

Archeological Evidence of Calcified Dental Plaque Shows Marked Shifts in the Oral Microbiome Towards a Disease-Associated Microbiome with Cariogenic Bacteria

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Introduction

Oral hygiene is the practice of keeping one's mouth clean and free of disease and other problems (e.g. bad breath) by regular brushing of the teeth (dental hygiene) and cleaning between the teeth. It is important that oral hygiene be carried out on a regular basis to enable prevention of dental disease and bad breath. The most common types of dental disease are tooth decay cavities, dental caries and gum diseases, including gingivitis, and periodontitis. General guidelines for adults suggest brushing at least twice a day with fluoridated toothpaste: Brushing last thing at night and at least on one other occasion. Cleaning between the teeth is called interdental cleaning and is as important as tooth brushing. This is because a toothbrush cannot reach between the teeth and therefore only removes about 50% of plaque from the surface of the teeth. There are many tools to clean between the teeth, including floss, tape and interdental brushes; it is up to each individual to choose which tool they prefer to use. Sometimes white or straight teeth are associated with oral hygiene. However, a hygienic mouth can have stained teeth or crooked teeth. To improve the appearance of their teeth, people may use tooth whitening treatments and orthodontics. The importance of the role of the oral microbiome in dental health has been increasingly recognized. Data from human oral microbiology research shows that a commensal microflora can switch to an opportunistic pathogenic flora through complex changes in their environment. These changes are driven by the host rather than the bacteria. Archeological evidence of calcified dental plaque shows marked shifts in the oral microbiome towards a disease-associated microbiome with cariogenic bacteria becoming dominant during the Industrial Revolution. Modern oral microbiota is significantly less diverse than historic populations. Caries Cavities, for example, have become a major endemic disease, affecting 60-90% of schoolchildren in industrialized countries. In contrast, dental caries and periodontal diseases were rare in pre-Neolithic and early hominins.

Tooth cleaning and decay

Tooth decay is the most common global disease. Over 80% of cavities occur inside fissures in teeth where brushing cannot reach food left trapped after eating and saliva and fluoride have no access to neutralize acid and remineralize demineralized teeth, unlike easy-to-clean parts of the tooth, where fewer cavities occur. Teeth cleaning is the removal of dental plaque and tartar from teeth to prevent cavities, gingivitis, gum disease, and tooth decay. Severe gum disease causes at least one-third of adult tooth loss. Teeth cleaning is the removal of dental plaque and tartar from teeth to prevent cavities, gingivitis, gum disease, and tooth decay. Severe gum disease causes at least one-third of adult tooth loss. Since before recorded history, a variety of oral hygiene measures have been used for teeth cleaning. This has been verified by various excavations done throughout the world, in which chew sticks, tree twigs, bird feathers, animal bones and porcupine quills have been found. In historic times, different forms of tooth cleaning tools have been used. Indian medicine (Ayurveda) has used the neem tree, or daatun, and its products to create teeth cleaning twigs and similar products; a person chews one end of the neem twig until it somewhat resembles the bristles of a toothbrush, and then uses it to brush the teeth. In the Muslim world, the miswak, or siwak, made from a twig or root, has antiseptic properties and has been widely used since the Islamic Golden Age. Rubbing baking soda or chalk against the teeth was also common however, this can have negative side effects over time.

The Australian Healthcare and Hospital Association's (AHHA) most recent evidence brief suggests that dental check-ups should be conducted once every 3 years for adults, and 1 every 2 years for children. It has been documented that dental professionals frequently advise for more frequent visits, but this advice is contraindicated by evidence suggesting that check-up frequency should be based on individual risk factors, or the AHHA's check-up schedule. Professional cleaning includes tooth scaling, tooth polishing, and, if tartar has accumulated, debridement; this is usually followed by a fluoride treatment. However, the American Dental Hygienists' Association (ADHA) stated in 1998 that there is no evidence that scaling and

polishing only above the gums provides therapeutic value, and cleaning should be done under the gums as well. The Cochrane Oral Health Group found only three studies meeting the criteria for inclusion in their study and found little evidence in them to support claims of benefits from supragingival (above the gum) tooth scaling or tooth polishing.

Dental sealants, which are applied by dentists, cover and protect fissures and grooves in the chewing surfaces of back teeth, preventing food from becoming trapped and thereby halt the decay process. An elastomer strip has been shown to force sealant deeper inside opposing chewing surfaces and can also force fluoride toothpaste inside chewing surfaces to aid in remineralising demineralised teeth. Between cleanings by a dental hygienist, good oral hygiene is essential for preventing tartar build-up which causes the problems mentioned above. This is done through careful, frequent brushing with a toothbrush, combined with the use of dental floss or interdental brushes to prevent accumulation of plaque on the teeth.

Preventive care

Routine tooth brushing is the principal method of preventing many oral diseases, and perhaps the most important activity an

individual can practice to reduce plaque buildup. Controlling plaque reduces the risk of the individual suffering from plaque-associated diseases such as gingivitis, periodontitis, and caries – the three most common oral diseases. The average brushing time for individuals is between 30 seconds and just over 60 seconds. Many oral health care professionals agree that tooth brushing should be done for a minimum of two minutes, and be practiced at least twice a day. Brushing for at least two minutes per session is optimal for preventing the most common oral diseases, and removes considerably more plaque than brushing for only 45 seconds. Tooth brushing can only clean to a depth of about 1.5 mm inside the gingival pockets, but a sustained regime of plaque removal above the gum line can affect the ecology of the microbes below the gums and may reduce the number of pathogens in pockets up to 5 mm in depth. Toothpaste dentifrice with fluoride, or alternatives such as nano-hydroxyapatite, is an important tool to readily use when tooth brushing. The fluoride or alternative in the dentifrice is an important protective factor against caries, and an important supplement needed to remineralize already affected enamel.