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Formulation and evaluation of medicated gummies

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Abstract

Medicated gummies offer a novel and patient-friendly approach to delivering therapeutic agents, particularly for individuals experiencing stress, anxiety, and depression. This study presents the formulation and evaluation of antidepressant gummies infused with natural herbal extracts such as ashwagandha, tulsi, and turmeric. These ingredients, recognized for their adaptogenic and antidepressant properties, are blended with orange juice, honey, gelatin, and lemon juice to create a palatable dosage form. The prepared gummies underwent various evaluations, including organoleptic properties, weight variation, pH measurement, texture analysis using a penetrometer, and stability testing. Results revealed the gummies had consistent weight, desirable texture, a pleasant fruity taste, and optimal pH (3-5). Stability studies confirmed that the gummies remained intact at room temperature but degraded at elevated temperatures. This formulation provides an effective, natural, and appealing method for managing mild to moderate mental health concerns and supports the potential of herbal-based gummies as a growing trend in functional food and nutraceuticals.

Keywords: Medicated gummies, herbal extracts, depression relief, natural formulation, drug delivery system

Introduction

Gummy is a Viscous or sticky in nature but reduction of sugar and healthier and some improved health characteristics to a product that usually is devoid of nutrition. Gummies can be used for masking agent and paediatrics as well as youngster. According to World health organization depression is most common lifestyle disorder.

The reduction of sugar and the addition of healthier ingredients in gummy jellies brings some improved health characteristics to a product that usually is devoid of nutrition.

The rapid absorption of medication through the buccal mucosa during chewing results in a quicker onset of action compared to traditional oral dosage forms. Any medication not absorbed through the oral mucosa is subsequently swallowed and enters the gastrointestinal tract for systemic absorption, ensuring a rapid and efficient delivery of the active ingredients. Gummy candies, popular among both children and adults, typically contain fruit extracts, sugars, gelatinizing agents, acids, flavours, and colourings. Studies have indicated that gummies exhibit lower bioavailability variability compared to tablets, leading to more consistent peak blood concentrations and faster absorption of active compounds.

Depression, often associated with high levels of stress and anxiety, can have severe consequences, including social isolation and suicidal ideation. To address this critical condition, gummy candies have been formulated with active ingredients such as tulsi, turmeric, and ashwagandha, known for their potential antidepressant properties. Tulsi, also known as holy basil, has demonstrated anxiolytic and antidepressant effects in animal studies, showing efficacy comparable to conventional antidepressant medications. Turmeric, with its anti-inflammatory properties attributed to curcumin, may also exert antidepressant effects by reducing inflammation, which is implicated in the pathophysiology of depression.

1.1 A Brief history

The origins of medicated gummies, particularly herbal medicated gummies, can be traced back to ancient civilizations that valued the healing properties of natural ingredients. Herbalism, deeply rooted in cultural practices and botanical knowledge, has been a longstanding tradition in medicine. Ancient cultures such as the Egyptians and Greeks utilized herbs like Aloe, Basil, and Bayberry for their therapeutic benefits, as documented in texts like the Ebers Papyrus.

In more recent history, herbal medicine experienced a revival, with influential figures like Nicolas Culpeper, an English herbalist, contributing to the understanding of herbal remedies. Culpeper's work, "The Complete Herbal," emphasized the medicinal value of botanicals. Hippocrates, revered as the "Father of Western Medicine," also advocated for herbal treatments and recognized the significance of dietary interventions in maintaining health. The evolution of medicated gummies as a contemporary drug delivery system represents a fusion of ancient herbal practices with modern pharmaceutical innovations. Herbal medicated gummies offer a convenient and enjoyable way to incorporate herbal ingredients such as tulsi, turmeric, and ashwagandha for addressing conditions like depression and anxiety. The formulation of herbal medicated gummies involves a meticulous blending of ingredients like gelatin, water, and specific herbal extracts to create a therapeutic and palatable product. In essence, the development of medicated gummies, particularly those infused with herbal elements like ashwagandha, reflects a harmonious blend of ancient herbal wisdom with cutting-edge pharmaceutical techniques, catering to the growing interest in natural remedies and holistic approaches to healthcare.

Advantage and disadvantage

Advantages

- Medicated gummies are a convenient dosage form that can be easily consumed and making them an attractive option for individuals who have difficulty swallowing pills or capsules.
- Gummies resemble traditional candies and can be consumed discreetly, which is particularly beneficial for

individuals who may feel stigmatized or uncomfortable taking medication in public.

