

## NATURAL HERBAL TOOTHPASTE FORMULATIONS FOR ORAL HYGIENE: A REVIEW

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Article Received on 25 April 2026,  
Article Revised on 15 May 2026,  
Article Published on 01 June 2026,

<https://doi.org/10.5281/zenodo.20438463>

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**How to cite this Article:** <sup>1</sup>Atish Kumar Singh, <sup>1</sup>Raghav Kumar, <sup>1</sup>Faraz, <sup>2</sup>\*Ashok Kumar. (2026). Natural Herbal Toothpaste Formulations For Oral Hygiene: A Review. World Journal of Pharmaceutical Research, 15(11), 132–145. This work is licensed under Creative Commons Attribution 4.0 International license.

### 1. ABSTRACT

Keeping your tongue clean is incredibly essential since it influences how joyful, confident, and peaceful you feel every day. People are becoming more and more interested in herbal toothpaste because they want toothpaste that is natural, created with herbs, or not unhealthy for them. Medicinal plants including guava, neem, clove, tulsi, amla, honey, and miswak are typically found in herbal toothpaste. People have used these plants for a long time to maintain their gums and teeth healthy. Flavonoids, tannins, phenolic compounds, and plant extract oils are some of the natural biologically active substances found in botanicals that are excellent for plants. These things are known to help maintain your mouth's health and protect your gums and teeth. They help keep bacteria from getting out of control in the mouth, preventing plaque from developing, soothe swollen gums, and get rid of foul breath. This review speaks about how

herbal toothpaste may help keep your mouth clean, how it works, how it can destroy bacteria and viruses, and how it has become better in the past few years. Herbal toothpaste is a gentle yet effective approach to brush your teeth every day. They serve individuals with both natural medication and modern research.

**KEYWORDS:** Herbal toothpaste; Oral hygiene; Antimicrobial activity; Guava; Neem.

## 2. INTRODUCTION

Oral health is very important for overall health since it has a direct influence on nutrition, speech, social confidence, and quality of life in general. It's not just for eating and digesting food that you need healthy tooth and healthy gingiva. They also help you avoid the pain, anguish, and mental tension that come with thinking about how you appear and how you feel about yourself. Microbes are the main reasons of most oral health concerns. *Streptococcus mutans* is commonly known to be the main germ that causes cavities because it can stick to teeth and turn carbohydrates into acids that break down tooth enamel. *Staphylococcus aureus* and *Escherichia coli* are two more kinds of bacteria that can cause infections in the mouth and poor breath. Guava (*Psidium guajava*) leaves have gotten a lot of interest as a possible natural substitute in this case. Many civilizations have utilized guava leaves for medicinal for a long time. There are several bioactive chemicals in them, including as flavonoids, tannins, saponins, and essential oils. These plant substances are beneficial for dental care because they reduce inflammation, destroy bacteria, and ease discomfort. Studies have shown that extracts from guava leaves kill germs in the mouth, notably *Streptococcus mutans*. This makes it less likely that you may get cavities and plaque accumulation. Their anti-inflammatory characteristics help stop bleeding and gum inflammation, while their deodorizing properties help keep foul breath at bay. In the past several years, the attention has shifted to how to release active substances while making formulations to halt and cure oral illnesses. Most of the time, people use toothpaste to clean their mouths. It also works as an abrasive to get rid of plaque and food particles on your teeth, cover up bad breath, and release active chemicals like fluoride to help keep your teeth and gums healthy. Herbal products are very popular in stores these days. Because it works well to avoid negative effects when compared with chemical formulation. The tooth paste is mainly composed of abrasive agents (Calcium carbonate), detergents (Sodium lauryl sulphate), humectants (Propylene glycol), gelling agents (Gum tragacanth) which is used to maintain the stability, dispersibility, and forming properties. Other ingredients such as preservatives, sweetening agents, colors also used in formulation, water is a vehicle. Guava is an anti-inflammatory, neem is an antibiotic, peppermint is a flavoring agent, and additional ingredients are honey, which is a sweetening agent; glycerine, which is a humectant; calcium carbonate, which is an abrasive; and sodium lauryl sulfate, which is a detergent. This made people pay more attention to employing natural ingredients in herbal toothpastes. Toothpaste recipes were originally made in China and India between 300 and 500 BC. People used crushed bones, powdered eggs, and clam shells as abrasives to clean their teeth at that time. The modern toothpaste compositions we use today were created in the

1800s. People these days are more inclined to choose herbal and non-alcoholic products since they don't include artificial color, flavor, or fluorides, which can be bad for your health.

