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Review article

Importance of Oral Hygiene and Maintaining Oral Health in Persons With Disabilities

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Abstract

This paper aims to approximate and facilitate the routine of daily oral hygiene for persons with disabilities, as well as to emphasize the importance of educating persons with disabilities and their caregivers about oral health as an essential part of overall health. Desk research of electronic databases was conducted with the aim of writing this paper, using the following keywords: 'oral hygiene', 'dental plaque', 'oral health' and 'persons with disabilities'. Literature research has shown that persons with disabilities have poor oral hygiene, as well as that there is a lack of education among them and their caregivers about the importance of oral health and proper oral hygiene. Poor oral hygiene can affect a person's quality of life due to discomfort during eating, bad breath, poor self-esteem, pain, and disturbed sleep, which is a result of caries or other diseases of the oral cavity. Maintaining oral health is an essential part of overall health.

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Introduction

It is estimated that around one billion people, which is about 15% of the world's population, have some form of disability. The term disability is broad and covers persons with physical, sensory, intellectual, medical, emotional and social disorders, and most commonly a combination of these disorders (1). Persons with disabilities often need extra help to achieve and maintain good health, and oral health is no exception.

Oral hygiene is the process of cleaning the hard and soft tissue of the oral cavity (teeth, gums, and tongue), fixed and removable prosthodontic restorations, and dental appliances. Irregular or poor oral hygiene results in an increased number and variety of bacteria in plaque (2). Dental plaque plays a significant role in the development of the two most common oral diseases, dental caries and periodontal disease.

Most toothaches are caused by caries. At first, caries looks like a painless white stain; at this stage, the process is reversible with good hygiene, and remineralization of the enamel is possible. With the advancement of demineralization, cavitation and caries coloration occur. If left untreated, caries progresses to the pulp and causes inflammation accompanied by severe pain. Inflammation can then spread to the top of the tooth, forming a granuloma, abscess, or cyst (2). Persons with disabilities mostly have genetic predispositions for the development of gingival and periodontal disease, and the medications that they take, in combination with poor oral hygiene, inevitably lead to rapid disease progression, gum recession, and tooth loss (3, 4).

It is important to raise awareness among persons with disabilities and their caregivers about the importance of maintaining oral hygiene and ways to achieve it, with emphasis on the need for regular visits to the dentist, who will teach them about routine and special procedures.

Dental plaque

Dentobacterial plaque is a soft deposit of living and non-living microorganisms in a matrix rich in polysaccharides and glycoproteins, which adheres tightly to the tooth surface and can only be removed by mechanical cleaning. The formation of dentobacterial plaque is a complex process that occurs in several stages that are not restricted. Initially, a pellicle is formed, the first acquired plaque on the teeth. The pellicle is a thin, translucent glycoprotein layer with no cells and bacteria. It is 10 µm thick and forms 20 minutes after the tooth has been cleaned. Once the pellicle has formed, bacteria begin to settle. Bacteria can adhere to the pellicle: through direct contact between the bacterial wall and the pellicle, through fibrous extensions on the walls of the bacteria, through mediation of a fluffy layer of epithelial cells. At this stage, the plaque matrix is still sufficiently permeable, and aerobic conditions prevail (5). Gram-positive streptococci such as *S. mutans*, *S. sanguinus*, *S. oralis*, *S. mitis*, and *Neisseria* spp. are the first to colonize the tooth surface. The primary colonizers of dentobacterial plaque are either aerobes or facultative anaerobes. Secondary colonizers are mostly gram-negative bacteria such as *Actinomyces* spp., *Fusobacterium*, *Prevotella intermedia*, and *Capnocytophaga* spp. (6).

From the third to the seventh day, the formation of extracellular polysaccharides dextran, mutan and levan intensifies. They increase the volume of plaque and reduce its permeability. Only small molecules such as sucrose, to which great cariogenic potential is attributed, can now penetrate the plaque. Due to the lack of oxygen, anaerobic conditions occur, in which the final products of decomposition of sucrose are pyruvic acid and lactic acid. The pH values are lowered to critical values of 5.2 to 5.4 (5).

