

PREVENTION OF CARIES OF PERMANENT TEETH IN PRIMARY SCHOOL CHILDREN

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Annotation

The paper discusses etiologic factors of caries disease directly and indirectly connected with the development of the disease process. The authors point to the relationship between the occurrence of early childhood caries and colonization time of oral cavity by cariogenic germs and present the relationship between caries in deciduous and permanent teeth.

Keywords: early childhood caries and colonization, early prophylactic activity

Introduction

The authors emphasize the necessity of early prophylactic activity already in fetal period (primary primal prophylaxis) and the importance of long-term prophylaxis. Prophylactic strategies are discussed: population and corporate strategies based on the assessment of caries risk. Attention has been paid to the advantages and disadvantages of prophylactic strategies from Public Health point of view. Epidemiologic data are presented indicating the necessity of combining prevention in population with high prophylaxis and individual risk prophylaxis carried out by dentists. The principles of individual caries prophylaxis and methods of proceeding recommended for patients with risk assessed as low, moderate and high are discussed. Epidemiological studies ('Monitoring of Oral Health') conducted under the auspices of the Ministry of Health report a poor dental health in the Polish population, with only negligible slight improvement over the last 20 years. Between the years 1987 and 2010, the percentage of 12-year-old children with caries-free dentition increased by a mere 7.2%, and the disease severity, expressed as/by a mean value of the DMFT index, decreased by 1.22 (Figure1a and 1b). Unfortunately, the pediatric study population shows that the values of dental caries indices have been increasing with age. The index values were as follows: 2.67 in three-year olds in 2009, 5.06 in six-year olds in 2008, and 5.62 in seven-year olds in 2011 (Figure 2). In accordance with the results of the 2011 study, the score in five-year old children (5.07) approximated the figures reported for six-year old children in 2008. Additionally, 5-year olds are diagnosed with an average index of 0.03 in their carious permanent teeth (DT=0.03). In 2011, seven-year olds showed the DMFT score of 0.42, which, in 15-year olds, reached 2.67. Unfortunately, the percentage of 15-year-old subjects with at least one tooth lost due

to dental caries exceeds 9% [1-3]. The epidemiological studies also focus on causes of the poor dental health in children and adolescents in Poland. Those include inadequate oral hygiene (approx. 10% of five – and seven-year-old children brush their teeth less frequently than once daily), dietary errors, and infrequent.

Application of fluoride agents other than those contained in toothpastes. With regard to the permanent dentition, carious disease in the deciduous teeth should also be considered. The literature provides abundant evidence of correlation between caries in the deciduous and permanent teeth. According to Li and Wang, carious lesions in the deciduous dentition contribute to a three-fold risk of caries in the permanent dentition. Skeie et al. reported that carious lesions in the deciduous second molars pose a particular risk. It has been proved that the presence of carious lesions in the teeth of five-year old children correlates with carious permanent teeth in those subjects at ten years of age. In their study of a group of Japanese girls, Mothusi et al. showed that severity of dental caries expressed as a index, is a significant prognostic risk indicator of dental caries in their permanent teeth. Nevertheless, the correlation between carious lesions in the deciduous and permanent dentition shows the significance of adequate early intervention with effective prophylactic measures.

Dental caries is defined as a pathological process, which, essentially, means a loss of mineral elements, and proteolytic disintegration of hard dental tissues. Its etiology has been well recognized. It is generally known that biological determinants of dental carious process include acidic and acidophilic cryogenic bacteria, a substrate for their metabolism (carbohydrates), local conditions in the oral cavity dependent on the saliva volume, composition, and its ability to buffer bacteria-produced acids, time for acid action upon dental tissues, and their susceptibility. The knowledge has also been increasing of the mechanism and structure of the bacterial biofilm residing on the dental surfaces, and its role in the development of dental caries. According to the present knowledge, the oral cavity is the site of continuous alternative processes of dental enamel demineralization, underneath the bacterial biofilm covering the enamel, due to a lowered pH, and repair processes, i.e. remineralization, in which mineral components from the saliva are incorporated into a decalcified tissue. Dental caries results from an imbalance between demineralization and remineralization. It is also a well-known fact that cariogenic microorganisms resident in the child's oral cavity are most frequently transmitted by the mother, and, rarely, a third party. The sooner the bacterial transmission and the oral cavity colonization, the higher the risk of caries in the deciduous teeth. Considering the factors directly associated with the carious process, prophylactic measures should:

