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Oral Health
Division of Noncommunicable Diseases
World Health Organization
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COMMUNITY BASED PRIMARY PREVENTIVE PROGRAMME FOR YOUNG ADULTS

EFFECTIVENESS OF TOOTHBRUSHING WITH AMINE FLUORIDE TOOTHPASTE IN THE PREVENTION OF CARIES AND PERIODONTAL DISEASES AMONG YOUNG ADULTS

(based on a study conducted by the WHO Collaborating Centre on Oral Health, Minsk, Belarus)

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1. INTRODUCTION

Although it is well known that there is a dramatic reduction of dental caries in children in a number of countries particularly in Western Europe, oral diseases in general still remain an important health problem among the adult population everywhere. In a recent World Health Organization (WHO) publication [1] dental caries is seen as a disease which will increase in many developing countries until preventive measures are implemented effectively. As regards to periodontal disease more studies are needed in the coming years to assess the world-wide periodontal health situation.

In general, apart from a certain success in gaining better oral health in many industrialized countries, a large proportion of the world population at present is still far from having reached the WHO oral health global goals by the year 2000. It is particularly so for more than three hundred million people of the East and Central Europe where the dental caries prevalence vary from moderate to very high and periodontal disease affects even children.

The policy of the WHO in the prevention of oral disease is the practical promotion of simple, efficient and effective oral hygiene measures through community-based programmes. Dental caries to a great extent is preventable by simple measures like the systemic and/or topical fluorides and a sugarless diet. In the future it is anticipated that caries management will be geared towards a more preventive approach rather than only treatment. Chronic periodontitis is also preventable by prudent oral hygiene measures if started early in childhood and continued throughout life. The effectiveness of this approach is very well documented by data where it is shown periodontal disease is reducing in some industrialized countries among the young populations.

Oral hygiene measures with the use of fluoridated toothpastes is especially important in all preventive programmes because in the course of teeth and gums cleaning, fluoride is delivered to the tooth tissues, strengthening them against carious disease. Furthermore dental plaque which is a major cause of periodontal disease is removed as well. The current poor oral health status in ex-USSR countries perhaps reflects the many years of neglect of oral hygiene measures in health education and dental care programmes. Therefore, the first and the most important step in public health programmes in this region, is the inclusion of oral hygiene education among children, young people and adults.

The effectiveness of toothbrushing with fluoridated toothpastes in dental caries and periodontal disease prevention in children has been very well documented in several WHO publications [2,3,4]. In fact this measure is recommended by WHO in community oral health programmes for all age groups. There is little information on expected outcome of a long-term toothbrushing programme among young people and adult populations. Data from long term studies demonstrating the practical implications and effectiveness of community based oral hygiene (toothbrushing) programmes are urgently needed.

Taking these into consideration a 3-year study on the evaluation of effectiveness of toothbrushing with amine fluoride toothpaste for dental caries and periodontal disease prevention among the young adult population in the Republic of Belarus was initiated by the WHO Collaborating Centre for Intercountry Demonstration, Training and Implementation of Oral Health in Europe (Minsk Medical Institute) and the Oral Health Programme, WHO, Geneva.

It is hoped that this publication will reach the widest possible audience amongst health professionals, dentists, therapists, hygienists and dental students who may require more detailed scientific information and evidence which supports the recommendations for oral disease prevention in community programmes.

2. RATIONALE

2.1 Toothpastes and dental caries

Regular toothbrushing by itself is not a measure to prevent dental decay, but a definite benefit is gained by the use of a fluoride toothpaste.[6] Investigations into the effectiveness of adding fluoride to toothpaste during the last 50 years covers a wide range of active ingredients such as phosphate fluoride, sodium fluoride, acidulated phosphate fluoride, stannous fluoride, sodium monofluorophosphate, and amine fluoride in various abrasive formulations. The results of most studies show that brushing with any fluoridated toothpaste can reduce the incidence of dental caries by about 25%[4]. Clinical testings show that, in countries where the habit of toothbrushing is widespread, toothpaste is an important means of applying fluoride to teeth. In many countries, fluoride-containing toothpastes make up more than 95% of all toothpaste sales. In Belarus about 60-70% of toothpastes contain active fluoride. When a person uses fluoridated toothpaste, the benefits of a topically applied fluoride can be achieved.

During the past 30 years there have been considerable improvements in fluoridated toothpaste formulation, which have resulted in increased effectiveness in preventing dental caries [4]. From a public health viewpoint, it is essential that only toothpaste formulations that are adequately supported by properly conducted clinical trials should be promoted.

Since the primary function of fluoridated toothpaste is to bring the fluoride ion into contact with the enamel and exposed root dentine the long-term and more frequent use of a fluoride toothpaste is important for reduction of caries incidence.

2.2 Toothbrushing and periodontal disease

Efficient cleaning of teeth at least once a day removes most dental plaque which is an important factor in the development of gingivitis [5]. The most important plaque control method is toothbrushing and toothbrushing skills should be taught to people of all ages. Use of the scrub technique with a recommended type of brush provides effective plaque removal. Plaque disclosing agents which colour plaque to make it easily visible is a useful means of improving plaque control.[6]

Toothbrushing has been recommended on a public health basis, to prevent periodontal disease. Thorough brushing should be advised. The toothbrush size and design should allow the user to reach all accessible tooth surfaces and gum margins easily and comfortably. Oral hygiene is promoted through oral health education and instruction. Oral health instructions should be continuing to ensure its success.

