

DENTAL HEALTH: TOOTHPASTES

Karimova Munavvarabonu Akmalovna

ToshDavTU Stomatologiya yo'nalishi 1-bosqich talabasi.

E-mail: karimovam0017@gmail.com

<https://doi.org/10.5281/zenodo.18976592>

Abstract. *This article highlights the importance of oral hygiene for maintaining overall human health. It discusses the significant role of toothpaste in preventing dental and gum diseases and analyzes the main components of toothpaste and their functions. The paper also describes different types of toothpaste and their specific characteristics and applications. In addition, several widely used toothpastes were experimentally tested and compared to evaluate their effectiveness and properties. The results emphasize the importance of choosing an appropriate toothpaste in order to maintain proper oral hygiene.*

Key words: *Oral hygiene, Toothpaste, Enamel remineralization, Hydroxyapatite, Fluoride, Tooth hypersensitivity, Dental plaque, Antibacterial agents, Periodontal diseases, Therapeutic toothpaste, Preventive dentistry, Biomimetic microRepair, Caries prevention, Herbal extracts, Dental restorations.*

Annotatsiya. *Ushbu maqolada og'iz bo'shlig'i gigiyenasining inson salomatligidagi ahamiyati yoritilgan. Tish pastasidan muntazam foydalanishning tish va milk kasalliklarining oldini olishdagi roli, shuningdek, tish pastalarining asosiy tarkibiy qismlari va ularning vazifalari tahlil qilingan. Maqolada turli xil tish pastalarining turlari, ularning xususiyatlari hamda qo'llanilish sohalari haqida ma'lumot berilgan. Bundan tashqari, hozirgi kunda keng tarqalgan bir nechta tish pastalari amaliy tajriba asosida o'rganilib, ularning samaradorligi va xususiyatlari solishtirilgan. Tadqiqot natijalari og'iz bo'shlig'i gigiyenasini saqlashda to'g'ri tish pastasini tanlash muhimligini ko'rsatadi.*

Kalit so'zlar: *Og'iz bo'shlig'i gigiyenasi, Tish pastasi, Emal remineralizatsiyasi, Hidroksiapatit, Ftor, Tish sezuvchanligi, Tish blyashkasi, Antibakterial moddalar, Periodont kasalliklari, Davolovchi tish pastasi, Profilaktik stomatologiya, Biomimetik microRepair, Karies profilaktikasi, O'simlik ekstraktlari, Tish tiklash materiallari.*

Oral hygiene is an essential part of maintaining overall health and well-being. The condition of the oral cavity can influence not only dental health but also the general state of the human body. Poor oral hygiene may lead to various problems such as tooth decay, gum diseases, bad breath, and other oral infections. Therefore, maintaining proper oral care is important for preventing these issues and ensuring healthy teeth and gums.

One of the most common and effective methods of maintaining oral hygiene is regular tooth brushing with toothpaste. The use of toothpaste helps remove food particles and dental plaque from the surface of the teeth, keeping the mouth clean and fresh. Regular brushing with toothpaste also helps protect teeth from harmful bacteria that may cause dental diseases.

Today, proper oral hygiene habits, including the use of toothpaste, are widely recommended by dental professionals as a key factor in preventing oral health problems.

Developing and maintaining these habits plays a significant role in preserving healthy teeth and improving the quality of life.

Toothpaste is a mixture of powder particles in a liquid form, where the powder particles include abrasives, structure-forming agents, and other fillers that are insoluble in the dispersion medium. The dispersion medium is a gel containing bioactive additives, surfactants, flavoring agents, and other components.

Composition:

- Abrasive substances (40%) – provide cleaning and polishing action (chemically precipitated chalk, dicalcium phosphate dihydrate, dicalcium phosphate monohydrate, aluminum hydroxide, etc.).
- Gelling agents – give structure to the paste.
- Binding agents – determine the consistency of the paste (seaweed, alginate and sodium carrageenan, fruits and fruit juices, ethyl and methyl cellulose ethers, sodium carboxymethyl cellulose).
- Humectants – help obtain a plastic, homogeneous mass that can be easily squeezed from a tube (glycerin, polyethylene glycol).
- Foaming agents (surfactants) – e.g., alizarin oil, sodium lauryl sulfate, sodium salt of fatty acid tauride.
- Flavors – (mint, peppermint, cinnamon, and synthetic substances) and sweeteners (sugar substitutes: sorbitol, mannitol, xylitol, cyclamate) – provide organoleptic properties, giving a pleasant color, taste, and aroma.
- Bioactive additives (BAAs) – allow toothpaste to be used as a primary preventive measure against dental caries and periodontal diseases.

The proportion of these components determines the toothpaste's properties, purpose, mechanism of action, and effectiveness.

Modified Classification of Toothpastes:

According to the modified classification proposed by Ulitovsky (2002), toothpastes are divided into several main groups depending on their purpose and functional properties. These groups include professional, special, and individual toothpastes.

Professional toothpastes are intended for use during professional oral hygiene procedures performed by dental specialists. These toothpastes may be simple or combined. Simple professional toothpastes include polishing, cleaning, abrasive, and whitening types. Combined professional toothpastes perform several functions simultaneously, such as abrasive-polishing, polishing-cleaning, whitening-polishing, or whitening-cleaning effects.

Special toothpastes are characterized by a pronounced therapeutic effect and are not intended for continuous or frequent use. This group includes medical (therapeutic) toothpastes, such as antifungal toothpastes and toothpastes with a high fluoride content. Another subgroup is conditionally medical toothpastes, which have strong therapeutic and preventive antibacterial properties due to antiseptics contained in their composition, such as chlorhexidine or triclosan.

