ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN — POLONIA
VOL. LVII, N 1, 40 SECTIO D 2002

Chair and Department of Paedodontics, Medical University of Lublin

DOROTA KRAWCZYK, MARIA MIELNIK-BŁASZCZAK

The role of oral hygiene in dental caries prevention in children and adolescents

Dental caries is a common pathology observed in children and adolescents. Due to its widespread inluence on health as well as its economic impact it is considered to be a social disease. At the same time it is a preventable disease (4, 5). One of the basic causative factors for dental caries is dental deposit referred to as bacterial plaque or dental plaque. It is a thin layer of material adhering to teeth surface, which accumulates 24h a day. Dental plaque consists of bacteria, food debris and elements of saliva. If plaque is not removed from tooth surface it undergoes mineralisation forming dental calculus. It has been proved that there is a direct link between the presence of bacterial plaque and inflammation of gingiva. The fact that many systemic diseases are accompanied by pathological changes within oral cavity is well known and has been well documented.

The basic hygienic procedure for oral cavity is eliminating dental plaque including the bacteria responsible for dental caries and periodontal disease (4, 5, 6). The following devices are used in these procedures: toothbrushes, dental floss, toothpicks, together with some supporting agents: toothpastes, rinses, sugarless chewing gum. The most basic and efficient method of preventing tooth caries is proper daily oral hygiene, the principles of which should be explained to expecting mothers. They should be prepared to taking appropriate care of their babies in terms of oral hygiene by being instructed about the necessity of cleaning their teeth initially with a piece of gauze wrapped around a finger and later, when the child is about one year old, with a soft toothbrush without any toothpaste. The procedure of toothbrushing and cleaning interdental areas must be carefully performed at least twice a day, most preferably after each meal, and it should last for two to three minutes. An important element of dental caries prevention is also fluoride prophylaxis, which can bring positive effects only if proper diet and hygiene is maintained. Systematic fluoride supplementation can significantly help in prevention of dental caries in case of both deciduous and permanent teeth. The method allowing daily application of fluoride is the usage of fluoride containing toothpastes. Currently there are

many types of toothpaste on the market that are adjusted to child's age and the choice may be based on individual preferences of the child. Fluoride toothpaste can be introduced at the age of three and the amount used should not be larger than a "pea" or a 0.5 cm long stripe (unless there are some regional contra-indications due to environment contamination with fluoride compounds). By the age of 6 it is recommended that toothpastes containing about 0.05% F are used, and since the age of 7 the fluoride content can be increased to 0.1%-0.18%. Recently toothpastes have been introduced in the market containing 0.18% and 0.25% F for children with rampant caries or hard dental tissues mineralisation dysfunction. After toothbrushing, oral cavity should not be additionally rinsed with water, so that the fluoride contained in saliva could exert its beneficial influence on the teeth longer. What remains of the toothpaste after toothbrushing should be left on teeth and especially between teeth for some time. Fluoride prophylaxis is used to supplement fluoride that is deficient in dental enamel surface layer. Preventive activity of fluoride is the most efficient at the time of tooth development and mineralisation (1). Antagonistic activity of fluoride against carious bacteria is also very important. After teeth eruption, even if enamel mineralisation was taking place with optimal fluoride supply, the surface layer contains too little fluoride to protect the teeth from caries. Fluoridation should be maintained indefinitely because the surface layer of dental enamel undergoes abrasion. Within 2 years about 6 μm of enamel surface are lost through abrasion.

In older children, from 8 to 10 years old, it is recommended that they use additional oral hygiene devices, such as toothpicks and dental floss. Flossing with fluoride dental floss should be performed in order to remove food debris from interdental areas and supply fluoride to interproximal surfaces. However, the basic oral hygiene device is still a toothbrush. Toothbrushes should be soft or medium and their size should be adjusted to child's age. The effectiveness of hygienic procedures depends on toothbrushing technique used, time and frequency. There are many toothbrushes in the market, which aim at increasing the efficiency of removing dental plaque. They can be divided into traditional (manual) and electric ones. They can have various shapes, designs and hardness level, which influence the efficiency of bacterial plaque removal without simultaneously causing trauma to periodontal tissue.

