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Chair and Department of Paedodontics Dentistry, Skubiszewski Medical University of Lublin

MARIA MIELNIK-BŁASZCZAK, BEATA KUBIĆ-FILIKS

The outcome of implementation of a dental prophylactics programme among eleven-year-old children from the Lublin region

Dental caries is an external localised pathological process leading to demineralisation and proteolytic decay of hard tissues of a tooth affected by the disease (3, 5). The necessary conditions for the disease process to occur are: the occurrence of caryogenic bacteria, *Streptococcus mutans* and *Lactobacillus acidophilus*; the presence of a substrate used by the bacteria in their metabolism – carbohydrates; the existence of susceptible hard dental tissue; time factor, that is length and frequency of contacts between the substrate and bacterial plaque (3, 5). In immature permanent teeth there are less inorganic substances compared to organic ones than in mature permanent teeth, which are fully mineralised. The carious process is very rapid. The period of dentition exchange which occurs in children at the age of 7–12 is especially important. In this period of child's development, due to eruption of permanent teeth, it is imperative for the children to frequently visit their dentists in order to systematically diagnose and treat the emerging foci of carious disease. However, for a dentist, more important than treatment of already existing caries is carrying out extensive caries prevention activities (2, 4, 5, 6, 7, 8, 9).

The aim of this study was evaluation of effectiveness of a professional carious disease prevention programme implemented in the Lublin region for a group of 11-year-old children at high risk of caries.

MATERIAL AND METHODS

In 1999, a clinical study of the status of dentition and oral hygiene was performed in a group of 512 eleven-year-old children from randomly selected primary school in the Lublin region. On the basis of the study results a smaller group of children, who were at high risk of caries, was selected. The children chosen for the study group had 4 or more new, active carious disease foci in permanent dentition occurring within a time span of one year. The group consisted of 169 children, which constituted 33% of the original group. Eventually, 62 children from the high risk group underwent the therapeutic and prophylactic procedures comprising the carious disease prevention programme because they were the ones who regularly attended the scheduled follow-up visits. This was the actual study group.

In the preliminary examination of the study group the following factors were evaluated:

1. The number of active caries foci (D).

2. Treatment index, calculated using the following formula: Dental treatment index (DTI) $= \frac{F}{D+F}$, where D – number of teeth with active caries foci (decayed), F – number of teeth with filled cavities (filled). The value of the treatment index can be from 0 to 1. It is assumed that values from 0 to 0.5 indicate lack of or little treatment efficiency, while values higher than 0.5 indicate significant treatment efficiency.

3. Simplified oral hygiene index (OHI-S).

Evaluation was performed by examining buccal surfaces of teeth 16 and 26, labial surfaces of teeth 11 and 31 and lingual surfaces of teeth 36 and 46 according to the following scale: 0 – no tartar or supragingival calculus; 1 – tartar or supragingival calculus covering up to 1/3 of tooth surface; 2 – tartar or supragingival calculus covering from 1/3 to 2/3 of tooth surface or a single band of subgingival calculus; 3 – tartar or supragingival calculus covering more than 2/3 of tooth surface or a thick band of subgingival calculus around the neck of the tooth.

Values obtained for particular teeth are added up and then divided by the number of the examined teeth. In case of lack of calculus the value of the index would be 0. In other cases the scope is from 1 to 3. After this preliminary examination, the children underwent therapeutic procedures included in the caries prevention programme. They were: preparation of active caries foci and filling of the cavities using glass ionomer materials; endodontic treatment of permanent teeth if necessary; extraction of permanent teeth that could not be conservatively treated.

The preventive procedures consisted of: professional instruction on oral hygiene; removing tartar and calculus from tooth surfaces; applying chlorhexidine varnish to smooth dental surfaces in order to limit dental plaque accumulation; applying peat and fissure sealant to caries-free permanent teeth; covering all permanent dental surfaces with fluoride varnish.

One year after completion of the programme the final follow-up clinical examination was performed involving evaluation of the number of active caries foci (D), treatment index and simplified oral hygiene index.

RESULTS

The obtained results were statistically analysed and presented in the form of four tables. Table 1 presents the number of new active caries foci in the studied children (D) as found in the preliminary examination before implementation of the caries prevention programme. In this group the D value of 4 was found in 22 children, D value of 5 in 16 children, D value of 6 in eight children, D value of 7 in five children, D value of 8 in four children, D value of 9 in four children, D value of 10 in two children and D value of 12 in one child. The mean D value in the whole group of preliminary examined children was 5.66.

Table 1. D value – results obtained in preliminary examination

Number of examined children	D value
22	4
16	5
8	6
5	7
4	8
4	9
2	10
1	12
Total 62	Mead D value 5.66

Table 2 shows the simplified oral hygiene index (OHI-S) evaluated in the preliminary examination. OHI-S value of 0 was found in 2 children, OHI-S value of 1 in 29 children, OHI-S value of 2 in 30 children and OHI-S value of 3 in one child. The mean OHI-S value in the preliminary examined group of children was 1.48. Before implementation of the preventive programme in the studied children mean treatment index was measured, which was 0.19.