However, long-term use of these products may lead to disturbances in the natural microflora of the oral cavity.

Individual toothpastes are the most widely used and are intended for everyday oral hygiene.

They are divided into cosmetic, hygienic, and therapeutic-preventive types. Cosmetic toothpastes are mainly used to improve the appearance of teeth and may have whitening or coloring effects. Hygienic toothpastes are designed to maintain oral cleanliness and freshness and may include abrasive, deodorizing, or mixed types.

Therapeutic-preventive toothpastes help prevent and control common dental diseases.

They can be simple, such as anti-caries, anti-inflammatory, or desensitizing toothpastes, or complex, combining several functions at once, for example anti-caries with anti-inflammatory, whitening, anti-tartar, or anti-plaque effects. These toothpastes play an important role in maintaining oral health and preventing dental problems.

R.O.C.S. Medical Minerals forms a stable protective film when applied, which ensures the gradual penetration of active ingredients, promotes the saturation of the superficial enamel layer with minerals, and increases its resistance to acid exposure. Its use reduces tooth hypersensitivity and extends the longevity of dental restorations.

Paradontax Classic, Paradontax F, and Paradontax Extra Fresh contain several herbal extracts and active ingredients. These include echinacea extract, which enhances the local immunity of oral tissues; sage oil, which has antibacterial and deodorizing properties; myrrh extract, which has hemostatic effects; chamomile extract, known for its antibacterial and anti-inflammatory properties; rhatany extract, which has an astringent effect; and mint extract, which provides antibacterial and deodorizing action. In addition, the toothpaste contains sodium fluoride, which promotes remineralization of enamel and exhibits anticaries (caries-preventive) activity.

The next product is the toothpaste *SPLAT "Arcticum"*, which also contains hydroxyapatite, a component that strengthens tooth enamel and helps reduce increased tooth sensitivity. Biosol and zinc ions help maintain long-lasting breath freshness, while extracts of rhatany root and stevia provide effective protection of the gums and exhibit bactericidal activity. In addition, the organic amine fluoride (Olaflur, 1000 ppm) helps prevent the development of dental caries.

Biorepair toothpaste contains biomimetic microRepair particles composed of zinc-substituted hydroxyapatite, a mineral structurally similar to natural tooth enamel. These particles can bind to enamel and dentin, penetrate microdefects, and promote remineralization of dental hard tissues. As a result, they help repair microscopic enamel damage, reduce dentin hypersensitivity, and increase resistance to acid attack. In addition, zinc ions released from microRepair exhibit antibacterial activity and contribute to the inhibition of plaque formation.

Biorepair formulations are fluoride-free and rely on hydroxyapatite-based technology to protect and restore enamel.

Colgate toothpaste commonly contains sodium fluoride, an active ingredient that promotes enamel remineralization and increases resistance to acid attacks, thereby helping to prevent dental caries. Fluoride ions enhance the formation of fluorapatite in the enamel structure, which is more resistant to demineralization.

In addition, Colgate formulations often include mild abrasives and antibacterial agents that assist in plaque removal, maintenance of oral hygiene, and protection of gingival tissues.

In conclusion, modern toothpastes contain a variety of active components aimed at improving oral health and preventing dental diseases.

Products such as Colgate, Biorepair, Parodontax, and SPLAT differ in their composition and mechanisms of action but all contribute to maintaining oral hygiene, strengthening tooth enamel, and preventing caries and periodontal diseases. Therefore, the correct selection and regular use of toothpaste play an important role in the prevention of dental disorders and in maintaining overall oral health.

References:

1. Ulitovsky, S.B. (2002). *Modern Classification of Toothpastes*. Moscow: Medicine Publishing House.
2. R.O.C.S. Medical Minerals Product Information. R.O.C.S. Official Website. <https://rocs.com>
3. Parodontax Classic, Parodontax F, Parodontax Extra Fresh Product Information. GlaxoSmithKline Consumer Healthcare. <https://www.parodontax.com>
4. SPLAT “Arcticum” Toothpaste Product Information. SPLAT Oral Care. <https://splat.com>
5. Biorepair Toothpaste Product Information. Coswell S.p.A. <https://biorepair.com>
6. Colgate Toothpaste Product Information. Colgate-Palmolive Company. <https://www.colgate.com>
7. Zero, D.T. (2006). Dental caries process. *Dental Clinics of North America*, 50(3), 571–589.
8. Featherstone, J.D.B. (2000). The science and practice of caries prevention. *Journal of the American Dental Association*, 131(7), 887–899.
9. Hegde, M.N., & Hegde, M.K. (2017). Oral Health and Preventive Dentistry. *Journal of Clinical and Diagnostic Research*, 11(7), ZE01–ZE05.
10. Amaechi, B.T., & Higham, S.M. (2005). Methods for assessment of enamel remineralization: Current status. *Journal of Dentistry*, 33(3), 209–221.
11. Ganss, C., & Klimek, J. (2015). Toothpaste and Oral Hygiene: Mechanisms and Effects. *International Journal of Dental Hygiene*, 13(2), 79–86.
12. Lingström, P., & van Houte, J. (2003). Role of dental plaque in oral diseases. *Caries Research*, 37(Suppl. 1), 5–12.
13. Walsh, L.J. (2003). Contemporary technologies for remineralization therapies. *Australian Dental Journal*, 48(3), 146–152.
14. Ten Cate, J.M. (2001). Remineralization of enamel subsurface lesions by casein phosphopeptide–stabilized calcium phosphate solutions. *Journal of Dental Research*, 80(8), 1772–1776.
15. Van Loveren, C. (2001). Prevention of dental caries: A review. *International Dental Journal*, 51(6), 340–350