3. OBJECTIVES

The objective of this study is to investigate the effectiveness of a toothbrushing (self-care) programme of regular oral hygiene practice using amine fluoride toothpaste, for a period of 3 years, in preventing dental caries and periodontal disease.

4. MATERIALS AND METHODS

4.1 Venue

During the 90's the Republic of Belarus commenced collaborating with the WHO in the development of oral health programmes. This coincided with the increasing international

cooperation, visits of WHO experts and international assistance to all aspects of dentistry, including prevention. Hence Minsk city, Republic of Belarus, situated to the west of Russia, bordering with Poland and the Baltic states was chosen as the site for this proposed study.

Analysis of local publications and recent oral health surveys in Belarus disclosed several important features of oral health, in this country.

(a) Dental caries has been increasing during the last 20-25 years in all age groups of the population, reaching the moderate to high level of disease.

(b) The trend of periodontal disease could not be predicted due to the different criteria used in the studies. The present level is high along with unsatisfactory or poor oral hygiene in children and adults.

(c) In the 60's and 80's there were several state preventive programmes so as to eradicate oral diseases; none of these programmes were implemented and/or are beneficial.

The Oral Health Programme of the WHO, Geneva therefore has initiated and supported the proposed oral hygiene education project amongst medical students in order to evaluate the effectiveness of toothbrushing with amine fluoride toothpaste in caries and periodontal disease prevention. This study was started in March 1992 when toothpastes containing amine fluoride and "Elmex" toothbrushes were donated by GABA International to the Minsk Medical Institute.

4.2 Study population

A sample of 470 subjects, students of the Minsk Medical Institute were chosen on the basis of compulsory participation in a health programme included into the curriculum. The age of subjects varied from 18 to 20 years. 63% of participants were females and 37% were males. Two groups were formed: one a study group of 330 subjects and the other a control group of 140 subjects.

4.3 Oral health programme

The study group was to receive (1) a programme of oral health education - aimed at increasing awareness of oral health and toothbrushing (self-care), (2) oral hygiene instructions (toothbrushing techniques) and (3) amine fluoride toothpastes and toothbrushes for the

study period of 3 years. The control group on the other hand will be given only an oral health education programme (they will not receive (2) and (3) described in the study group programme).

In the oral health education programme, the study and control groups were taught the importance of self-performed mechanical oral hygiene (toothbrushing). It was explained that toothbrushing for caries control is effective when fluoride toothpaste is used, though this is due to the fluoride rather than the actual brushing. The programme emphasized the frequent (at least two times daily) use of a fluoridated toothpaste. Also the importance of oral hygiene in the control of periodontal disease was clearly explained.

Subjects of the study group were taught the scrub toothbrushing as it was considered more effective in plaque removal and more easily taught and accepted [6]. Toothbrushing was carried out with a small toothbrush for ease of access. The method is to place the filaments of the brush at the neck of the tooth and to use very short horizontal movements to dislodge plaque from the stagnation areas at the gum margins cervically and between the teeth interproximally. Emphasis was placed on small movements and gentle pressure, together with an unhurried systematic approach to the cleaning of all surfaces.

In this study "Elmex" toothbrushes were used. Their specification was as follows: head dimension - 25 mm x 10 mm; the filaments are nylon with a diameter of 0.16 mm, medium texture and multi-tufted construction. The toothpaste used in the study group was the silica formulated amine fluoride with a fluoride ion concentration of 1400 ppm.

Subjects of the control group did not receive "Elmex" toothbrushes or the amine fluoride toothpastes, but were advised to continue with the oral hygiene products they usually used and were commercially available.

4.4 Data collection

For the oral health assessment at base-line and follow-up (two, six months and one, two and three years) of the study and control groups the following indices were employed: DMF teeth, the Simplified Oral Hygiene Index (Green, Vermillion, 1964),[7]; the Gingival Index (Löe, Silness, 1964),[8]; the Community Periodontal Index (Ainamo at al., 1982),[9].

4.4.1 *DMF Teeth Index*

The D (decayed), M (missing), F (filled) teeth index is widely accepted criteria to assess dental caries prevalence and incidence. Caries was recorded as present when a lesion in a pit or fissure, or on smooth surface has a frank cavity or detectably softened floor or wall.

4.4.2 *Simplified Oral Hygiene Index*

The Oral Hygiene Index (OHI) is used for measuring toothbrushing efficiency, evaluating the dental health practices of a community and the immediate as well as the long-term effects of dental health education programs. Six index tooth surfaces represent all anterior and posterior segments of the mouth.

The OHI-S consists of two components: a Simplified Debris Index (DI-S) and a Simplified Calculus Index (CI-S). Each component is assessed on a scale of 0 to 3. Only a mouth mirror and sickle-type dental explorer, and no disclosing agent, are used for the examination. The six tooth surfaces examined in the OHI-S are the facial surfaces of the teeth numbered 16, 11, 26, and 36 and the lingual surfaces of the teeth numbered 31 and 46. Each tooth surface is divided horizontally into gingival, middle, and incisal thirds.