- Be started in the fetal life as the so-called primary primal prophylaxis;
- Be provided for the patient's lifetime (primary and secondary prophylaxis);
- Consist in elimination or restriction of cariogenic factors, and introduction of protective measures to support reconstructive processes [8]. Various multiple factors

associated with the child itself, its family and the environment in which the child lives exert an intermediate effect upon the oral health, and resulting dental caries. Prevention of dental caries in a child therefore should include strategies directed also at the child's environment.

Caries severity in study populations is assessed in a group of subjects with very high DMFT indices. This shows a differentiated risk of the disease in a population and, consequently, measures to prevent it. According to Messer, "we need well directed prophylactic measures in dental caries for high risk patients/ individuals". According to Burt, dental caries prevention should be performed at three levels: I. population – to reduce prevalence of dental caries in the society, II. Local – in geographic areas with a high prevalence of dental caries,

III. in the highest risk groups. Prophylactic strategies based on the risk assessment levels assume selection of high risk caries groups (e.g. screening, epidemiological studies, socio-demographic data) and intensified preventive measures. Group prophylactic programmes, based upon the high-risk caries strategy, have proved to be effective. There was for example, a 3-year programme implemented for over three years in pre-school children (commenced in three-year-olds, completed in five-year-olds). It compared the efficacy of routine prevention (the control group: parental education focusing on oral hygiene, the use of fluoride toothpastes, and children's sweet consumption) with increased prophylaxis depending on the risk level (in high risk: additional usage of chlorhexidine and fluoride varnish). Prophylaxis based upon high-risk caries assessment proved to be more effective in both deciduous and permanent dentition. A follow-up study performed seven years after the programme completion (in 12-year old children).

In spite of the documented efficacy of the caries preventive programmes based on the risk levels related to groups of subjects at a particular risk, the programmes also show shortcomings – i.e. an imprecise methodology of risk assessment, and its variability over time. Additionally, on the population scale, the "burden" of the disease is an important aspect – i.e. the number of new carious foci in low risk subjects forming a larger group. According to Hansen et al., the intensive prophylaxis aimed at high-risk subjects, used in 12-year-old children, in a population with a low caries incidence, does not provide any significantly higher health benefits than basic prophylactic measures provided at a lower financial cost. Similarly, in their analysis of the effects of various prophylactic programmes performed in 7-year-old children (the US data of National Preventive Dentistry Demonstration Program (NPDDP), Batchelor & Sheiham, questioned the benefits of the prophylactic high risk strategies from the point of view of public health. Nevertheless, they emphasized its value when used in the group programmes. The present approach to prevent dental caries in the aspect of public health assumes a combination of population prophylaxis based on a high risk strategy in different groups and subpopulations. It is also crucial to identify children at a high

caries risk, e.g. using prophylactic screening tests, and refer them to dental surgeons to implement an individually established prophylactic programmes. Apart from polarization of dental caries, epidemiological studies conducted within the Oral Health Monitoring programme showed that in 2011 the percentage of seven-year-old Polish children with $dmft \geq 4$, reached a figure of 71%, whereas in those with $DMFT=0$, the percentage was only 10.2% [3]. The percentage of 12-year-old children with at least 4 teeth with carious lesions was 41.3% in 2010 [2]. Unfortunately, in 2011, 8.2% of 15-year-old adolescents showed $DMFT=0$; in 71.8% of the subjects, the index values were ≥ 4 . Over 20% of five-year old children, and 7.7% of seven-year olds had never any dental appointment [3]. Dietary and hygienic errors were found in all the age groups. In a society in which subjects with a low caries risk are not a majority, it is crucial to introduce prophylactic programmes for children based on a high risk strategy.

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