Oral Hygiene and Gingival Inflammation in 6-8-year-olds From a Junior School in Minsk who Participated in a Supervised Oral Hygiene Programme

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Abstract

Unsatisfactory oral hygiene is still a common problem among young children in Belarus. ***Aim:*** The aim of this study was to evaluate the effectiveness of supervised toothbrushing in improving oral hygiene reducing gingival inflammation in six- to eight-year-old schoolchildren in Minsk, Belarus. ***Methods:*** All 159 six- to eight-year-old children who attended a school in Minsk were examined for dental caries, oral hygiene, and gingival inflammation. Their DMFT, DMFS, oral hygiene - using the simplified oral hygiene index (OHI-S; Green & Vermillion, 1964) - and gingival inflammation - using the gingival index (GI; Löe & Silness, 1963) - were recorded. All children from two randomly selected classes were then recruited into a toothbrushing programme at school under the observation of schoolteachers. Forty-nine children participated in the four-week oral hygiene programme, in one of two groups. One group of 25 children used a fluoride-containing toothpaste (500 parts-per-million; ppm) and the other of 24 children used a fluoride-free toothpaste. ***Results:*** All 159 children had an unsatisfactory level of oral hygiene and the vast majority had mild gingival inflammation. Thirty-five had visible caries in their first permanent molars, 13 had existing fillings, and 18 had existing fissure sealants. Both groups who took part in the supervised toothbrushing programme showed statistically significant ($P<0.05$) improvements in their mean OHI-S and GI scores. There were no statistically significant differences in improvement between the two groups. ***Conclusion:*** This pilot programme improved the oral hygiene and gingival health of the young schoolchildren over a four-week period. It would be necessary to study the children concerned over a far longer period to assess whether or not they were able to maintain or further improve their oral hygiene and gingival health and to assess the effectiveness of the oral hygiene programme and toothpastes in preventing dental caries.

Key Words: Oral Hygiene, Gingivitis, Junior Schoolchildren, Belarus

Introduction

In modern oral health research, the accent should be on revealing interrelations between indicators and risk factors of disease occurrence [1,2]. Excessive accumulation of bacterial dental plaque is observed following unsatisfactory oral hygiene. Plaque is one of the most important risk factors for dental caries and periodontal diseases. The most effective method of dental plaque removal is regular toothbrushing [3].

In European countries there are significant differences in the percentage of children who brush their teeth twice a day. An ongoing series of surveys of inequalities in young people's health in Europe has indicated a wide variation in toothbrushing habits. In the latest survey, the data suggested that among those aged 11-15 years, the percentage of those who brushed their teeth more than once per day varied from country to country. In Switzerland, it was 85% (80% of boys and 89% of girls); in Germany, it was 79%; in Netherlands, 77%; and in Russia, 61% (52% of boys and 71% of girls) [4]. Previous studies of children in Belarus have shown unsatisfactory levels of oral hygiene and the presence gingival inflammation [5,6], suggesting that the children concerned either did not brush their teeth or brushed them irregularly and poorly. International experience shows that school-supervised toothbrushing programmes are effective for achievement of good oral hygiene in children [7,8]. There are fewer reports of toothbrushing among younger children.

Aim

The aim of this study was therefore to evaluate oral health status and to assess the efficiency of super-

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vised toothbrushing with fluoride-containing and fluoride-free toothpastes in schoolchildren aged from six to eight years.

Methods

The school N166 in Minsk was selected for this study because the authors had previously worked with the school administrators and teachers and it was one of eight schools that had previously taken part in a research programme. The current study was approved by the local health authority, and the parents of all six- to eight-year-old children who attended the school were approached and asked to consent to their children taking part in the study. All parents gave this consent.

All 159 children at the school aged six, seven and eight years in seven classes were examined by one calibrated examiner. The examinations were performed in a dental office, with adequate artificial illumination, using a standard set of dental instruments. Oral hygiene was evaluated using simplified oral hygiene index (OHI-S; Green &Vermillion, 1964) [9] and its components, debris (DI-S) and calculus (CI-S). Periodontal status was assessed using gingival index (GI; Löe & Silness, 1963) [10]. Dental caries in permanent teeth was scored by DMFT and DMFS.