For the DI-S a dental explorer is placed on the incisal third of the tooth and moved toward the gingival third assessing conditions according to the criteria:

0 - No debris or stain present.

1 - Soft debris covering not more than one-third of the tooth surface, or the presence of extrinsic stains without other debris regardless of surface area covered.

2 - Soft debris covering more than one-third but not more than two-thirds of the exposed tooth surface.

3 - Soft debris covering more than two-thirds of the exposed tooth surface.

The CI-S assessment is performed by gently placing a dental explorer into the distal gingival crevice and drawing it subgingivally from the distal contact area to the mesial contact area (one half of a tooth's circumference is considered a scoring unit). The criteria for scoring the calculus component (CI-S) of the OHI-S:

0 - No calculus present.

1 - Supragingival calculus covering not more than one-third of the exposed tooth surface.

2 - Supragingival calculus covering more than one third but not more than two thirds of the exposed tooth surface or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth or both.

3 - Supragingival calculus covering more than two thirds of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth or both.

The CI-S score per person is obtained by totalling the calculus scores per tooth surface and dividing by the number of surfaces examined. The OHI-S score per person is the total of the DI-S and CI-S scores per person.

The clinical levels of oral cleanliness for debris that can be associated with group DI-S scores are as follows.

Good	0.0 - 0.6
Fair	0.7 - 1.8
Poor	1.9 - 3.0

The clinical levels of oral hygiene that can be associated with group OHI-S scores are as follows:

Good	0.0 - 1.2
Fair	1.3 - 3.0
Poor	3.1 - 6.0

The OHI-S is used in epidemiologic surveys and in evaluating dental health education programs (longitudinal). It can also be used to evaluate an individual's level of oral cleanliness.

4.4.3 *Gingival Index*

The Gingival Index (GI) is appropriate for the purpose of assessing the severity of gingivitis and its location in four possible areas. The gingiva surrounding each tooth are divided into four gingival scoring units; distal-facial papilla, facial margin, mesial-facial papilla, and the entire lingual gingival margin. A blunt instrument, such as a periodontal pocket probe, is used to assess the bleeding potential of the tissues. Each of the four gingival units is assessed according to the criteria:

0 = Normal gingiva.

1 = Mild inflammation, sight change in colour, slight oedema; no bleeding on palpation.

2 = Moderate inflammation, redness, oedema, and glazing; bleeding on palpation.

3 = Severe inflammation, marked redness and oedema; ulcerations; tendency to spontaneous bleeding.

Totalling the score around each tooth yields the GI score for the area. Each of the scores around each tooth are totalled and divided by four by which the GI score for the tooth is obtained. Totalling all of the scores per tooth and dividing by the number of teeth examined provides the GI score per person. The numerical scores of the GI may be associated with varying degrees of clinical gingivitis as follows:

Gingival Scores	**Condition**
0.1-1.0	Mild gingivitis
1.1-2.0	Moderate gingivitis
2.1-3.0	Severe gingivitis

The index can be used to determine the prevalence and severity of gingivitis in controlled clinical trials of preventive or therapeutic agents.

4.4.4 *Community Periodontal Index of Treatment Needs*

The Community Periodontal Index of Treatment Needs (CPITN) is used for individual and community (group) assessment of the periodontal condition. The Index was recommended by WHO and is

recognized in most countries. Three indicators of periodontal status are used for assessment:

(1) presence or absence of gingival bleeding;
(2) supra- or subgingival calculus: and
(3) periodontal pockets - subdivided into shallow (4-5 mm) and deep (6 mm or more).

A specially designed lightweight probe with a 0.5-mm ball tip is used, bearing a black band between 3.5 and 5.5 mm from the ball tip.

The mouth is divided into sextants defined by teeth numbers 18-14, 13-23, 24-28, 38-34, 33-43, and 44-48. A sextant should be examined only if there are two or more teeth present and not indicated for extraction. When only one tooth remains in a sextant, it should be included in the adjacent sextant.

For adults the teeth to be examined are:

17 16 ¦ 11 ¦ 26 27
---
47 46 ¦ 31 ¦ 36 37

The incisor and either the first molars or the pairs of first and second molars should be examined and the highest score recorded in the appropriate sextant. Codes in descending order of severity are:

4 - pocket > 6 mm (black area of probe not visible);

3 - pocket 4 or 5 mm (gingival margin situated on black area of probe);

2 - calculus felt during probing but all the black area of the probe visible;

1 - bleeding observed, directly or by using mouth mirror, after using the probe;

0 - healthy.

4.5 Project Staff

The project was carried on by the staff of the Therapeutic Department, Dental Faculty, Minsk Medical Institute consisting of three dentists and two auxilliaries. The staff were clinically calibrated by Dr I. Moller, WHO Copenhagen, who is an expert in this field.

4.6 Ethical considerations

There were several ethical and legal issues to consider in this study which involves human subjects. The investigator must have the necessary qualifications and ethical responsibility to conduct the research project adequately and to assure safety of the subjects involved (The Declaration of Helsinki adopted by the 18th World Medical Assembly, Tokyo, Japan, 1974). The members of the study groups and the health workers were aware of what was being offered, how it is to be implemented and what outcome to expect. The scientific information was provided to the students in simple language to get their participation and cooperation.

