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FORMULATION AND CHARACTERIZATION OF HERBAL GUMMIES BASED ON CHAMOMILLA RECUTITA EXTRACT

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ABSTRACT

With the increase in the number of insomnia and anxiety, particularly in individuals with GI disorders this research intended to develop gummies with chamomile. Chamomile has been. For thousands of years, it has been employed as a natural remedy to calm the mind and induce restful sleep. This study primarily focused on providing an alternative to conventional medication by encouraging regular use in an innovative dosage form, chewable gummies. This study developed gummies containing chamomile with three different gelling agents; using the following gelling agents; pectin, guar gum, and gelatin. The study looked at the effects of various types and levels of gelling agents on some physical properties of the gummies, specifically physical appearance, texture (hardness, chewiness), pH and density. The gummies were prepared by heating to dissolve and then cooled to allow them to solidify. The results clearly showed that the gelling agents behaved differently given their interactions with each other, the active pharmaceutical ingredients (API) in the formulation (e.g., chamomile) and excipients. Of all of the formulations tested, the gummy that contained 2% pectin had the most favourable physical attributes and texture to be formed prepared into chewable gummies.

KEYWORDS: Chamomile, Gummies, Gelling Agents, Antioxidant, Insomnia, Anxiety, Anti-inflammatory.

INTRODUCTION

1. Herbal medicines

Herbal medicines are a type of nutraceutical and dietary supplement. The word “nutraceutical,” created by Dr. Stephen DeFelice, merges “nutrition” and “pharmaceutical”

and indicates foods or ingredients that offer medical or health advantages, such as preventing or treating diseases. Hippocrates' philosophy, 'Let food be your medicine,' is embodied in this concept.

In short, nutraceuticals = NUTRITIVE + PHARMACEUTICAL—food-based products, including supplements, that offer health benefits.

2. Chamomile

Fig 1 Chamomile Flower.

Pharmacognosy of Chamomile flower.

1. Plant profile

Botanical Name: Chamomilla recutita (L.) Rauschert

Common Name: German chamomile, blue chamomile, scented mayweed

Synonyms: Matricaria chamomilla, Matricaria recutita, Chamomilla chamomilla

Family: Asteraceae

2. Taxonomic hierarchy

Kingdom: Plantae

Phylum: Angiosperms

Order: Asterales

Family: Asteraceae

Genus: Chamomilla

Species: Chamomilla recutita (L.) Rauschert

3. Other species of Chamomilla

Chamomilla suaveolens (L.) Rydb.

Chamomilla matricarioides (Less.)

Chamomilla parthenium

There are several types of chamomile, such as German chamomile (Matricaria chamomilla), Roman chamomile (Chamaemelum Nobile), Moroccan Chamomile (Ormenis multicaulis),

Cape Chamomile (Eriocephalus punctulatus). Roman and German chamomile are the most often utilised varieties of chamomile. Chamomile medicinal uses; promoting relaxation and sleep, treating digestive issues, soothing skin irritation, reducing inflammation.

- Advantages of chamomile are; promotes relaxation, anti-inflammatory digestion aid, skin care benefits, safe and natural.
- Disadvantages of chamomile are; may show allergic reaction, interactions with medication, should be avoided during pregnancy and breastfeeding.
- Chemical constituents of chamomile; Chamomile is a medicinal herb that has been used for centuries to treat various ailments. Some of the key chemical constituents of chamomile includes; Chamazulene, apigenin, bisabolol, chlorogenic acid, geraniol, β-farnesene.

3. Gummies

Gummies are dietary supplement included in nutraceuticals used to treat illness or any deficiencies and can be used in daily routine intake. Gelling agents such as gelatin, pectin, and agar-agar are typically used to form gummies. Chamomile gummies are a type of dietary supplement that contain chamomile extract in a chewable gummy form, these gummies are often marketed as a natural and convenient way to promote relaxation and reduce stress.

