Review Article

# Chewing gums for optimal health


## Abstract

This article elaborates on the general aspects and health benefits of chewing gum. Chewing gums have been used since the time of prehistoric man as a source of entertainment and relaxation. It has also become a trendsetter with the teenagers. Currently, the health benefits of chewing gums are being studied and used in the treatment of various diseases. Certain medications have also been included in gums to act as an alternative drug delivery system. These gums have been found to be successful for the treatment of diseases, such as peptic ulcers, upper digestive tract cancer, oral candidiasis, and so on. It helps to relieve symptoms of xerostomia, Parkinsonism, tooth sensitivity after bleaching, and oral malodor. It helps in maintaining oral health, relieves stress, helps in weight loss, and improves alertness. Chewing gum may be distracting and irritating in numerous social environments, including schools, colleges, and the workplace. Research into the social effects of chewing gums is also necessary to further our knowledge into the psychosocial aspects of these gums.



**Key words:**
*Alternative drug delivery system, chewing gum, health benefits, medicated chewing gum*


## Introduction

Chewing is an important biological function that begins the process of ingestion and digestion, thereby affecting the entire body. This is an unstudied function that we perform innumerable times a day. The simple act of chewing gum may help to relieve anxiety, improve alertness, and reduce stress.[1] Chewing a sugar-free gum not only stimulates saliva production providing a buffering effect, it also helps to prevent tooth decay and contributes in remineralization. Chewing gum is gaining importance as a vehicle for administration of active medicaments that can improve health and nutrition. This method shows quick uptake of the drug, overcomes first pass metabolism, helps in the systemic administration via oral mucosa, and provides sustained release of the drug. The potential of medicated chewing gum as an alternative drug delivery system is under consideration for treatment of various diseases. The quantity of drug delivered will depend on mechanical chewing action, chewing force, frequency, and intensity.[2] Due to individual variation of these factors, standardization of drug delivery presents a stumbling block.

This review article helps:

- To summarize the general aspects and health benefits of chewing gum.
- Recent advances in medicated chewing gums and its use in the treatment of various diseases.

## Historical Perspective of Chewing Gum

Prehistoric men used to chew lumps of resin from mastic (*mastiche*) and/or sapodilla tree (*chicle*). Later, the spruce tree resin was used, that got replaced by paraffin wax, which became the new base for chewing gum. In 1869, Thomas Adams produced the first modern chewing gum using *chicle*, which got popular with the name "Adams


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New York No. 1." *Chicle*-based chewing gums had smoother and softer consistency and better flavor. In 1928, Walter Diemer invented a bubble gum that was elastic enough to stretch when filled with air.[3]

The modern day chewing gums contain synthetic resins for better quality, texture, and taste. They are available in different shapes, sizes (long sticks, ball form, and blocks), and flavors (peppermint, fruit, and spearmint). They are filled with liquid or speckled with crystals, with or without sugar with different flavor combinations, such as mango and watermelon.

## Ingredients of Chewing Gum

- Gum base: A complex mixture of synthetic elastomers, such as polyisobutylene and butyl rubber, provide elasticity and cohesion properties.
- Resins: Glycerol esters from pine resins are the natural resins and polyvinyl acetate is a synthetic resin. It acts as a binding agent between elastomers and fillers. It reduces the tendency of the gum to adhere to the teeth (detackifier) and to be cut into pieces during chewing.[4]
- Emulsifiers and fats: Monoglycerides, diglycerides, and partly hardened vegetable and animal fat are commonly used. They are used to soften the mixture and give the required chewing consistency.
- Antioxidants: Ascorbic acid, tocopherol, and butylhdroxytoluene are added to protect the gum base and flavors from oxidation.
- Fillers: Talc and calcium carbonate provide the right texture for the gum base.
- Powdered sugar or glucose syrup or sugar substitutes, such as xylitol and sorbitol.
- Flavoring agent: Mint, cardamom, watermelon, apple, mango, and so on.
- Other ingredients: Medicines (nicotine, fluorides, miconazole, nystatin[5]) and candy coating (with liquid sweetener). These are optional and vary between manufacturers.

## Ingredients of Bubble Gum

It contains almost the same ingredients as chewing gum, except having more natural "rosin," which makes it more viscous so that it will stretch and hold together when bubbles are blown.

## Health Benefits of Chewing Gum

Recent research indicates that chewing gum offers surprising health benefits. Some of them are enumerated in the following:

1. Improves memory and alertness: Chewing gum can help in improving memory and enhance cognitive powers. This may be attributed to increased activity in the hippocampus of the brain, while chewing[3] increased blood flow to the brain (25%–40%), which increases the level of oxygen, ensures faster disposal of $CO_2$, and thereby increases the supply of glucose that enhances the brain activity. Wrigley Science Institute[6] showed that chewing gum reduces stress and improves alertness, thereby contributing to improved cognitive performances. Chewing gum decreases stress and tension by increasing the blood flow in the body.
2. Dental benefits: Chewing gum increases saliva production, which flushes food debris, sticky sugars, and acids away from teeth surface, thereby reducing the risk of dental caries by up to 40%.[3] Stimulated saliva contains additional calcium and phosphate that helps in remineralization. Xylitol and sorbitol containing chewing gums have been shown to have a better anticaries effect by increased saliva production and strong antibacterial properties.[7,8] Xylitol chewing gum and/or syrup 10 g/day given 5 times daily helps to alleviate symptoms of acute otitis media[9] in children. American Dental Association (ADA)[10] suggests that chewing sugarless gum for 20 min after a meal can help prevent tooth decay; however, it cannot substitute for teeth brushing or flossing. A study by the University of York Health Economics Consortium[3] investigating the economic impact of chewing sugar-free gum concluded that if the entire British population chewed sugar-free gum, the National Health Service (NHS) could save over £100 million per year on dental care. Chewing gum reduces stain accumulation on teeth surfaces[10] and helps to reduce gingivitis and malodor.[11] Chewing gums containing Recaldent Calcium pyro phosphate (CPP) - Amorphous calcium phosphate (ACP)[8] is found to be effective to reduce postbleaching tooth sensitivity.
3. Chewing gum in Xerostomia and Parkinsonism: Chewing gum provides relief for most sufferers of dry mouth (Xerostomia), caused by drugs (eg, atropine), or congenital and developmental conditions.[3] Chewing gum increases swallow frequency and decreases latency of swallowing in an experiment in patients with stages 2–4 Parkinson disease that are asymptomatic for significant prandial dysphagia.[12] Sugar-free chewing gum also prevents hypoglycemic attacks in diabetic patients taking antidiabetic drugs.
4. Medicated chewing gum: Medicated chewing gum[4,13] offers a highly convenient patient-compliant way of dosing medications, for special population groups, such as children and elderly patients. Several ingredients are now incorporated in medicated chewing gum, for example, fluoride for prophylaxis of dental caries, chlorhexidine as a local disinfectant, nicotine[14-16] (Nicorette®, Leo) for smoking cessation, aspirin as an analgesic, and caffeine as a stay alert preparation. Children prefer chewing gum rather than oral liquids or tablets.[17,18] A medicated chewing gum containing colloidal bismuth subcitrate[19] helps in eradication

or substantial reduction of *Helicobacter pylori* present in the dental plaque and gingival sulcus in patients with a history of recurrence of duodenal or peptic ulcers. Addition of miconazole to the chewing gum helps in constant delivery of the drug for the effective management of chronic candidiasis.[20,21] L-Cysteine containing chewing gum[22] helps to eliminate acetaldehyde from the body of chronic alcohol drinkers and smokers, thereby preventing upper digestive tract cancers. Fortified gum provides a convenient way of intake for vitamins and minerals.[3] It helps to combat malnutrition by supplying vitamin A in the most convenient way.

5. Other benefits: Chewing action works the muscles of the jaw and neck,[23] especially those around the neck line. It helps in the fast recovery of bowel function after gastrointestinal surgery by stimulating the smooth muscle fibers of the intestine, increases the liver secretions, gut hormones, and pancreatic secretions.[24] Chewing gums with phosphate binders help to decrease salivary and blood phosphate levels in patients on dialysis with chronic kidney disease. It also helps in breathing and enriches brain with better oxygen supply.[25] Sugar-free chewing gum has low calorie count of 5–10 calories per serving and reduces cravings for high-calorie snacks, thereby regulating calorie intake. It may also stimulate lipolysis and increase energy expenditure, thereby helping in weight loss.[4,25]

## Disadvantages of Chewing Gum

- Dental problems: Frequent gum chewing may result in attrition of teeth. Sugared chewing gums can coat the teeth surfaces, thereby causing dental caries. Switching to a sugar-free chewing gum can alleviate this problem. The acidic filling of a chewing gum may reduce the microhardness of primary and permanent enamel, thereby causing dental erosion.[26]
- Jaw stress: Frequent gum chewing can contribute to temporomandibular joint disorder (TMD). The symptoms of TMD include severe facial pain and discomfort in the back of the neck.
- Other problems: Chewing gum may irritate the digestive system, leading to stomach aches. Chewing gum noisily, "popping" bubbles, or chewing while talking can be distracting and irritating in numerous social environments, including school and workplace.[25,26] Chewing gum may accidently get swallowed. It can pass along the digestive tract in an undigested form and is eliminated from the body within 1-2 days. But children less than six years of age may get choked on swallowing a gum. So under aged children should not be given chewing gum.
- Chewing gums are often disposed off carelessly by sticking it to surfaces of tables, benches, clothing, bags etc. It is a very laborious process to remove dried gum as it firmly sticks to the surface and resists removal. Cloth fabrics are sometimes irreversibly damaged due to gums. Dried chewing gums can be removed from hair and object surfaces with the help of peanut butter, ice, raw egg white and/ or WD-40 solutions.

## New Facts about Chewing Gum

- The world's oldest chewing gum is 9000 years old, which were made by hand. Today almost all gums are made by machine.
- Chewing gum can help one from crying while peeling onions and humans are the only animals on planet to chew on it.[27]

## Conclusion

Chewing gum has many dental and medical health benefits. Their use can provide relief in a variety of conditions and enhance the well being when used judiciously. In spite of their disadvantages, chewing gums provide a valuable contribution for the treatment of oral and general disease. Medicated chewing gums will soon be a part of alternative drug delivery systems. Chewing gum may be distracting and irritating in numerous social environments, including school and the workplace. Hence all the social and scientific reasons should be considered while advocating the use of chewing gums for general public.

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