5. RESULTS

The programme has been evaluated by the measurement of several indices assessing the dental caries, level of oral hygiene and periodontal conditions at baseline and at 2, 6 months and at 1, 2 and 3 years.

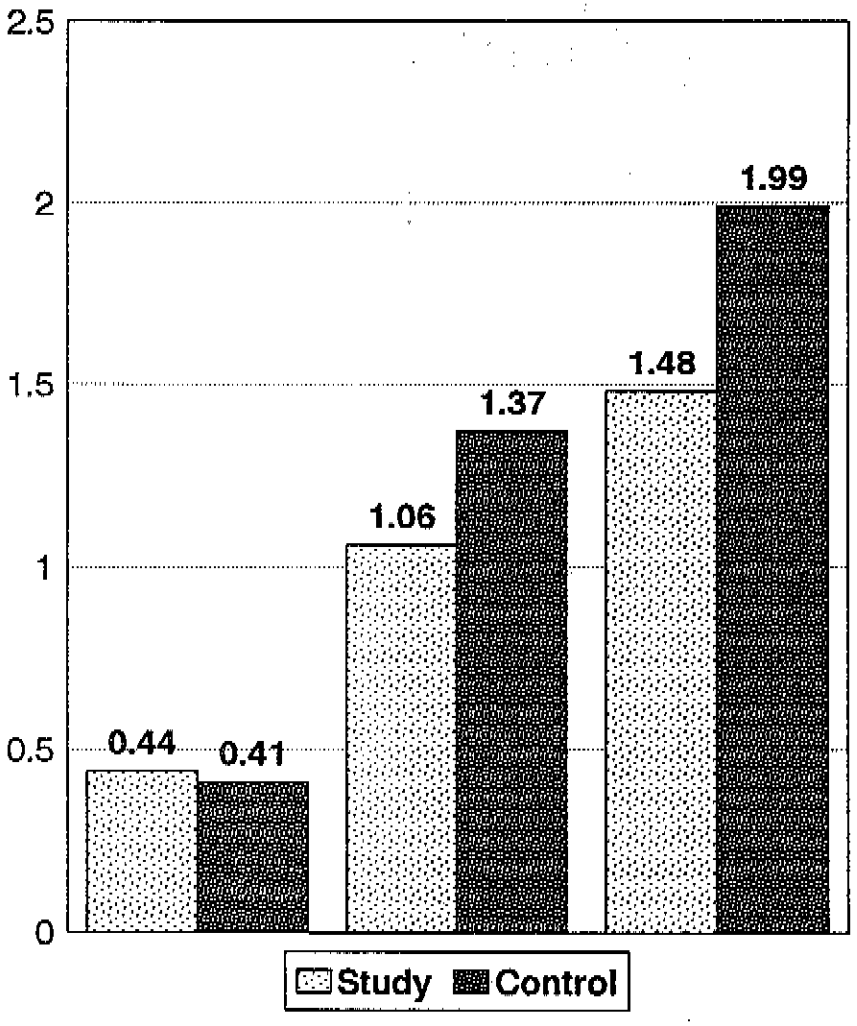
5.1 Effectiveness of toothbrushing on dental caries

In the study group, following twelve months of toothbrushing with the amine fluoride toothpaste the base-line DMF teeth of 7.88 showed an increment of 0.44 after one year. About the same increment of DMF teeth (0.41) was seen in the control group too (Table 1). During the second year the average DMFT increased to 0.62 in the study group and to 0.96 in the control group (Figure 1) but was not statistically significant. However the trend of slow-down rate of DMFT in the study group was continuing through the third year of the programme, finally reaching the level of 9.36 DMFT in the study group and 9.93 DMFT in the control group (Table 1). At the end of the 3-year toothbrushing programme the difference in DMFT between the study and the control group was not statistically significant ($p > 0.05$), however, if the annual slow-down rate which was recorded in

Table 1. Average DMFT ± SD in the study and the control groups of young adults

Study population	Base-line	Follow up assessment data			Increase of DMFT for the study period	Difference between two groups	
		1st Year	2nd Year	3rd Year		DMFT	%
Study group	7.88±4.39	8.32±4.50	8.94±4.67	9.36±4.73	± 1.48	-0.51	-25.6
Control group	7.94±4.32	8.35±4.26	9.31±4.92	9.93±4.99	± 1.99		

Figure 1. DMFT Increment



the second and the third years of the study will continue in the coming several years the anticarious effect of the toothpaste can be seen more distinctly.

5.2 Effectiveness of toothbrushing on dental plaque and calculus

In the study group where the participants were using the amine fluoride toothpaste, the debris index reduced dramatically through two months to the level of 0.5 DI-S score which was more than two times lower than the base-line. Follow up assessments during the three years of the toothbrushing programme shows a stable dental plaque condition at an acceptable (good) level achieved in the first two months (Figure 2).

