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Garden Herbs to Gums: *Psidium guajava* an Effective management for tooth sensitivity

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Abstract

Tooth sensitivity is common dental condition that affects a significant number of people worldwide. It is characterized by sharp, often sudden pain or discomfort in the teeth when exposed to certain stimuli. In this review paper aims to explore the potential benefits of herbal chewing gum addressing teeth sensitivity. The paper discusses *Psidium guajava* leaf extract and other herbal ingredients commonly used in chewing gum formulations and their reported effects on tooth sensitivity. *Psidium guajava* is one which has an enormous health benefits also has medicinal value. It has known for its anti-inflammatory, antimicrobial, antioxidant, antidiarrheal, properties. Despite it has a therapeutic effect in the treatment of tooth diseases.

Key words : *Psidium guajava,* tooth sensitivity, dentin hypersensitivity, leaf extract, Chewing gum.

To cure inflamed tissues, reduce the number of oral pathogens and alters the host response is the main goal of dental treatment[14]. The use of plant extract has resurfaced and gained popularity in recent years[2]. Tooth sensitivity, also known as dentin hypersensitivity, occurs when the underlying dentin of a tooth is exposed. In dental clinics, one of the most frequent complaints from patients is dentin hypersensitivity (DHS). A quick, intense pain that develops from exposed dentin in

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reaction to non-noxious stimuli—typically thermal, evaporative, tactile, osmotic, or chemical—that cannot be linked to any other type of dental illness or defect is known as DHS[15]. Dentin is a porous tissue that contains microscopic tubules filled with nerve endings. When dentin becomes exposed, either due to gum recession, enamel erosion, or other factors, stimuli such as hot, cold, sweet, or acidic foods and drinks can reach the nerves within the tubules, leading to discomfort or pain. Tooth sensitivity becomes a common dental problem worldwide. This review deals with use of a leaf extract in chewing gum for to relieve tooth sensitivity along with other natural ingredients. Commonly used herbs include mint, eucalyptus, clove, green tea, chamomile, aloe vera etc.

Chewing gum is a chewable and masticable confection composed of a gum base, sweeteners, flavourings, and various additives. Administration of the drug either locally or systematically via oral cavity is the main characteristics of chewing gum. Herbal chewing gums are unique and innovative products which combines the age old tradition of chewing gum with the natural benefits of herbs. In this particular formulation, *Psidium guajava* leaf extract, derived from the leaves of the guava plant (*Psidium guajava*), is included as a natural ingredient.

The act of chewing substances for enjoyment and dental health can be traced back thousands of years. Ancient Greeks, Mayans, and Aztecs are known to have chewed on resin from various trees. Native American tribes, such as the Aztecs and Mayans, chewed on the sap of the sapodilla tree, also known as chicle. Chicle is a latex harvested from the sapodilla tree, and it became a popular chewing substance. In the 19th century, settlers in North America adopted the habit of chewing spruce tree resin. This practice gained popularity during the Civil War when soldiers used it as a pastime. Dr. William F. Semple, a dentist from Mount Vernon, Ohio, filed the first chewing gum patent application in 1869, requesting U.S. Patent No. 98,304 for the manufacture of chewing gum[22]. In 1928, Walter Diemer, an employee of the Fleer Chewing Gum Company, accidentally discovered a formulation for bubble gum. The "STATE OF MAINE PURE SPRUCE GUM" was the first chewing gum to be sold commercially in the United States, having been introduced in 1948. Chewing gum is now produced and consumed worldwide, with numerous brands and flavours available. Sugar-free and functional gums, such as those claiming to promote dental health or provide a burst of energy, have also become prevalent.

Merits of chewing gum :

Quick release, Quick absorption and good consistency of substance[24]. There are now chewing gum pills with two layers that are compacted in new medicinal items[4]. It is excellent for acute medication[10]. Chewing gum stimulates saliva production, which helps in neutralizing acids in the mouth and promoting the remineralisation of enamel. This can contribute to improved oral health. Chewing gum can be beneficial for individuals with dry mouth conditions by increasing saliva flow and providing relief from the discomfort associated with dry mouth. No requirement of water for drug swallowing[4]. Chewing sugar-free gum can help to reduce formation of plaque on teeth by increasing saliva flow, which washes away

food particles and bacteria. The increased saliva production facilitated by chewing gum helps to buffer acids in the mouth, potentially reducing the risk of cavities. Chewing gum with the breath-freshening properties can help to neutralize odours and provide a quick solution for bad breath. Chewing gum has been associated with increased blood flow to the brain, potentially leading to improved concentration, alertness, and cognitive function. Chewing gum has been suggested to have stress-relieving properties, providing a simple and accessible way to manage stress or anxiety in some individuals. Chewing gum, especially sugar-free varieties, may help in controlling appetite and reducing the desire to snack between meals. Chewing gum can serve as a mild form of exercise for the jaw muscles, promoting their strength and flexibility. Chewing gum, particularly nicotine gum, can be used as an aid for individuals trying to quit smoking by providing a controlled dose of nicotine without the harmful effects of tobacco smoke[3]. Chewing gum is often a socially acceptable and culturally ingrained habit, providing a shared experience and a sense of relaxation or enjoyment. Chewing gum is a portable and convenient option for freshening breath or addressing oral habits, making it a practical choice for many people.

