



“FORMULATION AND EVALUATION OF GUAVA LEAF EXTRACT- BASED HERBAL GUMMIES”

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ABSTRACT:

The main aim of the research work is to prepare herbal gummies that can be used for Toothache. Herbal gummies for toothache are a type of herbal remedy that is designed to help alleviate pain and discomfort associated with toothaches. The gummies typically contain Natural ingredients such as herbs, essential oils and other plant- based compounds that are Known for their anti- inflammatory and analgesic properties. The herbal gummies were produced by using Psidium guajava (common name-guava) is well known tropic tree which is abundantly grown for fruit. It belongs to phylum Magnoliophyte, class Magnoliopsida and Myrtaceous family. Guava contains digestive, immunostimulant, hypoglycaemic, anticancer, antioxidant, anti-inflammatory, analgesic, lipid lowering, anti-anaemic, anti-diarrheal and anti-obesity properties. And clove oil contains eugenol that can be used as antiseptic and local anaesthetic and gelatine, agar as gelling agent and honey to produce natural sweetness. Herbal gummies for toothache are typically taken orally and are chewed like regular gummies. They are believed to work by reducing inflammation and pain in the affected area, as well as by promoting overall oral health.

KEYWORDS: Herbal gummies, Guava leaves, clove oil, toothache, anti-inflammatory.

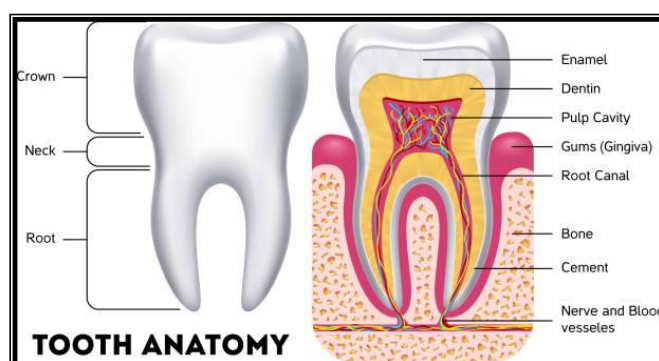
INTRODUCTION:

ANATOMY OF TOOTH:

Teeth are the hardest, mineralized structure that are found in the Jaws of most vertebrates, including humans. They are used to cut, tear, and grind food, as well as for others functions such as speech and anaesthetic appearance. Here's a brief overview of the Anatomy of teeth.

1. **Crown:** This is the visible part of the tooth that is above the gum line. The crown is covered by a layer of enamel, which is the hardest substance in the human body. Enamel protects the tooth from damage caused by chewing, biting, and grinding.
2. **Root:** This is the part of the tooth that is embedded in the jawbone. The root is covered by a layer of cemented, which helps to anchor that tooth in place. The root also contains a pulp cavity, which houses nerves and blood vessels that provide nutrients to the tooth.
3. **Dentin:** This dense, hard tissue makes up the majority of a tooth. Dentin, which is tougher than bone but softer than enamel, gives a tooth its shape and structure.
4. **Pulp:** This refers to the soft tissue found at the tooth's center. If the pulp is injured or infected, a root canal may be required to remove it. The pulp contains nerves and blood vessels that supply the tooth with oxygen and nutrients.
5. **Gum line:** This is the area where the tooth meets the gum tissue. The gum line aids in shielding the tooth from bacteria and other dangerous substances.
6. **Periodontal ligament:** This is a band of tissue that connects the tooth to the jawbone. The periodontal ligament aids in absorbing the impact of biting and chewing on the teeth.

Fig 1: Anatomy of tooth



TOOTHACHE: Toothache, sometimes referred to as dental pain, is discomfort in the teeth or their supporting tissues that is caused by non-dental illnesses or that is referred to the teeth. When it is severe, it may affect eating, sleeping, and other everyday tasks.

Toothache can be caused by a variety of factors, including:

Common symptoms of toothache include:

- ✓ Pain or sensitivity when biting or chewing.
- ✓ Sharp pain when consuming hot or cold beverages or food.
- ✓ Throbbing pain in or around the tooth.
- ✓ Swelling in the gums or face.
- ✓ Fever or headaches (in more severe cases).
- ✓ Pain when chewing.
- ✓ Sensitivity to hot, cold or sweet food.
- ✓ Bleeding from tooth or gums.