Dental calculus score was reduced only slightly (by 11% of initial) after two months of toothbrushing, however this trend continued through the whole study period resulting in a 52% reduction to the level of 0.5 CI-S (Figure 3). Although this level of dental calculus is not an acceptable oral health condition, it was achieved in the course of the self-care (toothbrushing) programme.

In the control group the base-line dental calculus scores of CI-S 1.17 varied from 1.04 to 0.95 during the 3-year follow-up assessments (Figure 3) and was not statistically significant. In contrast to the stable CI-S, the DI-S (dental plaque score) in the control group dropped by 30% from the base-line level after one year of observation reaching DI-S 0.8. In the following two years this DI-S level rose to about the initial level of unsatisfactory oral hygiene status (Figure 2).

5.3 Effectiveness of toothbrushing on periodontal conditions

Base-line assessment of gingival condition using gingival index (GI) in the study and control groups show the mild severity of chronic gingivitis at level 0.8 GI supplemented by dental plaque and calculus. The regular toothbrushing with the amine fluoride toothpaste resulted in a statistically significant reduction of the GI to the level of 0.48 among subjects of the study group in two months (Figure 4) along with the noticeable improvement of oral hygiene (see the preceding section).

Figure 2. Dental plaque (DI-S)

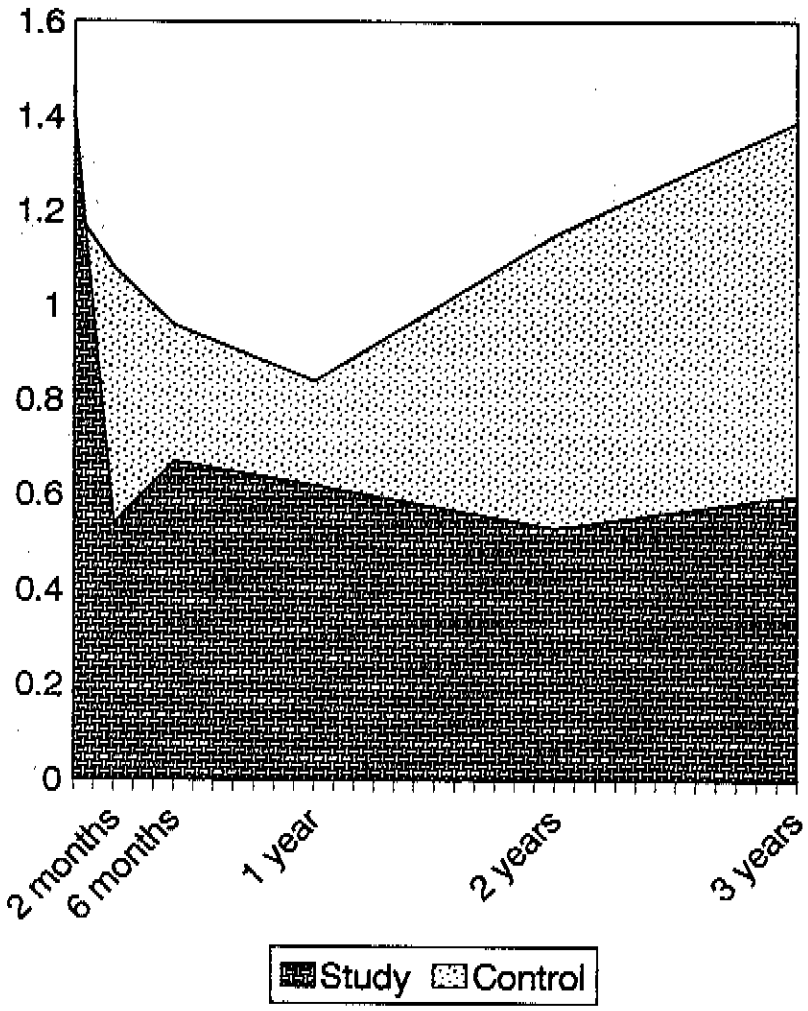


Figure 3. Dental calculus (CI-S)