- Medicine-infused gummies can be formulated to contain a wide range of active ingredients, including vitamins, minerals, and herbal extracts, allowing for customization to meet individual health needs.
- Gummies are often flavored, making them more palatable and enjoyable to consume compared to traditional medication forms.
- When consumed orally, the active ingredients in gummies are slowly released into the bloodstream, leading to longer-lasting effects compared to other forms of medication.

Disadvantages

- Gummies can be difficult to cut or break into smaller doses, leading to potential inaccuracies in dosing.
- The potency of gummies can vary depending on the manufacturing process, leading to inconsistencies in the amount of active ingredients present in each gummy.
- The candy-like appearance and taste of gummies can increase the risk of overconsumption, particularly in children or individuals with impulse control issues.
- The gelatin or pectin base used in gummies may not be compatible with certain drugs, leading to decreased efficacy or stability.
- Gummies often contain high amounts of sugar, which can be problematic for individuals with diabetes or other health conditions.

Types and Definitions

Table 1.1: Types

Sr.no	Types
1.	Antiperformance, providing a comprehensive solution for those seeking a natural remedy for stress and mood disorders
2.	Sleep aid gummies
3.	CBD gummies

Made with gelatin, sugar, flavorings, and colorings, gummies are known for their soft, chewy texture and comes in a wide variety of shapes and colors. For example - bears, worms, fruits, etc.

While enjoying gummies in a fun way they can be formulated with medications as well as vitamins in it. Medicated gummies are chewable candies infused with a medicinal ingredient, offering a more palatable way to consume medication. They're a growing trend, particularly for those who struggle with swallowing pills or find traditional medications unpleasant.

Such gummies are infused with Active Pharmaceutical Ingredient (API) or medicinal substances intended to address specific health concerns or conditions. These can include OTC medications like pain relievers or cough suppressants, as well as prescription drugs for managing chronic conditions such as anxiety, insomnia, or epilepsy. Medicinal gummies include number of types of gummies in which there are 3 main sub types which are anti-depressant gummies, sleep aid gummies and CBD gummies.

Antidepressant gummies infused with ashwagandha, tulsi, and turmeric offer a holistic approach to managing stress, promoting relaxation, and supporting mental well-being. These natural ingredients work synergistically to reduce stress, enhance mood, improve cognitive function, reduce inflammation, and potentially boost physical performance,

providing a comprehensive solution for those seeking a natural remedy for stress and mood disorders.

1. Anti-depressant Gummies



Antidepressant gummies typically contain as an API is fluoxetine or sertraline, which are commonly used for depression and anxiety disorders. They are a type of medication-infused gummy considered to help manage symptoms of depression and anxiety. These gummies are

regularly formulated with melatonin to help regulate sleep cycles and promote relaxation.

Research into ketamine as an antidepressant began in the 1990s, and it has been found to work differently than traditional antidepressants. Ketamine triggers reactions in the cortex that enable brain connections to regrow, making it unique as an antidepressant. However, it is not considered a first-line treatment option for depression and is typically only prescribed for people with moderate to severe major depressive disorder who haven't been helped by at least two other treatments.

2. Sleep aids gummies

Sleep aids gummies in herbal technology marks a significant advancement in the field of natural wellness and sleep support. These gummies combine the convenience and appeal of a chewable format with the benefits of herbal ingredients known for their calming and sleep-promoting properties.

Melatonin plays a crucial role in regulating the sleep-wake cycle, also known as the circadian rhythm. It is naturally produced by the pineal gland in response to darkness, signalling to the body that it is time to sleep. For individuals struggling with sleep disorders such as insomnia or disruptions due to jet lag, supplementing melatonin can help synchronize their internal clock and improve sleep quality.

3. CBD gummies

CBD gummies are palatable candies and it is infused with cannabidiol oil. CBD gummies come in various flavours, shape, colours and concentrations. These gummies are used for anxiety, depression, pain and to improve sleep. CBD gummies are not approved by FDA & it is not available in various strength and purity among brands. CBD gummies are legal at the federal level if derived from hemp with less than 0.3% THC, but their legality can vary by state. Unlike marijuana-derived CBD products, hemp-derived CBD gummies do not have psychoactive properties and will not induce a high. Different types of CBD gummies are available, including full-spectrum, broad-spectrum, and isolate options. Full-spectrum gummies contain a range of cannabinoids, including THC within the legal limit, while broad-spectrum gummies offer CBD and other cannabinoids without THC. CBD isolate gummies contain pure CBD without other compounds. Additionally, there are organic, vegan, and 1:1 CBD/THC gummies catering to various preferences and needs.