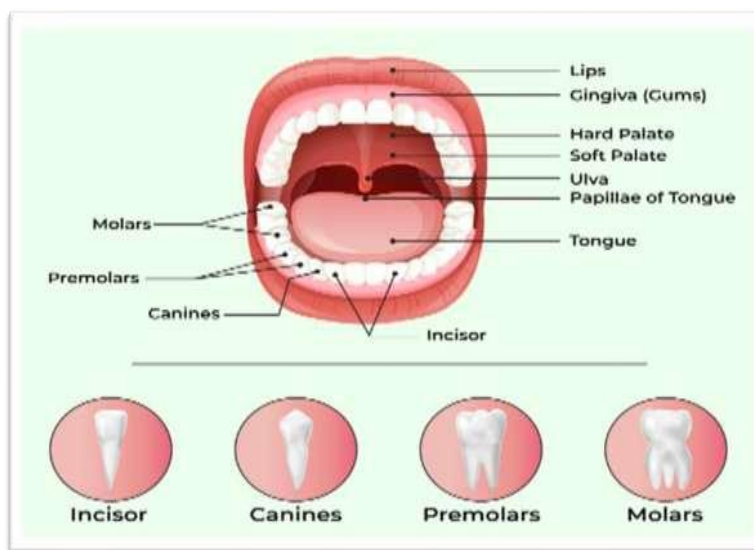


Fig. 2.1.1.: Teeth Type.

### Herbs Used In The Toothpaste

S.No.	Herbs	Biological source	Family	Chemical Constituents	Medicinal use
1.	Cardamom	The seeds of several plants in the genera <i>Elettaria</i> and <i>Amomum</i> .	Zingiberaceae	1,8-cineole, Linalol.	Antioxidant, Antibacterial, Anti-inflammatory, Antidiabetic.
2.	Guava	The genus <i>Psidium</i> and the species <i>Psidium guajava</i>	Myrtaceae	Vitamin E, Tetracosane.	Anti-bacterial, Anti-inflammatory.
3.	Tulsi	Obtained from <i>Ocimum sanctum</i> plant.	Lamiaceae	Linalol, Eugenol, Methylcinnamat, Camphor, Citral.	Anti-inflammatory, Antioxidant, Antimicrobial.
4.	Amla	Obtained from plant <i>Phyllanthus emblica</i> .	Euphorbiaceae	Tannins, Alkaloids, Fatty acid, Minerals	Antibacterial, Anti-inflammatory, Astringent
5.	Clove	Obtained from Dried flower buds of the <i>Syzygium aromaticum</i> tree	Myrtaceae	Eugenol, Caryophyllene, Acetyeugenol, Flavonoids.	Toothaches, Cavity prevention, Antibacterial.
6.	Honey	Obtained from Bees.	Apidae	Sugar, Amino acid, Minerals, Fructose	Antibacterial, Pain relief, Dry mouth.
7.	Neem	It is obtained from fully matured seeds of <i>Azadirachta indica</i> .	Meliaceae	Nimbin, Azadirachtin, Salannin,	Anti-inflammatory,
				Gedunin, Nimbidiol.	Cleaning teeth.

### 3. ORAL HEALTH AND PHYSICAL HEALTH

Several studies have shown that several personality factors might affect the health of your mouth. For instance, having personality disorders could make people more likely to have oral disease and modify how they feel about it. Some mental qualities, such worry, stress, unhappiness in everyday life, self-esteem, behavior patterns, and lifestyles, have been connected to how well people take care of their teeth. In this scenario, research has established that at least three things are going on. First, your personality traits might have an effect on how healthy your mouth is. Second, some traits of your personality are connected to poor practices that might affect your teeth. Third, personality factors can impact how people react to (understand) symptoms, which can affect how sick they are. Also, research has shown that mental stress (allostatic load) can change the way saliva appears and raise its levels (for example, protein content, cortisol levels, pH, etc.). Salivary proteins are particularly essential because they help keep the mouth healthy, defend it, and decide what the chemical and physical features of saliva are, such as how thick and slippery it is. Microorganisms also have unique jobs, such giving them food, helping them live and spread, and helping them stick together. persons with better-looking teeth tend to have more self-esteem and be more accepted by others than persons with dental issues. This illustrates that having ugly teeth might hurt people's social life. People who report their dental health is worse are also more likely to feel nervous, agitated, and sad. Several studies have shown that several personality factors might affect the health of your mouth. For instance, having personality disorders could make people more likely to have oral disease and modify how they feel about it. Some mental qualities, such worry, stress, unhappiness in everyday life, self-esteem, behavior patterns, and lifestyles, have been connected to how well people take care of their teeth. In this scenario, research has established that at least three things are going on. First, your personality traits might have an effect on how healthy your mouth is. Second, some traits of your personality are connected to poor practices that might affect your teeth. Third, personality factors can impact how people react to (understand) symptoms, which can affect how sick they are. Also, research has shown that mental stress (allostatic load) can change the way saliva appears and raise its levels (for example, protein content, cortisol levels, pH, etc.). Salivary proteins are particularly essential because they help keep the mouth healthy, defend it, and decide what the chemical and physical features of saliva are, such as how thick and slippery it is. Microorganisms also have unique duties, such as giving them food, helping them stay alive and spread, and helping them keep together. Fluoride in saliva is also vital for sustaining the enamel's equilibrium between losing minerals and gaining them back. Oral disease might also