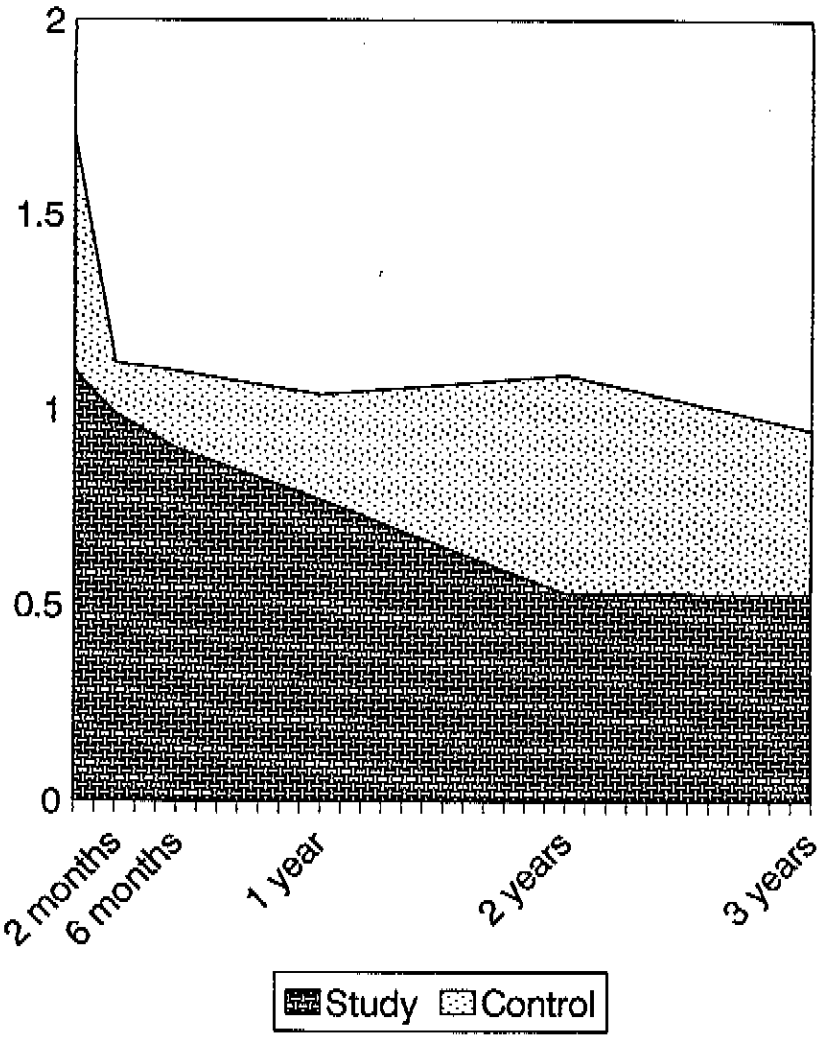
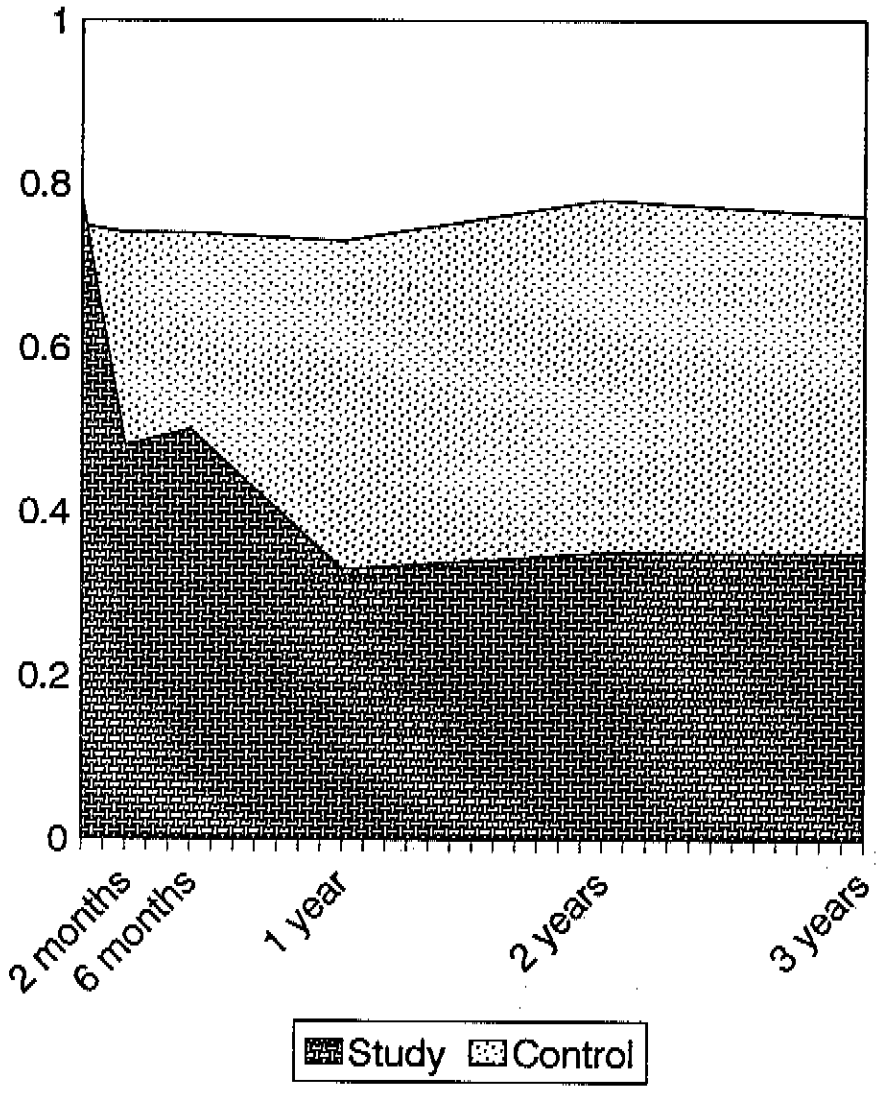


Figure 4. Gingival index (GI)



In the study group the curative effect of the toothbrushing programme proved to be stable through the first year of follow up assessments and even more reduction of the GI scores were recorded in the long-term period (Figure 4). In the control group there were no significant changes in the base-line condition all throughout the study. (Figure 4).