Two classes of children aged six to eight-years-old were then randomly selected to take part in the pilot toothbrushing programme. All children (total 25) in one class were randomly assigned to brush with a 500 parts-per-million fluoride toothpaste. All the children in a second class (total 24) were asked to brush with a non-fluoride toothpaste. Both toothpastes were approved for use in Belarus and were available in shops. Toothbrushing was carried out daily, after breakfast, at the school over a four-week period, under supervision of teachers *(Figure 1).*

Data were analysed using statistical software (SPSS for Windows, SPSS Inc, Chicago, USA).

Results

1. All children

The mean value of oral hygiene index OHI-S for all 159 children who took part in the study was 1.65±0.03 i.e., an unsatisfactory level of oral hygiene in the majority of children.

Their oral hygiene status was defined mainly by a significant amount of dental plaque; component DI-S was 1.64±0.03. Dental calculus was found only in a few children; the average value of component CI-S was 0.01±0.004. The mean gingival index (GI) was 0.81±0.01, indicating that mild inflammation was common. Within the 159 children, the GI scores varied from GI=0.1 to GI=1.2.

There were 113 children (71.1%) whose permanent teeth appeared to be caries free and without existing restorations (DMFT=0). There were 35 (22%) children with visible caries in their first molars and other erupted permanent teeth and 13 (8.2%) had existing fillings. The mean DMFT for all the children was 0.45±0.06, of which the D-component (decayed teeth) was 0.28±0.05 and F-component (filled teeth), 0.17±0.05. In most cases, caries had affected one tooth surface. The mean DMFS value was 0.46±0.07. Eighteen children (11.3%) had fissure sealants present in their first permanent molars. There were no statistically significant differences in oral health status scores between the boys and girls.

1.2 Test groups

The initial level of oral hygiene in the 49 children who took part in the supervised toothbrushing programme was poor, in that the mean OHI-S for the fluoride-containing toothpaste group was 1.77 and 1.74 for the fluoride-free toothpaste group. The mean GI for the fluoride-containing toothpaste group was 0.88 and 0.85 for the fluoride-free toothpaste group, suggesting that the majority had mild gingivitis caused by unsatisfactory oral hygiene *(Tables 1* and *2).* After four weeks of supervised toothbrushing, OHI-S was improved by 17.5% in the fluoride-containing toothpaste group and by 17.8% in the fluoride-free toothpaste group. Both were statistically significant improvements *(Table 1).* Over the four-week period, the mean GI had decreased from its initial level by 13.6% in the fluoride-containing toothpaste group and by 22.4% in the fluoride-free toothpaste group. Again, these were statistically significant improvements for both groups. There were no statistically significant differences in the improvements in oral hygiene and gingival inflammation scores between two groups *(Tables 1* and *2,* and *Figure 2).*

Discussion

Results of this study have indicated an unsatisfactory level of oral hygiene among the young schoolchildren who were studied. It is a risk factor for dental caries and an indicator of risk for chronic gingivitis. It confirms the results of previous studies, which have shown poor quality of toothbrushing and mild gingivitis in 7-8-year-olds in Belarus [5,6].

Figure 1. *Supervised toothbrushing after a school breakfast on 14 September 2008.*

Table 1. *Oral hygiene in children after four weeks of supervised toothbrushing at school*

Toothpastes	**Age (years)**	**Oral hygiene OHI-S±S.E.**		**Changes**		
		Initial	In 4 weeks	OHI-S	%	*P* value
Fluoride-free	7-8 n=24	1.74±0.08	1.43±0.08	-0.31	-17.8	<0.05
With fluoride	7-8 n=25	1.77±0.05	1.46±0.06	-0.31	-17.5	<0.05

Table 2. *Gingival status in children after four weeks of supervised toothbrushing at school*

