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Mechanical Plaque Control: Principles, Methods, and Importance in Preventive Dentistry. A Review Article

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Abstract

Dental plaques are a complex, adhesive biofilm that builds up on tooth surfaces and contains a variety of bacteria, nutritional leftovers, and salivary proteins. This biofilm is thought to play a major role in a number of oral health issues that afflict people throughout their lifetimes, such as periodontal diseases and carious lesions. Within hours of teeth cleaning, the creation process begins. If it is not removed every day, it can mineralize into calculus, creating further management difficulties and raising the risk of dental infections. Even though plaque has a natural tendency to accumulate, daily use of good oral hygiene practices, such as brushing, interdental cleaning, and professional dental care, has shown great effectiveness in reducing plaque accumulation and associated health risks. Plaque control means the regular removal and prevention of accumulations of the dental plaque on the teeth and adjacent gingival surfaces, which is broadly classified in to two groups: Chemical plaque control and Mechanical plaque control, which includes toothbrushes, floss, interdental sticks, interdental brushes, and oral irrigators. These aids are particularly beneficial for eliminating dental plaque. This study summarizes the information that is currently known on the kind of mechanical plaque management that can assist to maintain appropriate plaque control and stop or slow the development of dental caries and periodontal disorders.

Keywords: Dental plaques, brushing, interdental cleaning, periodontal diseases



Introduction

The microbial population found in dental plaque, which is mostly made up of bacteria and some fungus, forms a biofilm on the surfaces of the oral cavity and appears as a white, sticky deposit. When it calcifies into tartar, it can change into a brownish or light-yellow material. Interproximal gaps, anterior and posterior tooth surfaces, occlusal surfaces, supragingival gingival margins, and subgingival gingival margins in cervical regions are examples of common places. In the literature, this microbial aggregation is often referred to as bacterial plaque biofilm, oral biofilm, dental biofilm, or microbial plaque (1). One of the main causes of periodontal disease and teeth damage is bacterial plaque. According to research, there are gender-based variations in the microbial composition of dental plaque, particularly in individuals with periodontitis (2).

Supra-gingival and sub-gingival dental plaque are the two main categories. Supragingival plaque is often divided into tooth-adherent zones, epithelial-adherent zones, and non-adherent zones. It is located at or above the dento-gingival junction and is frequently seen in the gingival third of the dental crown, interproximal areas, pits, and junction (3). In order to prevent dental plaque and oral biofilm from building up on teeth and other oral cavity components, they must be removed on a regular basis. Chemical procedures, mechanical means, or a mix of both can be used to accomplish this (4).

Plaque control is the removal of microbial plaque and the prevention of its accumulation on the teeth and adjacent gingival tissues, it also deals with the prevention of calculus formation and leads to resolution of gingival inflammation. Therefore, plaque control is an essential component of all the processes involved in the treatment and prevention of periodontal disease since it is an efficient method of treating gingivitis. Plaque control involves both chemical compounds that delay the production of plaque and mechanical methods (such as tooth brushing, interdental cleaning tools, and professional prophylaxis (2).

Mechanical plaque control

Mechanical plaque control means the physical removal of microbial dental biofilm and prevention of its accumulation on teeth and gums using physical tools and devices. Because it removes microbial plaque and keeps it from building up on teeth and gingival tissues, researchers discovered that maintaining oral hygiene is crucial for maintaining oral health (5). In general, gingivitis and interdental caries formation may be avoided by attaining optimal plaque management by toothbrushing and interdental plaque removal once every 24 hours (6). The justification for treating interdental cleaning as a distinct

component is that toothbrushing alone is insufficient to effectively reach the spaces between neighboring teeth, leaving certain tooth surfaces unclean. This issue arises because, when teeth are in their normal alignment, the interdental gingiva occupies the embrasure between two teeth apical to their contact point, producing a "protected" region that is challenging to access. Effective interdental hygiene helps lessen the degree and severity of periodontal disease, which is caused by localized circumstances in the interdental region that promote bacterial plaque building and maturation when the papillae are initially inflamed (7). Flossing, which is perhaps the most widely applied technique, has historically been the main emphasis of interdental cleaning self-care instruction (8). Interdental brushes, on the other hand, have been found to be quite successful in eliminating plaque up to 2-2.5 mm below the gingival edge on both the embrasures and the middle part of the interdental area (9). However, the features of the interdental spaces—specifically, whether they are open or closed—must be taken into consideration while choosing an effective approach. (10).