Table 2. OHI-S – results obtained in preliminary examination

Number of examined children	OHI-S value
2	0
29	1
30	2
1	3
Total 62	Mean OHI-S value 1.48

Table 3 presents the number of new active caries foci in the studied children (D) as found in the examination of the study group performed one year after completion of the caries prevention programme. In this group the D value of 0 was found in 39 children, D value of 1 in 14 children, D value of 2 in six children, D value of 3 in two children and in one child D value of 6 was observed. The mean D value in the whole study group one year after completion of the caries prevention program was 0.61.

Table 3. D value – results obtained one year after completion of the programme

Number of examined children	D value
39	0
14	1
6	2
2	3
1	6
Total 62	Mean D value 0.61

Table 4 shows the simplified oral hygiene index (OHI-S) evaluated in the study group one year after completion of the caries prevention programme. OHI-S value of 0 was found in 47 children, OHI-S value of 1 in 11 children, OHI-S value of 2 in 3 children and OHI-S value of 3 in one child. The mean OHI-S value in the study group one year after completion of the caries prevention programme was 0.32.

After completion of the caries prevention programme implemented for the study group the mean treatment index achieved its optimal value of 1.

Table 4. OHI-S – results obtained one year after completion of the programme

Number of examined children	OHI-S value
47	0
11	1
3	2
1	3
Total 62	Mean OHI-S value 0.32

DISCUSSION

High D values acquired in the preliminary examination of 11-year-old children may be the result of the fact that dentists rarely commit themselves to performing proper caries prevention, as well as the result of insufficient dental care of school children (5, 7, 10).

The mean D value of 5.66 that was found in the preliminary examination is high and obliges us to pay special attention to prophylactic and therapeutic procedures performed in 11-year-old children (7, 10).

The mean treatment index value of 0.19 calculated in the preliminary examination shows that there are significant therapeutic needs in a group of 11-year-old children at high risk of caries. Young patients require easy access to ongoing and complex dental care based on early detection and elimination

of the emerging active caries foci, as well as appropriate professional preventive activities (sealing and varnishing with fluoride preparations) and educational activities concerning proper oral hygiene (1, 6, 11, 12).

The results obtained in the follow-up study proved accurateness of the therapeutic and prophylactic activities that we applied. One year after the completion of the caries prevention programme it was found that children from the study group had significantly smaller annual increase of new caries foci, namely 0.61. The mean simplified oral hygiene index value also decreased from 1.48 in preliminary examination to 0.32 in the follow-up examination. What is more, implementation of caries prevention programme allowed for the treatment index to reach optimal value of 1 (4, 7, 11).

CONCLUSIONS

1. The caries prevention programme that we applied in 11-year-old children at high risk of caries proved to be highly effective.
2. Annual increase of new active caries foci was low.
3. Oral hygiene status has improved.

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SUMMARY

The aim of this study was evaluation of effectiveness of a professional carious disease prevention programme implemented in the Lublin region for a group of 11-year-old children at high risk of caries. On the basis of clinical dental examination a group of children at high risk of caries was selected (yearly increase in the number of new active caries foci of 4 and more – mean D value of 5.66), in whom therapeutic and prophylactic procedures comprising the caries prevention programme were performed. In a follow-up examination performed one year after the completion of the programme, much lower yearly increase in the number of new active caries foci was observed (mean D value of 0.61). Improvement of oral hygiene status was also observed in the study group. The caries prevention programme that we applied in the group of 11-year-old children proved to be highly effective.

Kliniczna ocena programu profilaktycznego zastosowanego u dzieci z grupy wysokiego ryzyka choroby próchnicowej z województwa lubelskiego

Celem pracy była ocena programu profilaktyki próchnicy zębów u dzieci jedenastoletnich grupy wysokiego ryzyka choroby próchnicowej z województwa lubelskiego. Na podstawie klinicznych badań stomatologicznych wyodrębniono grupę 62 dzieci z wysokim ryzykiem choroby próchnicowej (roczny przyrost cztery lub więcej nowych czynnych ognisk choroby próchnicowej), u których zastosowano zabiegi lecznicze i profilaktyczne zaliczane do programu. W badaniu kontrolnym wykonanym po roku od zakończenia realizacji programu stwierdzono znacznie niższy roczny przyrost nowych czynnych ognisk choroby próchnicowej (średnia liczba P wynosiła 0,61). Zaobserwowano także poprawę stanu higieny jamy ustnej w badanej grupie dzieci. Stwierdzono dużą skuteczność zastosowanego programu w profilaktyce choroby próchnicowej u dzieci jedenastoletnich grupy wysokiego ryzyka.