MATERIALS AND METHOD

Materials

- **Active ingredient:** Chamomile flowers.
- **Apparatus and Instruments:** Soxhlet extractor, Volumetric flasks, Beakers, Test tubes, Porcelain dish, Glass rod/stirrer, measuring cylinders, Pipette, Petri plates, Rubber piping, Cotton, Weighing balance, Water bath, Heating mantle, Hot air oven, Laboratory Stirrer, Magnetic stirrer, Refrigerator, Mixer grinder, UV-VIS double beam spectrophotometer, Digital pH meter.
- **Excipients:** Corn starch, food colouring, pectin, guar gum, distilled water, ethanol (C2H5OH), and dextrose.
- **Ethanol:** 20gm of dry chamomile powder was packed into thimble and subjected to Soxhlet extraction with 200 ml ethanol as solvent, extraction was carried out for 14hrs, and temperature was maintained at 100°C. The Color of the extract was dark greenish yellow.

METHODOLOGY

- **Collection of flower**

Fresh flowers of chamomile were collected 1000g flowers were purchased from the local market of Navi Mumbai.

- **Drying of flowers**

The flowers kept under sun for drying. For obtaining sun-dried flowers process was take places for 4 to 5 Days.

- **Pulverization and sieving of flowers into micro powder**

The flowers were ground with a mortar and pestle and then passed through a sieve no. 60 to achieve fine powder granules.

- **Extraction procedure**

A 20 g of coarse powder was weighed and filled in the sample tube and cotton was placed above it few ceramic chips were put in the flask. The assembly was set up with a condenser over a water bath. The condenser was assembled with inlet and outlet pipes using a water pumping motor. A total of 200 ml of ethanol was added from above through the siphon tube. The thermometer was used to keep the water bath at a constant temperature of 100°C. The extraction process continues until the ethanol in the siphon tube turns colorless, which approximately needed 14 hours. Upon finishing the extraction process, the assembly is switched off. The solution was subsequently placed in a porcelain dish and maintained over a water bath for evaporation of the solvent. The extract is subsequently kept in an airtight container at 4^0C for later use. The extracted product is a deep greenish yellow compound.

- **Phytochemical Testing**

The concentrated extracts were utilized for primary screening of different phytochemicals such as Carbohydrates, Amino acids, Alkaloids, flavonoids, Steroids & Terpenoids, Glycosides, Tannins, and phenols, Saponin.

- **Determination of Antioxidant Activity**

Principle

The antioxidant property of the sample is checked by FRAP (ferric reducing antioxidant power) assay. The FRAP test accomplishes this by converting ferric ions into ferrous ions

using the antioxidants found in the sample. Once the ferric ions are reduced, it forms an intense blue color, which is measured spectrophotometrically. at 700nm.

Procedure

1. Make 5 concentrations of the extract make up to 1ml i.e., 20 µl, 40 µl, 60 µl, 80 µl, 100 µl. Then add ethanol & amp; makeup to 1ml.
2. Add 2.5ml phosphate buffer & 2.5ml 1% potassium Ferro cyanide in those created Concentrations.
3. Cover the test tube with Aluminium foil & incubate at 50ºC in a water bath for 20 minutes (start the timer once temp. reaches 50ºC).
4. Shake and add 2.5ml of 10% TAA & centrifuge at 300rpm for 10mins.
5. Pipette out 2.5ml supernatant layer and add 2.5ml distilled water + fecl3 and will give blue Color at an absorbance of 700nm.
6. The higher the absorbance higher the antioxidant property.
7. Prepare a negative control or blank i.e., add all the chemicals in 1ml ethanol without the Extract.

- **Formulation**

Preparation of gummies

- ❖ Weigh all the ingredients.
- ❖ In the heating mantle keep the beaker with q.s distilled water poured in it.
- ❖ Add jellying agent (pectin or guar gum) and gently stir the mixture until little thick consistency is formed heat until lumps are removed. (do not stir vigorously it may form bubbles).
- ❖ Add citric acid, starch, chamomile extract to it and stir gently.
- ❖ Add dextrose and food color and stir.
- ❖ Cool the mixture at room temperature and pour mixture in the mould.
- ❖ Let the gummies set at Room Temperature keep it in Refrigerator for a while.
- ❖ Remove gummies very carefully from mould.

Table 1: Formulation Table.

Sr. No.	Ingredients	Quantity	Property
1	Chamomile extract	1.5ml	API
2	Gelatin	18gm	Gelling agent
3	Dextrose	20gm	Sweetening agent
4	Citric Acid	1gm	pH modifier, preservative

5	Corn Starch	1.5gm	Binder, Coating Agent
6	Food Color	q.s	Coloring agent
7	Water	q.s	Solvent

Fig 2 Gummies without coating.