Classification of mechanical plaque control

Mechanical plaque control ways can be categorized into several types

1-Toothbrushes – Primary instruments for removing plaque from accessible tooth surfaces

The most popular type of toothbrush is a manual one. A common manual brush with a multitufted head design first appeared on the market in the 1980s. New designs with different head shapes, sizes, angulations, and bristle kinds appeared during the 1990s, improving the efficacy and efficiency of plaque removal (11). The handles, bristles, and head designs of manual toothbrushes have undergone further changes. Modern toothbrushes come in a variety of styles, such as compact and conventional sizes, and their bristles are divided into three stiffness categories: soft, medium, and hard (12).

The American Dental Association (ADA) states that a toothbrush must adhere to certain requirements (13):

1-The toothbrush head should be between one and one and a half inches long

. 2-It should be between 5/16 and 3/8 inches wide

3-The head's surface area should be between 2.54 and 3.2 cm

4- There should be two to four bristle rows.

5- There should be five to twelve tufts in each row



6- Each tuft should have 80–85 bristles

In the past, it was widely believed that toothbrushes with firm bristles were quite effective in cleaning. But studies have shown that these brushes are more likely to result in stress associated to brushing. Gingival recessions are more common in those who use hard-bristled toothbrushes, and research has shown that the severity of these recessions rises dramatically with brushing frequency (14). Gingival injury may result from vigorous brushing with firm-bristled toothbrushes. As a result, dentists typically advise against using harsh manual toothbrushes. However, it is still difficult to provide universal recommendations due to the lack of a common hardness rating system across various toothbrush manufacturers (15). Despite this drawback, observational data indicates that medium-hardness toothbrushes are less effective than those with softer bristles.

2- Interdental aids – Specialized tools such as dental floss, interdental brushes, and picks designed for cleaning between teeth.

Because toothbrushing is insufficient for interdental cleaning, the majority of periodontal diseases start in these areas. As a result, certain interdental cleaning tools must be used (16). Even though brushing your teeth is one of the most popular ways to manage plaque, periodontal disorders are still quite frequent (17). Since germs can grow in the interproximal gaps between neighboring teeth, cleaning alone might not be sufficient to stop the spread of periodontal disease. The buccal and lingual surfaces of teeth, which are easier to reach, are where toothbrushes mainly remove germs and plaque. To properly clean the proximal interdental areas, interdental cleaning tools are essential. (18).

One of the most popular interdental cleaning techniques is dental floss, which is usually used in addition to toothbrushing. Nowadays, there are many different kinds of dental floss available on the market, such as versions with and without handles, flavored and unflavored variety, waxed and unwaxed alternatives, and floss divided into thickness categories like thin, medium, and thick. Powered flossing devices are now commercially accessible due to recent technology improvements (19). These solutions are made specially to get rid of food particles and plaque that adhere to oral surfaces. Toothbrushing should be combined with tools that make cleaning interproximal surfaces easier for optimal plaque control. The user usually cuts a suitable length from the dispenser when using dental floss. The floss section, with about 1-2 cm of floss exposed, is then either placed on a fork-like tool or held between the fingers with both hands (20). The floss is directed beneath the gingival border by the user as it is guided between each pair of teeth and softly curved in a "C" form against the tooth surface. Food particles lodged between teeth and dental plaque adhered to tooth surfaces

beneath the gum line are successfully removed by this procedure (21).

3- Gingival stimulation aids – Devices like rubber tips created to stimulate and massage gingival tissues

4-Aids for people with missing teeth: Patients with partial or total edentulism can maintain good oral hygiene with the use of specialized instruments like denture brushes and other cleaning supplies.

5-Tongue cleaning tools: These are devices that deal with tongue coating, which is important for the generation of volatile sulfur compounds in both healthy people and people with periodontal disease (22).

Conclusion

The foundation of preventative dentistry and oral hygiene is still mechanical plaque control. In order to minimize plaque buildup and avoid oral illnesses such dental caries and periodontal disorders, the use of toothbrushes, interdental cleaning equipment, and tongue cleaning instruments is essential. Even though toothbrush design and interdental cleaning technology have advanced significantly, patient adherence, appropriate method execution, and regular oral hygiene habits are ultimately what determine how successful mechanical plaque management is. A customized mix of brushing, flossing, and interdental cleaning that is suited to each person's needs and oral conditions is the most successful strategy, according to the research that is currently available. Moreover, patient motivation and education are important components of long-term oral health maintenance. Future studies should concentrate on expanding the availability of efficient oral hygiene products and creating novel approaches to improve patient compliance with suggested plaque management techniques.

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