Statistically significant differences support the data.

Table 8: Average values of the plaque index in the two investigated groups during the study

PLI Groups	Baseline mean ± SD	After 2 week mean ± SD	After 1 mont mean ± SD
Control group	1.58 ± 0.60	1.10 ± 0,53	1.02 ± 0.48
Experimental group	1.64 ± 0.53	0.43 ± 0.34	0.48 ± 0.42
Ind T-test	T=-,519; p=0,605	T=8,032; p=0,000	T=6,584; p=0,000

When comparing the plaque index values between the two groups, it was found that there were significant differences two weeks and one month after the start of the study. In both groups, a decrease in plaque accumulation was observed, but significantly more in the group that applied the "lift the lip" technique during oral hygiene.

Discussion

The present study evaluates and compares the effectiveness of the "lift the lip" technique in qualitative plaque removal in children up to 6 years of age. We are unaware of such a study being done so far for children from Bulgaria. The results show a significant decrease in plaque accumulation in the experimental group compared to the baseline. The value of Silness and Loe oral hygiene index at baseline decreases during the second examination after two weeks and maintains close values one month after the start of the study - tables 7 and 8. A recent study also investigated the "lift the lip" technique but used other brushing techniques, and the authors assessed plaque accumulation using the O'Leary index [10]. The authors concluded that the modified Bass technique, in combination with "lift the lip," is most effective for plaque removal in preschool children [10]. Other colleagues also found a significant reduction in plaque between baseline and day 14 of the study [8]. Our data show that combining the Fones technique with lifting the lip improves biofilm control in young children.

Children under 7-8 years of age rarely can brush their teeth effectively and efficiently [11]. This is most often due to their young age, the lack of sufficient manual dexterity, and the lack of the necessary motivation [8]. For older children up to 12 years of age, it is also important that parents participate and help maintain oral hygiene [12]. Motor skill development varies from child to child, but it is generally recommended that children brush their teeth only when they can tie their shoelaces [12]. Therefore, nowadays, it is recommended for a young child that plaque removal should be done with the participation of a parent at least until the age of 7 and that the teeth should be brushed twice a day with fluoride toothpaste [8, 13, 14]. Research shows that

parents rarely follow these recommendations, and a more significant proportion of 5-year-old children brush their teeth without help from an adult [15]. This is a significant problem because early childhood caries are strongly associated with low frequency of tooth brushing, late initiation of oral hygiene, and lack of parental involvement in maintaining oral hygiene [16]. Plaque removal by tooth brushing depends on proper technique, proper brush position, and patient compliance [17]. The participation of parents in the implementation and control of oral hygiene allows the creation of better oral hygiene habits and the acquisition of a correct brushing technique. This is valid to a greater extent when the "lift the lip" technique is included [17].

The results of the present study confirm that the "lift the lip" technique positively affects plaque removal when combined with the Fones method. Several authors have observed a significant plaque reduction when using this brushing technique (18-20). This was confirmed in the results obtained from the present study, where plaque accumulation decreased significantly in the control group with the independent use of this technique (Table 6). There are several disadvantages to the Fones technique [21], so combining it with the "lift the lip" technique is recommended to achieve better results (Table 8).

An additional advantage of the "lift the lip" technique is that, in addition to improving visibility during oral hygiene, it also supports the early diagnosis of carious lesions [22]. Pediatricians see young children much more often than pediatric dentists so that they can play an important and responsible role in the early oral examination [22]. The object of future research may be the application and evaluation of the "lift the lip" technique by parents and pediatricians for the early diagnosis of initial carious lesions of temporary incisors.

Limitations

One of the study's limitations is the short duration of the observation period of the patients - one month. This duration was chosen and reflects studies in the literature that suggest between 12 and 15 repetitions are required to effect a habit change [17]. The only brushing technique investigated in the study was the Fones technique. Therefore, future research may investigate other techniques, such as roll or Bass, which also give good results in plaque control in young children.

Conclusion

The data give us reason to conclude that the 'lift the lip' technique is effective and is recommended to be used by all parents of young children for quality plaque control. This, in turn, could lead to and help in managing early childhood caries.

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