hurt your mental wellness. For example, malocclusion, which is a common problem with teeth that aren't lined up properly, can not only impair how the patient feels about their body and how well they can use their mouth, but it can also lead to serious mental and psychiatric problems. This indicates that malocclusion makes life worse, and the greater the misalignment, the worse life is. persons with dental difficulties often have lower self-esteem and are less accepted by others than persons with better-looking teeth. This proves that having bad teeth can hurt people's social life. People who report their dental health is worse are also more likely to be nervous, agitated, and sad. Several studies have shown that several personality factors might have an effect on dental health. For instance, having personality disorders could make people more likely to have oral disease and modify how they feel about it. Some mental qualities, such worry, stress, unhappiness in everyday life, self-esteem, behavior patterns, and lifestyles, have been connected to how well people take care of their teeth. In this scenario, research has established that at least three things are going on. First, your personality traits might have an effect on how healthy your mouth is. Second, some traits of your personality are connected to poor practices that might affect your teeth. Third, personality factors can impact how people react to (understand) symptoms, which can affect how sick they are. Also, research has shown that mental stress (allostatic load) can change the way saliva appears and raise its levels (for example, protein content, cortisol levels, pH, etc.). Salivary proteins are particularly essential because they help keep the mouth healthy, defend it, and decide what the chemical and physical features of saliva are, such as how thick and slippery it is. Microorganisms also have unique duties, such as giving them food, helping them stay alive and spread, and helping them keep together. Fluoride in saliva is also vital for sustaining the enamel's equilibrium between losing minerals and gaining them back. Oral disease might also hurt your mental wellness. For example, malocclusion, which is a common problem with teeth that aren't lined up properly, can not only impair how the patient feels about their body and how well they can use their mouth, but it can also lead to serious mental and psychiatric problems. This indicates that malocclusion makes life worse, and the greater the misalignment, the worse life is. persons with dental difficulties often have lower self-esteem and are less accepted by others than persons with better-looking teeth. This proves that having bad teeth can hurt people's social life. People who report their dental health is worse are also more likely to be nervous, agitated, and sad.

Finally, recently it has been shown that chewing not only enables the mechanical crushing of food and aids digestion but also stimulates the central nervous system (particularly in the

hypothalamus and hippocampus) and homeostasis, which increases the temperature in the brain, improves cerebral blood flow, and activates the metabolism in the brain. Thus, tooth loss could also be a risk factor for cognitive decline and various forms of dementia, including Alzheimer's disease, and other causes of, such as Parkinson's disease.

The interaction of various oral microorganisms helps the human body against the invasion of undesirable stimuli abroad. This is because, in a similar way to the intestinal microbiome, it helps train the immune system, keeps dangerous colonizers away and produces small molecules that nourish the cells that line the mouth.

#### 4. MECHANISM OF ACTION

Herbal toothpaste keeps your mouth clean and stops dental problems in a number of ways. It has antibacterial qualities because it can break down bacterial cell walls and stop enzymes from working, which stops the formation of oral infections like *Streptococcus mutans*. It stops biofilm from forming and stops germs from sticking to teeth, which helps keep plaque from forming. Herbal components have anti-inflammatory characteristics that stop inflammatory mediators from working, which lowers gingival inflammation, swelling, and bleeding. Phytoconstituents have antioxidant qualities that protect oral tissues from damage produced by free radicals and speed up healing. Herbal toothpaste is good for your mouth's health in general since it makes your gums stronger and lowers the chances of bad breath. It also has astringent and deodorizing effects.