The CPITN shows some improvement of the periodontal conditions in subjects of the study group. Average number of healthy sextants (CPITN "0") increased from the initial 1.20 to 1.85 (by 54%) after one year of toothbrushing and further to 1.97 and to 2.29 after two and three years of toothbrushing respectively. (Table 2 and Figure 5). Statistically significant reduction of the dental calculus (CPITN "2") from 3.54 to 2.78 logically completed the observed trend of the CI-S changes (Figure 3), as well as the noticeable drop of the shallow periodontal pockets (CPITN "3") from 0.32 base-line to the level of 0.02 is consistent with the lessening of chronic gingivitis measured by GI (Figure 4). In the control group the CPITN criteria were stable or worsening through three years of observation (Table 2 and Figure 5).

Thus the results of this study indicate a significant improvement of periodontal condition in young people in the course of self-care toothbrushing programme supplemented by amine fluoride toothpaste.

6. DISCUSSION

Following the dramatic drop of dental caries in children, the reduction of caries prevalence among the adult population is a proven fact in a number of industrialized countries [1]. One of the most evident reasons for this is the use of fluoridated toothpastes [4, 10].

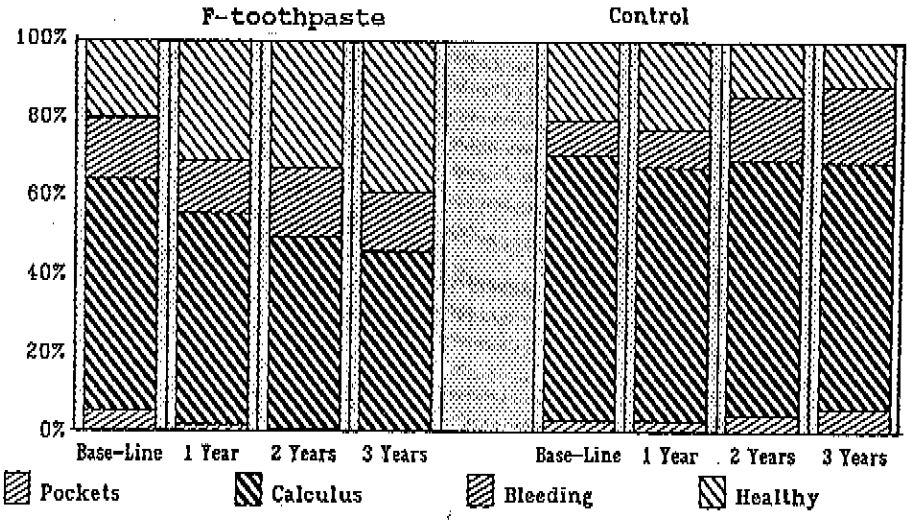
Routine use of fluoride toothpastes is recommended practically everywhere, except for young children living in areas of endemic fluorosis. The findings of many clinical trials and evidence from widespread use of fluoridated toothpastes over a long period of time indicate that reduction of dental caries may be 20-30% or even greater. [10]

Table 2 - Comparison of the mean number of sextants by CPITN scores in two oral health programmes

Programme	CPITN criteria	Average number of sextants				Change in %		
		Baseline	One year	Two years	Three years	After one year	After two years	After three years
Toothbrushing with Fluoridated toothpaste	Healthy (0)	1.20	1.85	1.97	2.29	+ 54*	+ 64*	+ 91*
	Bleeding (1)	0.95	0.81	1.05	0.89	- 15	+ 11	- 6
	Calculus (2)	3.54	3.23	2.94	2.78	- 9*	- 17*	- 21*
	Pockets (3)	0.32	0.09	0.03	0.02	- 72*	- 91*	- 94*
Oral health education	Healthy (0)	1.22	1.36	0.84	0.69	+ 11	- 31*	- 43*
	Bleeding (1)	0.54	0.58	0.99	1.20	+ 7	+ 83	+ 122*
	Calculus (2)	4.08	3.91	3.91	3.74	- 4	- 4	- 8
	Pockets (3)	0.16	0.16	0.27	0.36	0	+ 69	+ 125

* Statistically significant difference with the base-line value

Figure 5. Mean percentage of CPITN sextants in young adults at base-line and through three years of toothbrushing with the fluoridated toothpaste



Recent investigations, mainly in children show that toothpastes containing different forms of fluorides like the sodium fluoride and sodium monofluorophosphate provide same levels of anticarious protection.[11] Our study using amine fluoride toothpaste among young adults clearly indicates a slow-down of dental caries over a period of 3 years. The results show increasing caries reduction commencing in the 2nd year and continuing to the 3rd year of the study. The amine fluoride toothpaste used in this study therefore demonstrates definite anti-caries protection and in accordance with WHO recommendations [4] can be considered as equally effective, as the other accepted, commercially available fluoride toothpastes.

One of the restrictions to widespread use of fluoridated toothpastes in economically underdeveloped countries like Belarus remains the cost. Thus the development of affordable and effective fluoride-containing toothpastes is a major priority. New toothpaste formulations with enhanced caries-preventive effects should be critically evaluated in terms of costs and added benefits. This is especially important if the cost of a new formulation is greater than that of currently available toothpastes. [4]

The three-year toothbrushing drill was extremely effective in improving the oral hygiene and in reducing the severity of periodontal disease. It is important to note that the curative effect of the toothpaste towards chronic gingivitis was nearly maximum within the initial two months of self-care toothbrushing. Only a slight further improvement of the periodontal condition in the long-term continuous programme perhaps shows the limitation of self-care and/or the amine fluoride toothpaste at community level among young people.