Psidium guajava:

The fruit of *Psidium guajava* L., a member of the Myrtaceae family, is widely consumed in tropical regions such as South America, Bangladesh, Pakistan, Indonesia, and India[12]. All portions of *Psidium guajava* have long been used for therapeutic purposes[17]. In English, the plant is commonly referred to as

Figure 1. *Psidium guajava* Plant

"guava," in Spanish as guayabo, in French as goyave and goyavier, in Dutch as guyabaorgo-eajaab, in Portuguese as goiaba and goaibeira, and in Malayan languages as jambubatu[16]. Extensive research has highlighted its potential in exhibiting antibacterial, lipid-lowering, hypoglycaemic, hepatoprotective, anti-diarrheal, and antioxidant properties[9]. The plant that has been used in the enhancement of oral hygiene also consists of bioactive substances and to manage various systemic conditions, is *Psidium guajava*[6,11]. The *Psidium guajava* consists of important constituents like vitamins, tannins, phenolic compounds, flavonoids, essential oils, sesquiterpine alcohols and triterpenoid acids. The guava leaves consist Isoflavonoids, phenolic compounds, Gallic acid, catechin, epicatechin, rutin, naringenin, kaempferol that's why it having antioxidant, anti-inflammatory, antimicrobial, antihyperglycemic and analgesic action[5]. The guava leaf mainly consists two important flavonoids quercetin and guajaverin, quercetin having spasmolytic, antimicrobial, anti-inflammatory and antioxidant properties, whereas guajaverin known for its antibacterial action[19]. General uses of guava such as antidiarrheal[18], antimicrobial, antiparasitic,

antitussive, hepatoprotective, antioxidant, antigenotoxic, antimutagenic, anticancer, antiallergic and antihyperglycemic effects [9]. Using leaf extract toothpaste and gellies are formulated[1,22].

Advantages :

Chewing gum containing *Psidium guajava* leaf extract may offer potential advantages for individuals dealing with tooth sensitivity. While scientific studies specify this combination may be limited, certain properties of guava leaves could contribute to addressing teeth sensitivity. It's important to approach these potential benefits cautiously, citing available scientific literature and ensuring accurate information. Some potential advantages include.

It has antimicrobial properties that could help combat harmful bacteria in the mouth[20]. This may contribute to maintaining oral hygiene and reducing the risk of infections that can exacerbate tooth sensitivity. The anti-inflammatory properties might help reduce inflammation in the oral cavity, potentially alleviating discomfort associated with sensitive teeth[7]. The antioxidants present, such as flavonoids and polyphenols, may help neutralize free radicals. This could contribute to overall oral health and potentially alleviate symptoms of tooth sensitivity. The presence of minerals like calcium and phosphorus, which are essential for maintaining strong teeth. Strengthening tooth structure may help reduce sensitivity.

Certain compounds in guava leaves may have desensitizing effect, providing relief to individuals with sensitive teeth. These effects could be attributed to the interaction with nerve endings in the teeth. Natural astringent properties that could help tighten and strengthen gums tissue. This may contribute to reducing sensitivity by protecting the tooth roots. Guava leaves may help regulate oral pH levels. Maintaining a balanced pH environment in the mouth important for preventing acid erosion, which can contribute to tooth sensitivity. Chewing gum, in general, stimulates saliva production. Saliva helps in maintaining oral health by neutralizing acids and promoting remineralisation, potentially benefiting individuals with sensitive teeth. Chewing gum with guava leaf extract provides a natural and non-invasive option for addressing teeth sensitivity. It may serve as a complementary measure alongside other oral care practices.

Disadvantages :

While *Psidium guajava* (guava) leaf extract may have potential benefits, it's crucial to consider potential disadvantages or side effects, especially when addressing tooth sensitivity. Here are some potential drawbacks associated with *Psidium guajava* leaf extract chewing gum:

There may be limited scientific research specifically on the effects of *Psidium guajava* leaf extract on tooth sensitivity. This lack of comprehensive research can make it challenging to assess its safety and efficacy. Some individuals may be allergic to compounds present in guava leaves. Allergic reactions can vary from mild irritation to more severe responses. It's important to consider potential allergens and conduct patch tests before widespread use. While guava leaf extract may have potential benefits, there is a possibility

that it could exacerbate tooth sensitivity in some individuals. It's important to monitor for any adverse effects and discontinue use if sensitivity worsens. Individuals undergoing dental treatments or using other oral care products should be cautious about potential interactions between guava leaf extract and these treatments. Consulting with a dentist before incorporating new products is advisable. The environmental impact of obtaining guava leaves for extraction should be considered. Sustainable and ethical sourcing practices are important for minimizing the environmental footprint. The natural flavour of may not be appealing to everyone. Individual taste preferences can vary, and some users may find the flavour unpleasant. In some cases, individuals may experience digestive sensitivity to certain plant extracts. While guava leaf extract is generally considered safe, it's important to monitor for any adverse gastrointestinal effects, especially if the chewing gum is ingested. Chewing gum products containing herbal extracts may need to comply with specific regulatory standards. Ensuring adherence to local regulations and quality standards is essential for product safety. Chewing gum with specialized herbal extracts may be more expensive than conventional gum. Cost considerations may influence the accessibility and affordability of the product for some consumers. Users might be tempted to use guava leaf extract chewing gum excessively, thinking it will provide more benefits. However, moderation is crucial, and excessive use may lead to unintended side effects.