CAUSES OF TOOTHACHE:

Toothache can be caused by a variety of factors, including:

- 1) Tooth decay
- 2) Gum disease
- 3) Tooth abscess
- 4) Impacted wisdom teeth
- 5) Dental injury
- 6) Sinus infection
- 7) Temporomandibular joint (TMJ) disorder
- 8) Teeth grinding

DENTAL CAUSES OF TOOTHACHE:

- 1) Pulpal
- 2) Pulpitis
- 3) Dental hypersensitivity
- 4) Periodontal
 - a) Apical periodontitis
 - b) Food impaction
 - c) Combined pulpal-periodontal
 - d) Periodontic-endodontic lesion

INGREDIENTS:

Guava:



Fig 2: Guava Leaf

Any of several tropical American shrubs or small trees belonging to the myrtle family, especially those of the genus *Psidium*: a shrubby tree (p. guajava) is widely cultivated for its sweet, tangy yellow or pink flesh and yellow-skinned fruit. The guava fruit resembles a pear or round shape. Bioactive compounds and a variety of macro and micron nutrients that promote health are found in guava leaves.

SCIENTIFIC CLASSIFICATION:

- **Kingdom:** plantae shops
- **Subkingdom:** Trophobionta vascular shops
- **Super division:** Spermatophyta seed shops
- **Division:** Magnoliophyta flower shops

- **Class:** Magnoliopsida Dicotyledonous
- **Subclass:** Rosidae
- **Order:** Myrtaceae
- **Subfamily:** Myrtoideae
- **Tribe:** Myrtaceae
- **Gender:** Psidium
- **Species:** Psidium guajava the origin of guava is Psidium Guajava.

❖ **Parts used:** Leaves

BENEFITS OF GUAVA LEAVES:

- ✓ Helps in stopping diarrhoea.
- ✓ Helps in losing weight.
- ✓ Helps to manage blood sugar levels.
- ✓ Helps in improving your skin texture.
- ✓ Help relieve painful symptoms of menstruation.

CLOVE OIL:



Fig 3: Clove Oil

Taxonomical classification:

- **Domain :** Eukaryote
- **Phylum :** Tracheophyta
- **Class :** Magnoliopsida
- **Order :** Myrtales
- **Family :** Myrtaceae
- **Genus :** Syzgium
- **Species :** aromaticum

❖ **Parts used:** Bud and Stalk

Uses:

- ✓ As an Antimicrobial, to help kill bacteria
- ✓ As a pain reliever for conditions such as tooth ache and muscle pain
- ✓ For digestive upset
- ✓ To relieve respiratory conditions like cough and asthma.

GELATINE:



Fig 4: Gelatine

SYNONYM: Hydrolysed collagen, gelatine hydrolysate, hydrolysed gelatine.

CATEGORY: Gelling and non-gelling.

DISCRIPTION: A Whitish powder, odourless.

CHEMICAL CONSTITUENTS: Amino acids, peptides, minerals, water, lipids

USES:

Gelatine is a common ingredient in soups, broths, sauces, gummy, candies and medications.

HONEY:



Fig 5: Honey

SYNONYM: Pure Honey.

CLASS: Utilized as an organic sweetener.

DESCRIPTION: Honey is a sticky liquid that ranges in colour from pale yellow to reddish. They have a distinctive and enjoyable Odor, as well as a somewhat acrid and sweet flavour.

CHEMICAL COMPOSITION: Approximately 2% sucrose, 35% glucose, and 45% fructose.

APPLICATIONS: Honey is used as an anti-inflammatory, antioxidant, and antibacterial agent.

AGAR:



Fig 6: Agar

SYNONYMS: Chinese gelatine, Chinese isinglass, Japanese gelatine, Japanese isinglass. **CATEGORY:** Gelling and thickening agent, stabilizing agent.

DESCRIPTION: Yellowish crystalline, odourless.

CHEMICAL CONSTITUENTS: Agar is comprised of two polysaccharides, agarose and agaropectin, with roughly 70% of the mixture being agarose and about 30% being agaropectin.

USES: Agar is used to gel, stabilize, thicken, texturize, and enhance the texture of sauces, meat products, dressings, dairy products, confections, baked items, and drinks.

LEMON:



Fig 7: Lemon

SYNONYM: Nimbu, Citrus limon

BIOLOGICAL SOURCES: The lemon peel comes from the fresh, ripe fruits of Citrus limon (L.) bumm. f. (C. medico var. limon Linna.), which is part of the **Rutaceae** family.

CHEMICAL CONSTITUENTS: Limonene (90%), citronellal, geranyl acetate, alpha-pinene, camphene, and terpineol are the main components of the volatile oil.

USES: Utilized in stomachics, carminatives, perfumery, and flavorings.