## 5. APPLICATION

- a. Used for daily cleaning of teeth and maintenance of oral hygiene.
- b. Helps in prevention and control of dental plaque.
- c. Reduces gingival inflammation and bleeding gums.
- d. Exhibits antimicrobial activity against oral pathogens.
- e. Aids in prevention of dental caries.
- f. Controls halitosis and maintains fresh breath.
- g. Suitable for sensitive teeth and gums.

## 6. ANTIMICROBIAL ACTIVITY

Herbal toothpaste has gotten a lot of attention as a natural alternative to chemical dentifrices because it has strong antibacterial properties against oral infectious agents that cause dental caries, gingivitis, and periodontal diseases. Herbal plants contain bioactive plant chemicals that give herbal toothpaste its antibacterial properties. . These chemicals kill bacteria and stop them from growing in different ways. This keeps your mouth healthy and stops diseases from spreading.

### 6.1. Neem (*Azadirachta indica*)

Nimbidin, a major active principle isolated from seed kernels of *A. indica* exhibits several biological actions. From nimbidin, other active constituents like nimbin, nimbinin, nimbidinin, nimbolide and nimbidic acid have been isolated which are responsible for its biological activities. Neem dental care products contain Neem leaf or bark extract. Neem leaf is rich in antioxidants and helps to boost the immune response in gum and tissues of the mouth. Neem offers a good remedy for curing mouth ulcers, tooth decay and acts as a pain reliever in toothache problems.



**Fig. 6.1.1.:** Neem (*Azadirachta indica*).

## 6.2. Miswak (*Salvadora persica*)

A lot of research has been done to understand how effective miswak is in killing infectious agents that can cause disorder, especially in the oral. Both water-based and methanol extracts of miswak were tested on different oral microorganisms such as *Lactobacillus acidophilus*, and even *Candida albicans*. The results showed that miswak is quite effective against a wide range of these microbes.

Interestingly, miswak seems to work even fast and more powerfully against Gram-negative bacteria. These include harmful pathogens like *Salmonella enterica*, *Pseudomonas aeruginosa*, and *Haemophilus influenzae*, which are known to cause serious infections.

In addition, three in vitro studies have further explored its benefits. The first study looked at how miswak affects certain oral bacteria like *Streptococcus sanguis*, *Streptococcus salivarius*, *Eikenella corrodens*, and *Porphyromonas gingivalis*.

These findings suggest that miswak is a promising natural option for maintaining oral hygiene and fighting harmful microbes.



**Fig. 6.2.1.: Miswak (*Salvadora persica*).**

## 7. ANTIBACTERIAL ACTIVITY

Toothpaste is vital for keeping the mouth clean because it stops bad germs from growing. There are a lot of different types of bacteria in the mouth, but some of them can cause common dental issues including tooth decay, plaque accumulation, gingivitis, and other gum disorders. To deal with this, toothpaste is made with active chemicals that fight these germs as you brush your teeth.

When you brush your teeth every day, toothpaste not only gets rid of food particles, but it also lowers the quantity of germs in your mouth. It kills germs, stops them from clinging to

teeth, and breaks down the sticky plaque film that builds up over time. If rid of plaque, it might cause more significant problems with your teeth. *Streptococcus mutans*, *Lactobacillus* species, *Actinomyces*, and *Porphyromonas gingivalis* are some of the bacteria that are often impacted. All of these bacteria are known to cause oral infections. Flavonoids, tannins, phenols, and essential oils from plants are some of the natural elements in these products. These kinds of chemicals help keep germs from growing in a more moderate and balanced way, and they usually have fewer negative effects.

Toothpaste's ability to kill microorganisms is important for keeping your mouth clean. Using it regularly can help keep your teeth healthy by preventing cavities, controlling plaque buildup, and reducing gum irritation.

### 7.1. Clove (*Syzygium aromaticum*)

Clove has been used in dental care for many years because of its natural healing properties. Its effectiveness mainly comes from a compound called eugenol, which is known for its ability to relieve pain, reduce inflammation, and control the growth of microorganisms. Because of these benefits, clove is still widely used in both traditional remedies and modern dental practices. Studies and practical use have shown that clove can effectively reduce dental pain when applied directly or used in dental products. Laboratory findings have also supported this, showing that clove extract can form a thin protective layer over exposed dentin and partially block the tiny tubules present in it. This reduces the movement of fluid inside these tubules, which is one of the main reasons behind tooth sensitivity. Overall, the combined effects of pain relief, inflammation control, and protection of dentin make clove a reliable and natural option for managing dental sensitivity and discomfort.