Toothpastes	**Age (years)**	**Oral hygiene GI-S±S.E.**		**Changes**		
		Initial	In 4 weeks	GI	%	*P* value
Fluoride-free	7-8 n=24	0.85±0.04	0.66±0.04	-0.19	22.4	<0.05
With fluoride	7-8 n=25	0.88±0.03	0.76±0.03	-0.12	13.6	<0.05

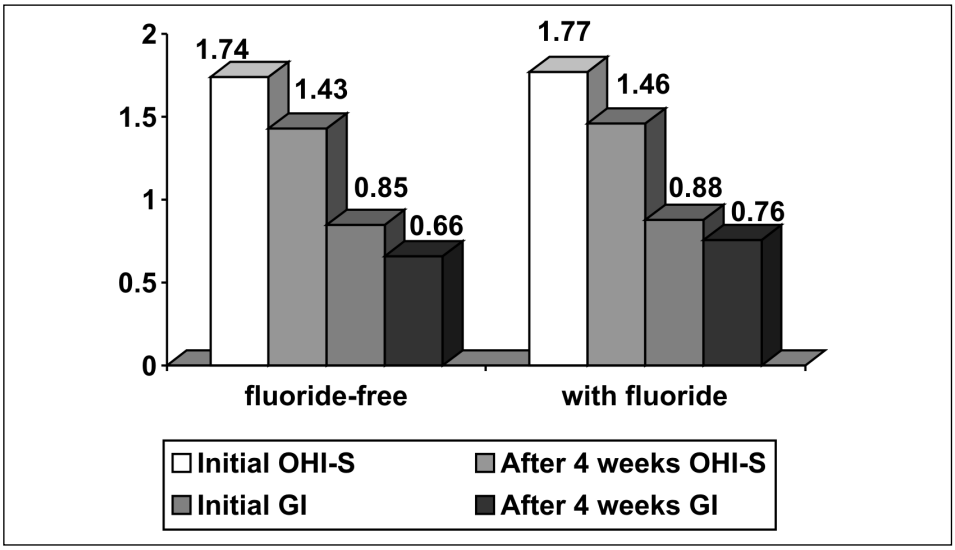

Figure 2. *Oral hygiene (OHI-S) and gingival status (GI) in children after four weeks of supervised toothbrushing using fluoride-free and fluoride-containing toothpastes.*

Every fifth child needed treatment of caries in permanent teeth. It is interesting to note that a similar caries level in children of the same age was observed in a previous Russian study [11]. However, it should be noted that this study [11] took place some ten years before the current study. It should also be noted that in a number of European countries, dental caries of permanent teeth in children has become rarer thanks to the introduction of preventive programmes [12].

The short duration of the study and the relatively small numbers involved made it impossible to assess the effect of the programme on the prevention of dental caries. There is good evidence to show that brushing twice a day with a fluoride-containing toothpaste prevents dental caries [13]. However, the response of gingival tissues to plaque accumulation or removal is seen within 48 hours [14] so, in spite of the short duration of the study, it was possible to demonstrate that both oral hygiene and gingivitis were improved as a result of the supervised toothbrushing programme. It is far from clear whether or not the presence or absence of fluoride in the toothpaste that the children used had any influence on their gingival health. The fact that there were no statistically significant differences between the improvements in the oral hygiene or gingival inflammation of the two groups suggests that it probably did not have an influence and that the improvements in gingival health were due to toothbrushing rather than to the toothpaste.

A further unknown factor is the extent to which the children brushed their teeth at home in the evenings and at weekends. It may be that the programme stimulated them and their parents to improve oral home care and that this contributed to their improved oral hygiene and gingivitis.

Conclusions

In summary it can be said that:

1. The oral hygiene status of the young schoolchildren who were examined in this study was unsatisfactory and that 22% had observable dental caries.

2. Toothbrushing with fluoride-containing and fluoride-free pastes was equally effective in improving oral hygiene and gingival health over a four-week period of observation.

3. Supervised toothbrushing at school facilitated oral health education for all the young schoolchildren who took part in the study.

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