Chapter-2 Material and methods

2.1 Formulation of gummies contain following ingredients

Sr.no.	Ingredients used	Quantity
1	Orange juice	250 ml
2	Honey	25 gm
3	Gelatin	21 gm
4	Lemon juice	2 ml
5	Ashwagandha extract	5 gm
6	Turmeric extract	2.5 gm
7	Tulsi extract	1.5 gm
8	Sodium benzoate	1 gm

These antidepressant gummies are formulated with a blend of natural ingredients that have been traditionally used to promote mental well-being and reduce stress and anxiety.

- Orange juice and honey provide natural sweetness and antioxidants, while gelatin acts as a gelling agent to create the gummy texture.
- Lemon juice adds a tangy flavor and enhances the absorption of ashwagandha extract.
- Ashwagandha extract, turmeric extract, and tulsi extract are apoptogenic herbs that have been shown to have stress-relieving and anti-anxiety properties.
- Sodium benzoate is added as a preservative to extend the shelf life of the gummies.
- These gummies offer a convenient and delicious way to support mental health and promote relaxation.

Methodology

1. Two equal content gelatin and orange juice was taken and slowly dissolved in it.
2. Then slowly add honey into it.
3. When complete homogenous mixture is ready then maintain temperature 70-80 C.
4. Add 2.5 gm of Ashwagandha extract, Add 1.5 gm of Tulsi extract & Add 2.5 gm of turmeric extract.
5. Add 1 gm of sodium benzoate along with 2 ml lemon juice.
6. The following mixture present on hot plate when reaching temperature of 70-75 c which is enough for complete dissolution of ingredients.
7. The mixture was filtered right after to remove any undissolved impurities.
8. After filtration process this mixture was transferred directly into the silicon mold.
9. Gummies were cooled down at room temperature and then put into refrigerator.



Fig 6.1: Base



Fig 6.2: Addition of ashwagandha extract



Fig 6.3: Addition of Tulsi extract



Fig 6.4: Add curcumin



Fig 6.5: Filtration process



Fig 6.6: Addition of Tulsi extract



Fig 6.7: Finished product

These types of gummies are the mixture of sugar and carbohydrates. They are in non-crystalline forms usually in soft or squishy state. They are also called as “gummy candies”. The weight of gummies is between 7-8gm. Moisture content of those are 0.5-1.5% these gummies must undergo directly into dissolution instead of disintegration, but these gummies preparation requires high temperature hence heat liable substance or ingredient cannot be formulated. Medicated gummies are widely used to treat the stress, anxiety & depression.

Medicated gummies such as used for treatment of depression, anxiety, etc.

It is ideal dosage form for children's and additional advantage of this include patient compliance, comfortable and effective treatment including fast onset of action, it requires low dose, dose regimen is also reduced, and the main thing is it is economic. Gummies are of various-shaped, solid dosage forms usually containing a medicinal agent and a flavoring substance, intended to be dissolved slowly in the oral cavity for localized or systemic effects. A primary disadvantage of gummy candy is the high temperature required for their preparation.

Hard candy lozenges generally weigh between 7 to 8 gm. Regular gummy candy has a pH of about 3-5.

Evaluation parameter

1. Macroscopical Evaluation

The formulation developed in the laboratory were evaluated for its acceptance based on visual observation for various organoleptic properties.

Table 7.1: Parameter, Observation

Sr.no.	Parameter	Observation
1	Color	Orange & scarlet red
2	Odour	Fruity smell
3	Taste	Sweet
4	Texture	Soft & stretchy
5	Shape	Cylindrical

2. Weight Variation

10 gummies were taken and individual weights were noted, then average weight of gummies was calculated by total weight divided by ten. Then it was compared with standard monograph.