Creating an herbal chewing gum involves a combination of herbal extracts, gum base, sweeteners, and flavourings.

Ingredients :

Gum Base: Chicle or sapodilla gum is good options.

Herbal extract: This plant is rich in essential phytoconstituents, including tannins, triterpenes, and flavonoids such as quercetin. Notably, the presence of pentacyclic triterpenoids, such as guajanoic acid, contributes to its pharmacological significance. Additionally, Psidium guajava contains carotenoids, lectins, saponins, amritoside, beta-sitosterol, leucocyanidin, ellagic acid, uvaol, oleanolic acid, and ursolic acid. The array of bioactive compounds in Psidium guajava underscores its potential therapeutic utility. Tannins and flavonoids, for instance, have been associated with antioxidant properties, while triterpenes contribute to hepatoprotective effects. Quercetin, a flavonoid, has been linked to hypoglycemic activities, offering potential benefits for individuals managing diabetes. Guajanoic acid, a pentacyclic triterpenoid, has demonstrated lipid-lowering effects, suggesting a role in cardiovascular health[23].

Sweeteners: Natural sweeteners like honey or maple syrup can be used. Adjust the quantity based on desired sweetness level. Flavourings: Essential oils like peppermint or spearmint can enhance the flavour.

Binders: Add natural binders like guar gum or xanthan gum to improve the gum's texture.

Coating: Powdered sugar or a mixture of powdered sugar and starch can be used to coat the finished gum.

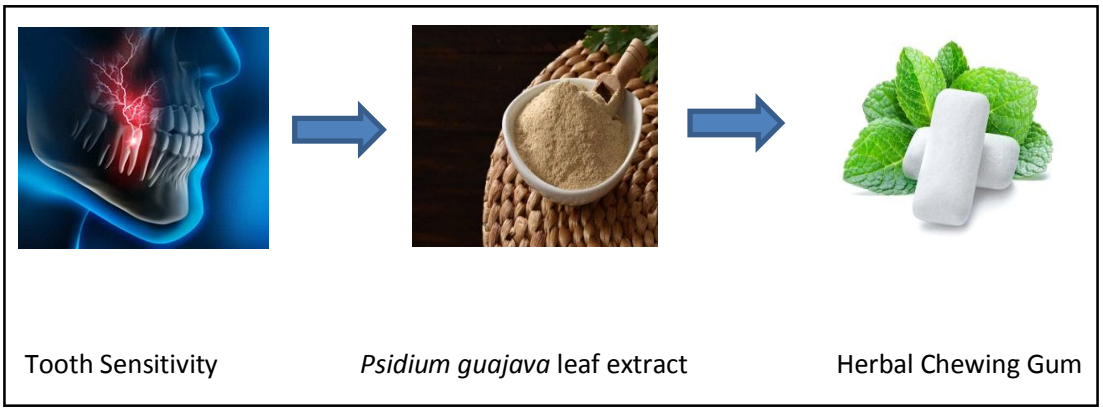

Figure 2: Flow diagram of preparation of herbal chewing gum

Method of preparation :

Vijay Metkari *et al*., gave the method of preparation of herbal chewing gum. Accurately weigh all ingredients. Crush gum base using mortar and pestle. Add adequate quantity of distilled water and stir it properly in a porcelain dish. Add honey for sweetening. It kept in a water bath at maintaining temperature about 35-45. Then drug will be added. Adequate amount of sweetener, colouring and flavouring agent is added with continuous stirring for 30 minutes. Prepared mass poured into moulds and allowed to cool at room temperature, gum pieces removed[15].

The utilization of *Psidium guajava* leaf extract in chewing gum presents a promising avenue for addressing tooth sensitivity. The natural properties of guava leaves, known for their anti-inflammatory and antibacterial characteristics, may contribute to alleviating tooth sensitivity issues. The incorporation of this extract into chewing gum offers a convenient and potentially effective method for individuals seeking relief from sensitive teeth. The identified bioactive compounds within *Psidium guajava,* including flavonoids and tannins, have been associated with antioxidant and anti-inflammatory properties. These attributes hold significant promise in addressing teeth sensitivity, a common oral health concern often linked to enamel erosion and exposed dentin. The antioxidant effects may contribute to reducing oxidative stress in the oral cavity, potentially mitigating the discomfort associated with sensitive teeth.

Further research is warranted to delve into the specific mechanisms through which Psidium guajava leaf extract may alleviate tooth sensitivity. Rigorous clinical trials and long-term studies are needed to assess the sustained efficacy and safety of this natural remedy.

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