If dental plaque remains undisturbed for about seven days, tertiary colonizers accumulate. These are mostly strict anaerobes that opportunistically exploit the environment provided by other bacteria, including pathogenic bacteria such as *Porphyromonas gingivalis*, *Aggregatibacter actinomycetemcomitans*, and

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spirochetes such as *Treponema denticola*. When living as a microbial community in dentobacterial plaque, individual bacteria tend to share their virulence properties through gene transfer, particularly antibiotic resistance genes found in plasmids (6). The pathogenic biofilm of dental plaque results not only in dental diseases such as dental caries and periodontal disease, but may also be involved in the development of cardiovascular, respiratory and renal diseases, as well as diseases of other organs (6). It is therefore important to understand the mechanism of occurrence and the possibilities of prevention and control of dentobacterial plaque.

Oral hygiene in persons with disabilities

Persons with disabilities usually have poorer oral health, more extracted teeth, more caries, fewer fillings and treated teeth, gingivitis, a higher rate of edentulism, fewer preventative procedures, and more inadequate dental care compared to the general population (7, 8). As oral diseases primarily have a microbiological origin, it is necessary to establish plaque control, which can be achieved mechanically and chemically (9). The essential means for removing plaque from teeth are mechanical brushing agents and interdental cleaners such as dental floss and interdental brushes (10). Use of soft toothbrushes as well as modified and electric toothbrushes is recommended, especially for persons with reduced motor skills and intellectual abilities. Studies have shown greater plaque removal efficacy in this population when electric toothbrushes are used (11). It is equally important to clean the spaces between the teeth, so it is essential to educate patients, in line with their perceptual and cognitive abilities, about the use of interdental brushes and dental floss. Most of these patients will find it more convenient to use dental floss with a holder (12).

In addition to mechanical cleaning, chemical control of plaque is of great importance. It includes the use of toothpaste, gels, mouthwashes, etc., the composition of which contains active ingredients such as fluorides and

chlorhexidine. Various studies have demonstrated the efficacy of using chlorhexidine in persons who are unable to maintain proper oral hygiene mechanically, and it is the first choice for supporting the treatment of gingivitis and periodontal diseases (13). Adequate use of fluoride is recommended from an early age, because of the high risk of caries in this population. Where lower risk is assessed, the recommendation is to use a toothpaste with up to 1000 ppm fluoride for young children, and with around 1500 ppm after the age of 6. In case of high risk, which pertains to most children with disabilities, toothpaste or gel with 1000 to 1500 ppm fluoride is administered immediately when the first teeth appear in the mouth (pea-size). For 12-year-old children at high risk, 2800 ppm of fluoride is recommended, and up to 5000 ppm at the age of 16 (14).

Education of persons with disabilities and their caregivers

Persons with disabilities and their caregivers need to be educated about and conscious of the importance of oral health: how to achieve and maintain it. Despite evidence that this population generally has poor oral health, oral hygiene training programs are not readily available for their caregivers (15). The results of the research show an improvement in the knowledge, skills, and attitudes of caregivers about oral hygiene after completing an educational program (15, 16).

Education about oral hygiene and dental cleaning procedures should be provided from an early age in order for children to develop the habit of maintaining oral hygiene and oral health. To support this, one study conducted among children with disabilities of preschool age showed a significant correlation of good tooth brushing with adaptive skills and practicing oral hygiene. Multiple oral hygiene steps could be performed by children who developed the habit of brushing their teeth before the age of 1 and who regularly brushed their teeth at least twice a day, as opposed to children who started with oral hygiene later and brushed their teeth only occasionally (17). Since one type of education does not suit everyone, such education needs to

be tailored to the specific condition of the individual or group.

