

Short time effect of elmex[®] and Listerine[®] mouthrinses on plaque in 12-year-old children

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Abstract

Purpose: This study was conducted to determine the effect of two mouthrinses elmex[®] and Listerine[®] on plaque accumulation in 12-year-olds.

Material and methods: 30 12-year-old children took part in the clinical study. They were divided into three groups. Group I (10 people) was given Listerine[®] to home use. Group II (10 people) was given elmex[®] to home use. Group III (10 people) did not receive any mouthrinses. Following indices were used in first and base study Plaque Index (PI), Approximal Plaque Index (API) and Sulcus Bleeding Index (SBI). The statistical analysis was performed using T test for related samples and Spearman rank order correlations.

Results: Mean PI lessened in group I (Listerine[®]) from 0.996 to 0.804 and group II (elmex[®]) from 0.807 to 0.698. In group III it stayed almost at the same level. In all children values of API and SBI decreased after two weeks. Reduce of API in participants using Listerine[®] was important statistically and it lessened from 57.4% to 48.1% (reduction by 16.2%). The other results of API and SBI were not statistically important. API in children using elmex[®] lowered by 15.5%. Bleeding (SBI) in Listerine[®] group decreased by 21.5% and in elmex[®] group decreased by 24.5%. In control group diminish of SBI was only by 14.4%.

Conclusions: In summary, this study has demonstrated that additional rinsing helped in reducing plaque and gingivitis in 12-year-olds but it is not as essential as motivation to everyday oral hygiene.

Key words: plaque, gingivitis, mouthrinses.

Introduction

Dental plaque is an essential etiological factor of caries and gingivitis. Nowadays dental plaque is regarded as microbial biofilm. Bacteria in biofilms are different from the same species freely floating in saliva. They develop phenotypes that can be more resistant to microbial agents [1,2]. There is a cause-consequence association between dental plaque and gingivitis. If young supragingival plaque is allowed to grow without any oral hygiene practice some changes will appear that result in gingivitis after 2-3 weeks [3,4]. Everyday oral hygiene meaning toothbrushing twice a day and cleaning interdental spaces with dental floss is an effective means of helping control dental caries and periodontal diseases. Mechanical home-care methods require time, manual dexterity and motivation. Even patients after professional oral hygiene training may miss hard-to-reach areas which are retention places of dental plaque. Especially uphill is daily interdental cleaning. Still slight per cent of patients uses dental floss in everyday routine. In countries where prophylaxis is well developed such as Canada 25% of population floss regularly, in England only 10 per cent [5]. That is why usage of chemotherapeutic agents can be an useful adjunct to mechanical methods. Mouthwashes are recommended after the patient has brushed and flossed his teeth. Market offers a lot of different mouthwashes. As an active ingredient they can comprise chlorhexidine, triclosan, fluorides, metal ions, oxidising agents, essential oils and many others. With the exception of 0.2% per cent chlorhexidine all mouthwashes are recommended as supplements to everyday oral hygiene. It is advised to test the products in the same way using long-term home use studies [2,6,7]. Investigator decided to test two of commercially available mouthrinses (elmex[®] and Listerine[®]) in a clinical study lasting two weeks.

Mouthrinse elmex[®] contains amine fluorides that are surface active. They concentrate easily on teeth surface and form

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Table 1. T test for related samples. No statistical differences between PI 1 and PI 2 ($p < 0.05$) in any group were noted

	Variable	Mean	Std. Dv.	N	Diff.	Std. Dv. Diff.	t	df	p
group I Listerine®	PI 1	0.995833	0.349410						
	PI 2	0.804167	0.306218	10	0.191667	0.464894	1.303745	9	0.224680
group II elmex®	PI 1	0.807292	0.362515						
	PI 2	0.697917	0.406269	8	0.109375	0.502443	0.615710	7	0.557567
group III control	PI 1	0.712500	0.357055						
	PI 2	0.733333	0.337474	10	-0.020833	0.255533	-0.257817	9	0.802346

calcium fluoride areola that makes enamel more resistant to cariogenic bacteria. Supply of fluorine constantly released into saliva accelerate enamel remineralization. Additionally amine fluorides affect metabolism of bacteria creating dental plaque. It disturbs creating plaque biofilm [8].

Listerine® is a mouthwash that comprises essential oils (thymol, menthol, eucalyptol and methyl salicylate). It prevents dental plaque accumulation, effects on oral flora, has antimicrobial activity. It is effective against gingivitis and oral malodor [9].

As an examined group 12-year-old children were chosen. Interdental hygiene is especially important in adolescents 12-18 because of increase in caries on mesial and distal surfaces and arising gingivitis [10].

Material and methods

30 12-year-old children took part in the clinical study. They were divided into three groups. Group I (10 people) was given Listerine® to home use. Group II (10 people) was given elmex® to home use. Group III (10 people) did not receive any mouthrinses. Children belonging to group I and II were asked to use chemotherapeutic agents as the producer advises as a supplement to everyday oral hygiene, after every brushing.

Plaque Index (PI) (Silness i Löe) [11], Approximal Plaque Index (API) (Lange et al., 1977) [12] and Sulcus Bleeding Index (SBI) (Mühlemann and Son modified by Lange) [12,13] were recorded in screening examination. Dental plaque was stained with erythrosine tablets Red-Cote (manufactured by Butler). Each participant was instructed about oral hygiene.