Fig 3 Gummies with coating.

Storage Condition

- ❖ Pack the gummies in zip lock bag and store all gummies in air tight container
- ❖ Keep it in Cool and dry place away from moist

- **Evaluation parameters**

1) **Physical characteristics:-** The prepared gummies were assessed for their physical properties, including color, taste, odor, and texture. The results showed that all the gummies exhibited a uniform profile: they were orange in color, sweet in taste, had a melon odor, and possessed a gummy texture.
2) **Weight variation test:-** Firstly, select 5 gummies, weigh all 5 gummies collectively. The average weight of the gummies can be calculated by following formula.

   Average weight = weight of 5 gummies / 5
3) **Density determination:-** Measure the height, width, length, and volume of each gummy placed in separate labeled containers, each filled with a different solvent (water, salt water, vinegar, and methanol). Calculate and record the information.
4) **pH determination:-** Add 1g of gummy into a 50ml beaker and add 10ml of distilled water. Stir well to ensure a complete solution. Assess the solution's pH for 5 minutes with a pH meter.
5) **Solubility:** The gummies are added to solvents like water, ethanol, and HCL to determine how soluble they are.

RESULT AND OBSERVATION

Characteristics table

Table 2: Characteristics table.

Sr.No	Characteristics	Result
1.	Color	Orange
2.	Taste	Sweet
3.	Odour	Melon
4.	Texture	Gumminess

Phytochemical screening

Table 3: Phytochemical screening.

Chemical Constituents	Test	Flower Extract
Alkaloids	Wagner test	-
Carbohydrates	Molisch test	-
Triterpenoids	Salkowski test	+
Steroids	Salkowski test	+
Tannins	5%FeCl3	+
Flavonoids	Shinoda test	+
Amino acids	Ninhydrin	-
Glycosides	Legal test	-
Phenols	Lead acetate	-

Antioxidant determination (FRAP Test)

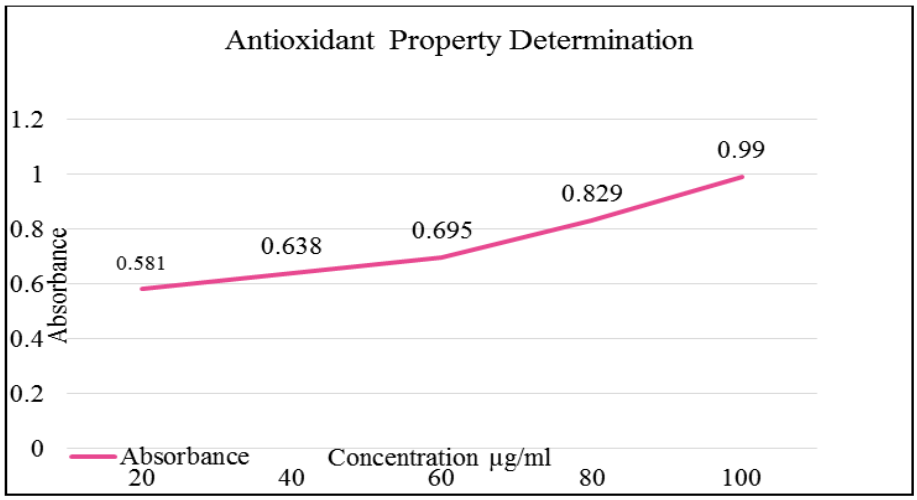

Fig 4: Antioxidant determination.

Weight variation

pH Determination

Table 6: pH Determination.

Sr.no	Buffer Capsule	pH
1	4	3.59

Density Determination

Table 7: Density Determination.