**Fig. 7.1.1: Clove (*Syzygium aromaticum*).**

## 7.2. Guava (*Psidium guajava*)

*Psidium guajava* is a medicinal plant of the family Myrtaceae and has long been utilised in herbal medicine for maintaining oral health. The leaves of guava contain a wide range of biologically active compounds, including flavonoids such as quercetin and guaijaverin, tannins, phenolic compounds, and triterpenoids, which are responsible for its therapeutic properties. Scientific investigations have reported that guava leaf extracts possess powerful antibacterial activity against common oral microorganisms like *Streptococcus mutans*, and *Porphyromonas gingivalis*, which are closely associated with dental plaque, caries, and periodontal infections. The ability of guava to prevent plaque formation is mainly linked to its inhibitory effect on bacterial adhesion and biofilm development on tooth surfaces. that strengthens gingival tissues and helps control gum bleeding. Moreover, the anti-inflammatory and antioxidant activities of guava leaves contribute to the reduction of gingival inflammation and protect oral tissues from oxidative damage. Because of these combined pharmacological effects, *Psidium guajava* is commonly included in herbal toothpaste formulations as a natural agent for controlling and improving overall oral health. Its effectiveness, along with its traditional use and safety, supports its importance as a valuable ingredient in herbal oral care products.



**Fig. 7.2.1: Guava (*Psidium guajava*).**

## 8. RECENT ADVANCES IN HERBAL TOOTHPASTE

Recently years, herbal toothpastes have seen significant development, moving beyond ancient practices toward more scientific and reliable approaches. Earlier formulations were mainly based on single plant extracts and traditional knowledge, but modern products now focus on combining multiple herbal ingredients in carefully designed formulations. These

combinations are often standardised, meaning that the active components are measured and maintained at consistent levels to ensure uniform effectiveness. There has also been a noticeable increase in clinical research. Some of these studies suggest that certain herbal formulations can help in reducing plaque accumulation and gingival inflammation. While the results are sometimes moderate, they are consistent enough to support their use in daily oral care. Formulation techniques have also improved. Researchers are now paying attention to preserving the activity of natural compounds during processing and storage.

## 9. FUTURE PERSPECTIVES

The future of herbal toothpaste is focused on improving traditional remedies and making them more reliable through scientific support. In the past, these formulations were mainly based on natural knowledge and experience, but now the aim is to make them more consistent and clinically dependable. With better than techniques in chemical constituents analysis, researchers can identify and measure the key active compounds present in herbs. This helps ensure that every batch of toothpaste give the same effect and maintains its quality. There is also a growing shift toward using combinations of different plant extracts rather than relying on a one ingredient. These polyherbal formulations are designed so that the ingredients work together to control bacteria, reduce inflammation, and gives antioxidant benefits, making them more effective for oral care. New formulation approaches are also being explored to improve how these herbal ingredients work. Methods that help in protecting and slowly releasing active compounds in the mouth can increase their stability and effectiveness over time. At the same time, modern herbal toothpastes are likely to include important components like fluoride or calcium-based compounds to ensure proper protection against tooth decay while still maintaining their natural appeal. From a research viewpoint, more well-planned and long-term clinical studies are needed to confirm their effectiveness in controlling plaque, managing gum diseases, reducing sensitivity, and preventing cavities. In addition, stricter regulations may require manufacturers to provide strong scientific evidence for their claims.

## 10. CONCLUSION

Herbal toothpaste has slowly become a popular choice over regular chemical-based products. This is mostly because it has many benefits and is typically safe and mild enough to use every day. Guava, neem, clove, and honey are just a few of the typical elements that work together to keep your mouth healthy. These natural ingredients help stop plaque from forming, stop cavities, and lower the risk of gum disorders including gingivitis and other ailments.

One of the best things about herbal toothpaste is that it has a lot of different benefits. It can kill germs, lower inflammation, function as an antioxidant, and even make gums feel a little tighter. This means that it not only helps clean the teeth, but it also keeps the gums healthy. One further reason it is becoming more popular is because it usually has less adverse effects than some synthetic compounds included in normal toothpastes.

More and more individuals are selecting herbal products for their everyday dental care as they learn more about natural and eco-friendly solutions. This has also made herbal dentifrices more useful in contemporary dentistry. There is still a need for more extensive and long-term study, even if many studies and short-term findings appear good. Standardizing herbal ingredients is also vital to make sure that every product works and is of the same quality. In general, herbal toothpaste has a lot of promise, especially when traditional knowledge is properly blended with current scientific methods to provide safe and effective dental care products.

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