It is important to note that the level of oral hygiene and periodontal condition in the control group was worse compared with the study group although the students of the control group were carrying on routine daily toothbrushing with oral hygiene products locally available. Actually, oral health of the control group reflects the oral health status of the local population. In order to change the situation, both the regular toothbrushing and the use of effective fluoridated toothpastes should be encouraged.

7. GENERAL GUIDELINES FOR PROGRAMME PLANNING

Planning and implementation of a community-based preventive programme requires careful utilization of the WHO principles and methods of health education [10], adapted to the situation, in particular:

- Preventive oral health procedures (measures) should be available to the population.
- Education of a target group should be an integral part of any regulatory effort, legislation, or preventive service programme.
- Educational materials should be designed to gain or focus attention, to provide new knowledge.
- Oral health education should be built into general health education programmes.
- Oral health instruction should be consistent and compatible with scientific knowledge as well as with the local culture, the educational system, and social goals.

For development of an oral hygiene instruction programme much attention should be given to the management, ethical issues, information and communication, training and evaluation at a stage of the project planning.

Participants of the programme should have opportunities to learn how to identify and analyse oral health and health related problems, how to set priorities. Providers of the programme have to make oral health and health-related information easily accessible to the participants, create awareness of the importance of effective communication in fostering mutual understanding between the study population and the health care providers (Figure 6).

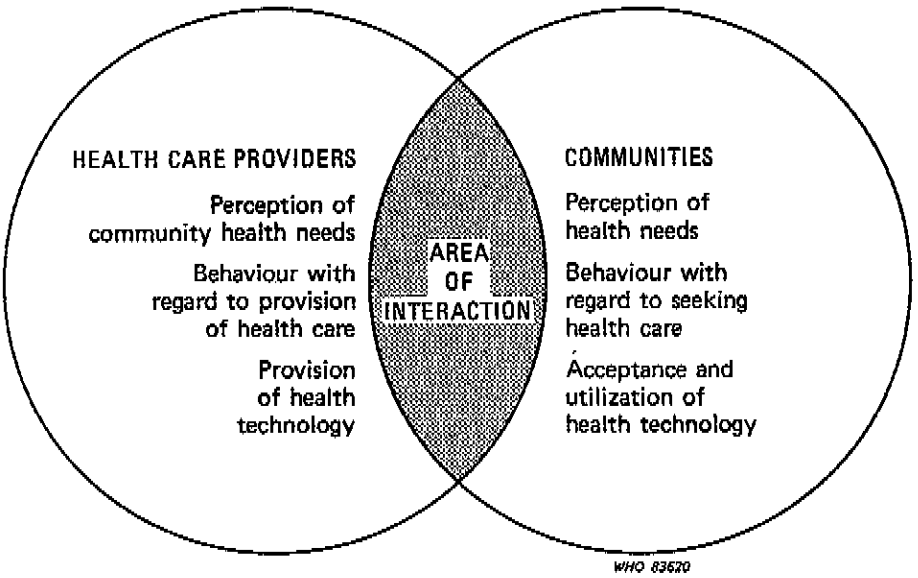
Active participation in a community-based, self-applied fluoridated toothpaste programme helped the participants learn about the value of the measure and encouraged acceptance of the procedure as an important part of daily routine.

The local media could help by giving prominence to particular health messages. Well-targeted messages within the programme can play a very important role, by both taking the lead in and maintaining

the momentum of health education efforts. Oral health education goals should be translated into clearly defined objectives to be achieved within a given time and with the resources available [12].

It is clear that oral health education is necessary, but education alone is insufficient to achieve optimum oral health. The target population must have access to proven preventive measures. The process of ensuring this access involves health promotion [10]. Thus, both health education and health promotion are required to attain and maintain oral health in a community.

Figure 6. Interaction between health care providers and communities [11]



8. SUMMARY AND RECOMMENDATIONS

A. The three-year assisted self-care oral hygiene programme using amine fluoride toothpaste carried out among students aged 18-20 years at the Minsk Medical Institute in Belarus, was effective in stabilizing dental caries in the study group demonstrating the effectiveness of this fluoride toothpaste.

B. The amine fluoride toothpaste was also effective in reducing dental plaque by 2-3 times from the initial poor oral hygiene situation. A significant improvement of oral hygiene was observed after 2-12 months of toothbrushing and the achieved level was stable and even improved through the three years of the on-going toothbrushing programme.

C. Along with the rising oral hygiene standard, the periodontal status of the young adults improved. The CPITN and GI recorded for 3-years showed a visible reduction of periodontal disease symptoms such as bleeding, dental calculus and shallow periodontal pockets, in the study group.

D. Oral health promotion and oral hygiene education are of critical importance in implementing and maintaining the prophylactic measures in community programmes. Amine fluoride toothpaste use is an effective means of caries and periodontal disease control even in adults. Every effort must be made to develop affordable fluoridated toothpastes for use in countries with weak economies.

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