Trial	Time in minutes	Density of solvents			
		Water	Salt water	Vinegar	Methanol
1	2min	1.08	1.07	0.93	1.01
2	3min	0.8	0.8	0.73	0.76
3	9min	0.6	0.7	0.57	0.78
4	15min	0.7	0.9	0.95	0.99
5	21min	0.6	0.6	0.59	0.88

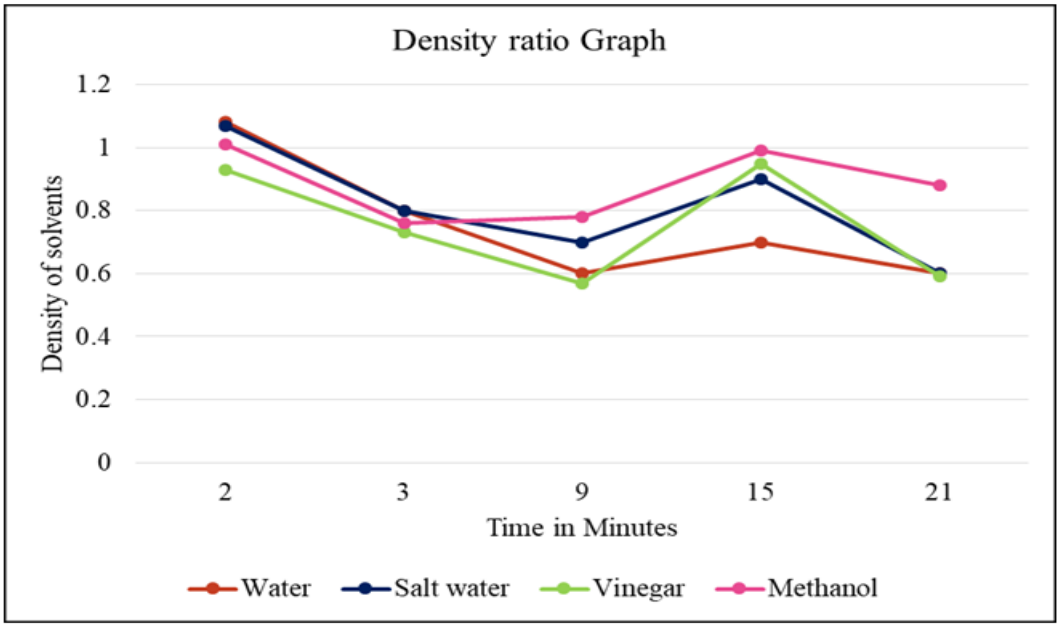

Fig 5: Density Determination.

CONCLUSION

Chamomile is a well-known herb that has been used for centuries for medicinal and therapeutic purposes.

Chamomile gummies are a type of dietary supplement that contain chamomile extract in a chewable gummy form. Chamomile is an herb that has been used for centuries for its medicinal properties, including as a natural remedy for anxiety, insomnia, and inflammation.

Chamomile gummies are typically made with a combination of chamomile extract, natural sweeteners like honey or agave syrup, and gelatin or pectin to create a chewy texture.

Chamomile gummies are often marketed as a natural and convenient way to promote relaxation and reduce stress.

However, as with any dietary supplement, it's important to talk to your healthcare provider before adding chamomile gummies to your routine, especially if you have any underlying medical conditions or are taking prescription medications. Additionally, it's important to choose a reputable brand and follow the recommended dosage instructions carefully to avoid any potential side effects or interactions with other medication.

CONTRATIDICATIONS

People allergic to plants in the Asteraceae/Compositae family (such as marigolds, daisies) might have hypersensitive reactions. Chamomile has the potential to interact with anticoagulants, sedatives, and NSAIDs, possibly intensifying their effects. Use during pregnancy/lactation should be avoided without medical advice due to limited safety data. Not recommended for young children or individuals with chronic liver/kidney diseases without healthcare supervision.

FUTURE PROSPECTIVE

Development of nano-encapsulated extracts or multi-layered gummies for controlled release and enhanced bioavailability. Further characterization of active constituents (flavonoids, terpenoids) using advanced analytical techniques like LC-MS or NMR. Conduct in vivo studies or clinical trials to validate efficacy in managing anxiety, insomnia, and gastrointestinal disorders. Establishing standard dosing guidelines for consistent therapeutic outcomes. Long-term storage stability testing under different environmental conditions to ensure product efficacy over time. Mixing chamomile with additional herbs such as valerian, lavender, or ashwagandha for enhanced benefits. Aligning with nutraceutical and herbal regulatory frameworks (e.g., FSSAI, FDA, EMA) for market readiness and consumer safety.

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