Recent research has proved the importance of tailor-made education for achieving significantly better results in regard to understanding oral health and oral hygiene. A study conducted among the deaf and hard of hearing showed that participants with standard education in print form achieved good results compared to their pre-education status. However, a group of participants with tailor-made training, which included a video in sign language, showed statistically significant results when compared to their initial knowledge and skills in oral hygiene (18).

It is crucial to regularly visit the chosen doctor of dental medicine, who will monitor oral health and provide additional oral hygiene instructions depending on the psycho-physical capabilities of the individual patient. For example, a dentist will demonstrate the process of tooth brushing to blind and partially sighted people using the 'hand-to-hand' technique, guiding the patient's hand, alerting them to particular locations in the mouth that have a more significant physiological tendency to accumulate plaque, such as areas of contact between tooth and gums, gritted and rotated teeth, etc. (12). Other methods, also used with the general population in the event of higher anxiety when performing dental procedures, help reduce fear in persons with disabilities. One of them is the so-called 'tell-show-do' method, in which, before any procedure is performed, it is explained to the patient using understandable language, and instruments that will be used are shown. It always begins with a tool or procedure that will cause the least fear in patients (13, 19). The doctor of dental medicine will apply various other methods in communication, preventive and curative action, depending on the patient's medical history and individual needs. Regular visits to the dentist and intervention training decrease dental phobia and aversion to the doctor's office, as well as to necessary preventive and curative treatments (20).

The importance of healthy and balanced nutrition, which is an essential factor in oral

health, should undoubtedly be included in the education of persons with disabilities and their caregivers. For example, this could include highlighting the negative role of sugar in the onset of dental disease and pointing out some ingredients in the diet that have a potentially anticarcinogenic effect, such as xylitol (13, 21).

Sedation and general anaesthesia

Most persons with disabilities can be treated routinely in dental practices, with procedures tailored to them. However, some of them cannot cooperate well enough for the necessary dental procedure to be performed (22). Appropriate sedation or general anaesthesia is used on all patients who are unable to cooperate during a visit to the dental office: very young children, patients with motor or cognitive dysfunctions, general population with severe dental phobia; this is likewise used in cases when procedures are extensive and cannot be done under local anaesthesia (23, 24). Today, sedation is most often performed using an oral sedative or inhalation of nitric oxide. These methods can be very effective in relaxing anxious patients, but require a certain dose of cooperation; e.g., for inhalation, the patient must be willing to wear a mask through which gas is inhaled and must breathe through the nose (22, 25).

General anaesthesia involves a reversible loss of consciousness caused by the use of one or more anaesthetics, during which the patient cannot be awakened by painful stimulation. It does not require patient cooperation and its application is considered relatively safe and has been widely described as a useful way of treating patients with a disability (22, 26). General anaesthesia allows for complete oral rehabilitation in the same visit, including tooth extraction, pulp and root canal treatment, placement of necessary tooth fillings, treatment with fixed and removable prosthodontic restorations, scaling and root planing, prophylactic procedures, etc. (27).

Conclusion

Poor oral hygiene and diseases of the teeth and oral cavity limit normal daily functions such as eating, swallowing, chewing, and ultimately result in poorer general health. The impact of oral diseases on systemic diseases and the functioning of the organism in this specific population plays a significant role, even more so than in the general population (13, 28). Therefore, a doctor of dental medicine should be an indispensable part of a multidisciplinary team that looks after the health of persons with disabilities. Society should also contribute to better quality of life and the realization of optimal healthcare by providing high-quality health insurance, more frequent visits to the dentist, and more preventative and curative

procedures, which are key to maintaining oral health (14, 29). Oral disease prevention as an integrative part of overall health should be imperative, with emphasis on the mandatory continuous education of persons with disabilities or their caregivers, good oral hygiene, which includes mechanical and chemical plaque control, regular visits to the dentist, and proper nutrition. Good oral health improves the quality of life.

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