MATERIALS & METHODS:

Table 1: List of Materials

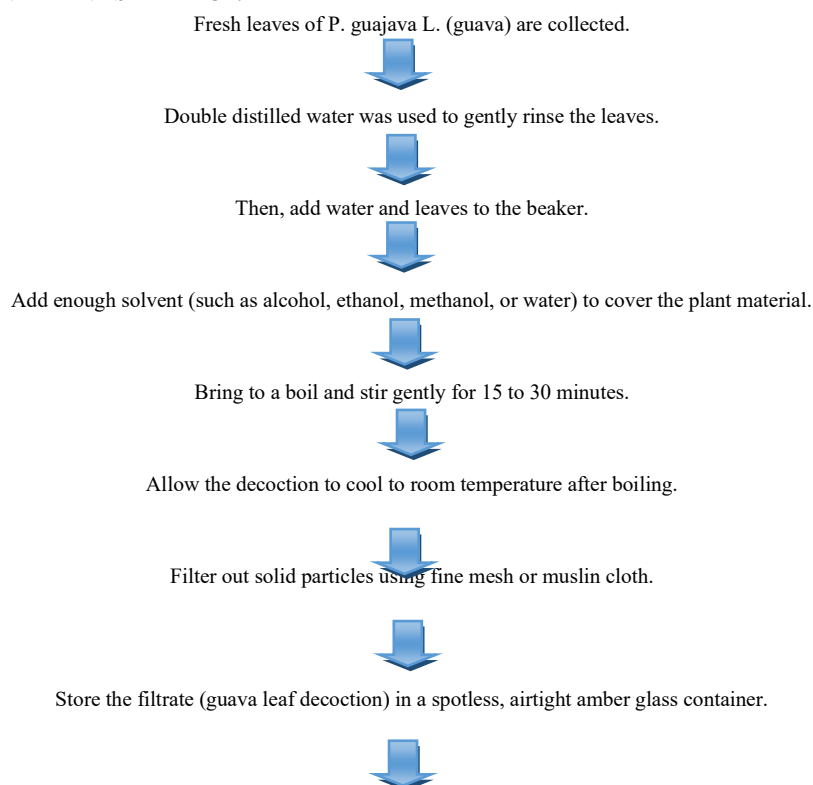
SR.NO.	MATERIAL	PROPERTIES
1.	Guava Leaves Extract	• Anti-inflammatory • Anti- bacterial
2.	Honey	• Anti-inflammatory • Anti-bacterial
3.	Gelatine	• Thickening agent • Gelling agent
4.	Agar	• Stabilize • Texturize
5.	Clove Oil	• Antiseptic • Carminative
6.	Lemon Juice	• Flavouring agent • Carminative

Table 2: List of Equipment

SR.NO.	EQUIPMENT
1.	Measuring Cylinder
2.	Beaker
3.	Funnel
4.	Burner
5.	PH Meter
6.	Refrigerators
7.	Molds

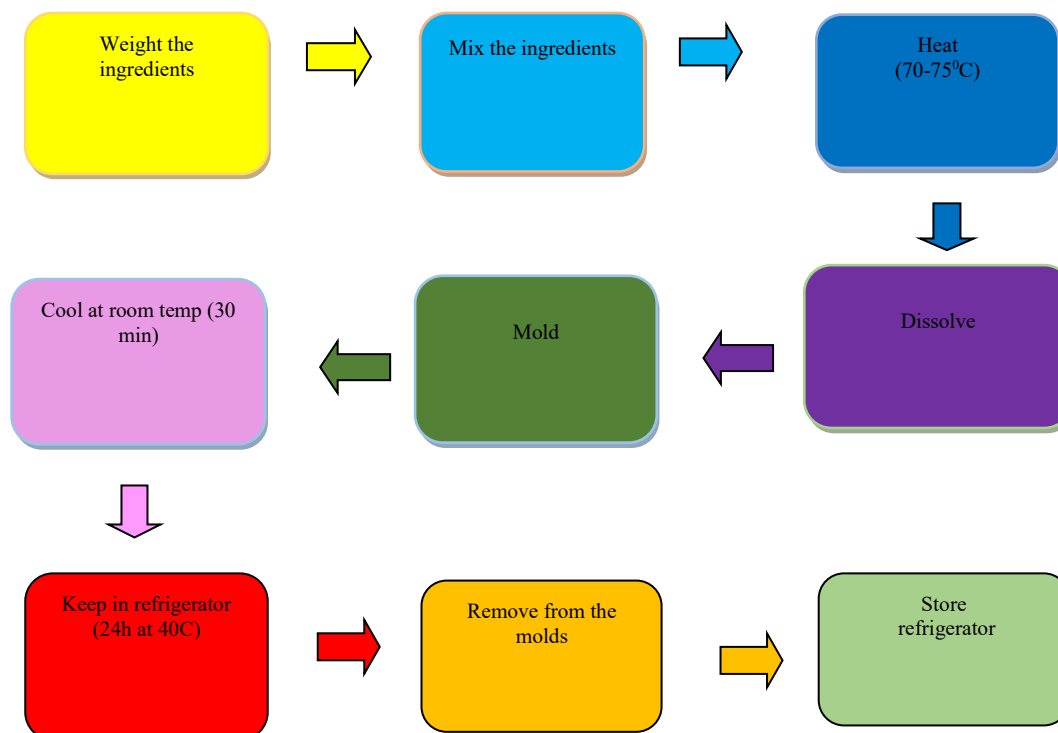
EXPERIMENTAL WORK:

PREPERATION OF GUAVA LEAVES EXTRACT:

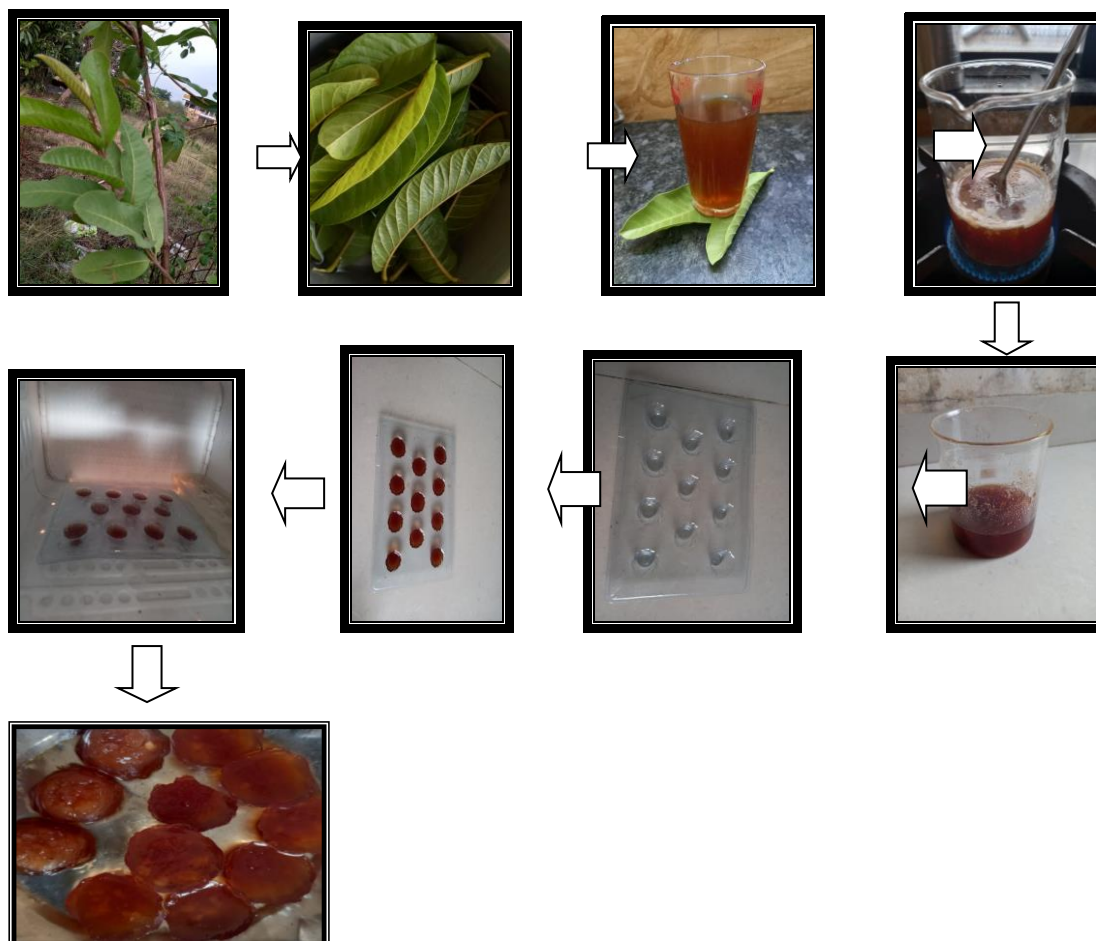


Keep refrigerated if storing for more than 24 hours; preferably use within a few days.