Plaque Index (PI) (Silness i Löe) [11] was scored on four surfaces (that is buccal, lingual, mesial and distal) of six representative teeth (16, 12, 24, 44, 32, 36) after disclosing with erythrosine. Hygiene was assessed according to following scale:

- 0 – no plaque
- 1 – plaque invisible but can be found with periodontal probe at the gingival margin
- 2 – moderate plaque easily seen without probing
- 3 – ample plaque easily seen.

The mean index was calculated by dividing the sum of numbers from the scale by the total number of sites scored within the mouth.

Approximal Plaque Index (API) was scored after staining dental plaque. A periodontal probe was gently guided through approximal spaces of the first and third quadrants from the oral

aspect and of the second and fourth quadrant from the buccal aspect. The plaque remnants were noted as “+” answer. Maximum 28 points were measured. Percent of surfaces with plaque was counted:

- API 100-70% bad oral hygiene
- API 70-40% average oral hygiene
- API 39-25% rather good oral hygiene
- API <25% optimum oral hygiene.

Sulcus Bleeding Index (SBI) was measured by guiding probe through the gingival sulcus in the first and third quadrants from the buccal aspect and in the second and fourth quadrant from the oral aspect. “+” or “-” answer was noted and per cent SBI was counted:

- SBI 100-50% heavy gingivitis
- SBI 50-20% moderate gingivitis
- SBI 20-10% light gingivitis
- SBI <10% clinically healthy gingiva.

After two weeks the indices were recorded again. Two subjects (group II) were excluded from the analysis because of missing the last examination.

The statistical analysis was performed using T test for related samples and Spearman rank order correlations.

Results

Results are featured in *Tab. 1-4*. According to PI index in basic examination the best oral hygiene was noted in third group (0.713) after two weeks it stayed almost at the same level (0.733). Mean PI lessened in group I (Listerine®) from 0.996 to 0.804 and group II (elmex®) from 0.807 to 0.698. The differences were not statistically important (*Tab. 1*).

In all children values of API and SBI decreased after two weeks. Reduce of API in participants using Listerine® was important statistically and it lessened from 57.4% to 48.1% (reduction by 16.2%). The other results of API and SBI were not statistically important. API in children using elmex® lowered by 15.5%. Bleeding (SBI) in Listerine® group decreased by 21.5% and in elmex® group decreased by 24.5%. In control group diminish of SBI was only by 14.4% (*Tab. 2*).

Tab. 3 displays oral hygiene according to Approximal Plaque Index. Most children had average oral hygiene (API 70-40%).

Correlation between API and SBI indicates that accumulation of dental plaque is associated with gingival bleeding (*Tab. 4*).

Table 2. Mean values of SBI% and API%

	Index	Examination 1 ±SD	Examination 2 ±SD	Difference	Difference %	Statistical importance p<0.05
group I Listerine®	SBI%	26.5±6.4	20.8±6.9	5.7	21.5%	no
	API%	57.4±13.5	48.1±14	9.3	16.2%	yes
group II elmex®	SBI%	24.5±6.1	18.5±8.8	6	24.5%	no
	API%	55.625±15.9	47±22.1	8.625	15.5%	no
group III control	SBI%	22.2±11.8	19±11.6	3.2	14.4%	no
	API%	47.8±18.8	43.8±14.6	4	8.4%	no

Table 3. Oral hygiene of examined children according to API

Examined group	Examination	API			
		100-70%	70-40%	39-25%	<25%
group I Listerine®	1	1 (10%)	8 (80%)	1 (10%)	0
	2	0	7 (70%)	2 (20%)	1(10%)
group II elmex®	1	1 (12.5%)	6 (75%)	1 (12.5%)	0
	2	2 (25%)	4 (50%)	1 (12.5%)	1 (12.5%)
group III control	1	1 (10%)	5 (50%)	3 (30%)	1 (10%)
	2	0	4 (40%)	6 (60%)	0

API 100-70% bad oral hygiene; API 70-40% average oral hygiene; API 39-25% rather good oral hygiene; API<25% optimum oral hygiene

Discussion

Conducted examination showed that using Listerine® mouthwash reduced amount of dental plaque and bleeding units in 12-year-olds. Reduction of interdental plaque according to API was statistically significant. Efficacy of Listerine® was acknowledged in many *in vitro* [14-17] and *in vivo* trials. References shows that essential oils are effective in people who suspend oral hygiene for a short time of examination [18] as well as in long-term observations when the mouthwash was used additionally to everyday oral hygiene [19-21].

Similar clinical trial with Listerine® lasting two weeks was undertaken by Skiba M. and colleagues. Mouthwash was used in patients with periodontitis after professional scaling and root planning and oral hygiene instructions. Authors received reduction of API by 57.38% and SBI by 69.63%. Difference was statistically significant [22].

According to results elmex® is similarly effective to Listerine®. The lowest reduction of API and SBI was in control group. That indicates that by single oral hygiene instructions it is hard to motivate children to improve their oral hygiene. Śniatała R. noted that systematic brushing with repeated training, usage of fluoride toothpastes and dentist supervision are able to reduce the amount of dental plaque in children without additional aids [23]. Suchlike conclusions depicts as well Witt-Pawłowski K. who received statistically important reduction of API and SBI in 10-12-year-old children by 5 visit individual profilaxis that relayed on instruction, remotivation, fluorization, caries treatment and professional scaling [24].

In summary, this study has demonstrated that additional rinsing helped in reducing plaque and gingivitis in 12-year-olds but it is not as essential as motivation to everyday oral hygiene.

Table 4. Spearman Rank Order Correlations

	N	R	t(N-2)	p level
API% & SBI%	56	0.542660	4.747550	0.000016

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