Toothbrushes can have a rectangular or triangular working part 20-35 mm long and 13-20 mm wide. Bristle bunches can be arranged in one, two or more height levels and in many cases with one bunch in the front part of the toothbrush longer and set horizontally. Variety in bristle arrangement together with various hardness of respective bristle bunches allows the adjustment of the toothbrush to tooth shape and removing of food debris and bacterial plaque from gingival pouches, interdental areas and tooth surfaces. In spite of significant progress in traditional toothbrushes design, their usage allows for removal of only 50% of dental plaque from smooth surfaces of teeth, and even less from interproximal surfaces. A clinical study performed among adults and children showed that electric toothbrushes allow to more efficienly remove bacterial plaque. The comparison between efficiency of traditional and electric toothbrush was performed using PLI

(plaque index – evaluation of thickness of plaque concretions in the tooth cervix area), OHI (oral hygiene index) and GI (gingival index). In patients using electric toothbrushes all these indexes had lower values.

Due to the use of electric toothbrushes, and thereby, the decreasing pressure on teeth surfaces, there are less cases of gingival bleeding. Boyd's studies demonstrated that pressure during teeth cleaning with an electric toothbrush is about 1/3 of the strength used while using a traditional toothbrush. There are various models of electric toothbrushes in the market, characterized by the possibility of making rotational and oscillating movements accompanied by pulsating and vibrating movements. Some toothbrushes have an inbuilt 260 Hz sound waves generator causing bristle vibration (bristle movement rate of 31,000 per minute), which additionally increases the cleaning effect, especially concerning interdental area and other difficult places. Both electric and sound toothbrushes change toothpaste into microfoam facilitating its penetration into anatomical teeth fissures and interdental areas. In fluid oral environment (toothpaste and saliva) bubbles are formed, which hit teeth surfaces and gingiva cleaning them from bacterial plaque and other deposits. Cavitation phenomenon has been used here – the pressure is locally reduced (2, 3).

Summing up, it should be stated that it is essential to elevate health awareness in terms of oral hygiene principles. Good oral and dental health status is very important in maintaining good general health status in children, adolescents and adults.

REFERENCES

1. Bratthall D., Hausel Peterson G., Sundberg H.: Reasons for the caries decline: What do the experts believe." Euro J. Oral Sci., 104, 416, 1996.
2. Jongenalis A. P. J. M., Wiedemann W.: A comparison of an electric vs. a manual toothbrush in children. J. Dent. Child., 5/6, 1997,176, 1997.
3. Jutai D. K. G., Hawkins R. J.: An update of mechanical oral hygiene practices: Evidence-based recommendations for disease prevention. J. Can. Dent. Assoc., 64 (4) 295, 1998.
4. Mielnik-Błaszczak M., Krawczyk D.: Profilaktyka próchnicy zębów u dzieci i młodzieży, a cele zdrowia WHO na 2000 rok. Czas. Stomat., 48, 1, 30, 1995.
5. Mielnik-Błaszczak M., Krawczyk D., Pels E.: Stan higieny jamy ustnej i poziom świadomości prozdrowotnej wśród dzieci ze środowiska wiejskiego. Ortodoncja Współczesna, 1, 2, 10, 1999.
6. Mielnik-Błaszczak M., Stanios-Śnieżyńska J.: Caries intensity, salivary *Streptococcus mutans* and *Lactobacillus couns* in 12–year–old children. Ann. UMCS, sectio D, vol 54, 1999.

2001.10.16

SUMMARY

The role of oral hygiene in prevention of caries and periodontal diseases has been presented based on the literature and own clinical experience.

Rola higieny jamy ustnej w profilakyce próchnicy zębów u dzieci i młodzieży

Na podstawie piśmiennictwa i własnych doświadczeń klinicznych przedstawiono rolę higieny jamy ustnej w profilaktyce próchnicy zębów.