FORMULATION OF HERBAL GUMMIES:



Flow Chart



FORMULATION TABLE:**Table 3: Formulation Table**

INGREDIENTS	F1	F2	F3
Guava Leaf Extract	250 ml	250 ml	250ml
Honey	50 gm	50 gm	50 gm
Gelatine	10 gm	10 gm	10 gm
Agar	5 gm	-	5 gm
Water	Q.S	Q.S	Q.S
Clove Oil	1-2 ml	-	-
Lemon Juice	2-3 drops	2-3 drops	2-3 drops

EVALUATION PARAMETERS:

- 1. Physical Evaluation:** The colour and homogeneity of the herbal formulation were checked through visual observation. The scent of the herbal mixture and the herbal mixture was analysed.
- 2. pH:** A digital pH meter was used to measure the pH of the herbal gummies.
- 3. Visual inspection:** shape and size were assessed according to range and length.
- 4. Dissolution test:** The dissolution medium (water) is heated to between 36.50 and 37.50 degrees Celsius, one lozenge unit (gummy) is placed in the equipment, the container is covered, and the apparatus is operated at the required rate. Following two hours of working in the acidic environment, aliquot the liquid and immediately place it according to the buffer stage instructions.
- 5. Hardness testing:** The hardness and stability of the herbal gummies were evaluated using a hardness tester.
- 6. Sensitivity Test:** The herbal gummies passed the acceptance criteria for difference testing and visual examination based on appearance, texture, smell, taste, size, ranking, and shape. **Shape:** Circular.

RESULTS AND DISCUSSION:**Formulation of Herbal Gummies:**

Batch F1: This batch contains honey as a sweetener, along with guava leaf extract, clove oil, lemon juice, gelatin, and agar.

Batch F2: In this batch, gelatin is used as a gelling agent together with guava leaf extract, lemon juice, and honey.

Batch F3: This formulation uses gelatin and agar as gelling and stabilizing agents, along with guava leaf extract, lemon juice, and honey.

EVALUATION PARAMETERS:**Table 4: Evaluation Parameter of Herbal Gummies**

SR.NO.	FORMULATION PARAMETER	BATCH NO.		
		F1	F2	F3
1.	Colour	Brown	Brown	Brown
2.	Odour	Characteristics	Characteristics	Characteristics
3.	Taste	Sweet	Sweet	Sweet

PH:**Table 5: PH of Herbal Gummies**

SR.NO	FORMULATION NO.	PH
1.	F1	4.5
2.	F2	4.6
3.	F3	4.6
4.	Standard	4.6

SUMMARY AND CONCLUSION:

The formulation and evaluation of herbal gummies incorporating guava leaf extract for toothaches presents a promising approach to leveraging traditional medicine in a modern, palatable dosage form. Guava leaves are well-documented for their antimicrobial, anti-inflammatory, and analgesic properties, attributed to compounds like flavonoids and tannins. The process involves preparing a standardized guava leaf extract, then combining it with gelling agents (like gelatine or pectin), sweeteners, flavourings, and other excipients to create a stable and appealing gummy matrix.

Evaluation of these gummies is crucial to ensure their quality, safety, and efficacy. Key parameters assessed include physical attributes (appearance, taste, texture), physicochemical properties (pH, weight variation, moisture content), and critically, the uniform distribution and release of the active guava leaf extract. Microbiological purity and rigorous stability studies are vital to ensure a safe product with an adequate shelf life. Furthermore, in vitro efficacy tests, such as antimicrobial activity against oral pathogens and anti-inflammatory assays, are essential to substantiate the traditional

claims of guava leaf extract for toothache relief.

Challenges in formulation include masking the distinct herbal taste, maintaining the stability of the extract's bioactive compounds during processing and storage, achieving optimal texture, and ensuring consistent dosing.

Herbal gummies formulated with guava leaf extract offer a convenient and consumer-friendly alternative for managing toothaches, particularly appealing to individuals who prefer natural remedies or have difficulty with conventional dosage forms. The inherent properties of guava leaf extract—specifically its proven antimicrobial, anti-inflammatory, and pain-relieving effects—provide a strong scientific basis for its application in oral health. Successful formulation and evaluation of these gummies, demonstrating good physical and chemical stability, precise dosing, and confirmed bioactivity (e.g., inhibition of oral bacteria and reduction of inflammation), would solidify their potential as an effective adjunctive or standalone remedy for toothaches.

While traditional uses are well-established, comprehensive scientific validation through robust evaluation methods is paramount to ensure the product's safety, efficacy, and widespread acceptance in modern healthcare. Further clinical studies would ultimately be necessary to confirm the efficacy and safety of such gummies for toothache relief in human subjects.

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