Table 7.2: Weight of lozenges (gm)

Sr.no.	Weight of lozenges (gm)
1	7.5
2	7.4
3	7.4
4	7.4
5	7.3
6	7.5
7	7.7
8	7.5
9	7.5
10	7.4

Total weight of 10 gummies = 74.6gm

Average weight of lozenges = $74.6/10 = 7.46$ gm

3. pH determination

- The total pH of gummies were measured by using pH meter.
- First the electrode of pH meter was washed thoroughly and dipped into the distilled water to calibrate the pH.
- Then the pH of the gummy mixture was measured which was in the range of 3 to 5.

4. Penetrometer

- The most common way to find firmness is resistance to contraction. Firmness is checked by Penetrometer as shown in figure.
- It determines the softness of the finished product i.e., medicated gummies.

**Fig 7.1:** Cone Penetrometer

Hardness tester

Hardness testing using a Texture Analyzer and soft gel Hardness Testing System is crucial in gummy production for quality control. These testers measure the force needed to deform gummies, ensuring consistent texture. In a study, the Texture Analyzer optimized stoving processes by correlating gummy hardness with elasticity. The soft gel Hardness Testing System is also effective for quality control in gummy production, providing accurate and repeatable results.

**Fig 7.2:** Hardness tester

5. Stability testing

Factors such as temperature, humidity, light, and packaging can affect the stability of gummies. Testing can be categorized into physical and chemical factors. Physical testing assesses changes in flavor, aroma, color, and other organoleptic properties, while chemical testing evaluates chemical degradation, loss of potency, and microbial growth. Stability testing is essential for establishing "best before" dates.

Stability testing was performed at 50 °C, at such temperature the gummies started to melt. Meanwhile the gummies were stable at room temperature (28-35 °C).

Hence the gummies tend to have stability at room temperature and starts to degrade or melt at elevated temperatures.

Result and conclusion

Medicated gummies for depression & anxiety contains ashwagandha extract, turmeric extract, tulsi extract, honey, gelatin, lemon & orange juice and sodium benzoate. The determination in appearance, weight, uniformity, texture and clarity was analysed organoleptically.

Parameter	Specification
Appearance	Orange & scarlet red color gummies with fruity smell
Average weight	7.25 to 7.7 g
Texture	Stretchy & soft
Clarity	Translucent

Conclusion

- Medicated gummies, including antidepressant gummies, have gained popularity due to their ease of dosing and innovative formulation.

- They offer a creative way to consume medicines for disease prevention and treatment, particularly in the Indian market, which is expected to grow exponentially.
- These gummies are still in the development phase compared to traditional medicines but have the potential advantage of ease of dosing.
- Antidepressant gummies, in particular, have shown potential in managing depression and anxiety. However, further research is needed to fully understand the impact of medicated gummies on various health conditions, and it is important to approach their use with caution and under the guidance of a healthcare professional.
- The present manuscript highlights history, global market, formulation, information of ingredients, evaluation parameters. Molding method is used to formulate these gummies. Molding the mixture is very convenient method for preparation of gummies. These gummy candies have been developed with 3 different herbs- 1) Ashwagandha 2) Turmeric 3) Tulsi. These herbs are very effective to cure depression, anxiety & stress. The manuscript further provides information of evaluation tests used for these gummies.
- Macroscopical evaluation, weight variation test, determination of hardness, determination of pH, penetrability, stability testing, evaluation of gummies were tested.
- Thus it can be concluded that these medicated gummies can be used in depression and is a suitable dosage form for administration.
- For future development more scientifically rigorous and adequately studies are needed for better study of the bioequivalence, more relevant *in vitro* dissolution study, drug metabolism and drug-excipient interactions in the area of medicated gummies as powerful drug delivery technology.

References

1. Natural ingredients-based gummy bear composition designed according to texture analysis and sensory evaluation *in vivo*. NCBI [cited 2024 Jun]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6480394/>
2. Atwa ADA, Abu Shahba RY, Mostafa M, Hashem MI. Effect of honey in preventing gingivitis and dental caries in patients undergoing orthodontic treatment. *Saudi Dent J*. 2014;26:108-114. doi:10.1016/j.sdentj.2014.03.001
3. Teixeira-Lemos E, Almeida AR, Vouga B, Morais C, Correia I, Pereira P, *et al*. Development and characterization of healthy gummy jellies containing natural fruits. *OPAG*. 2021. doi:10.1515/opag-2021-0029
4. Lynn D. Analysis of the relationship between sweetener properties and variations in both functionality and final product characteristics. Master's Thesis. Clemson University; 2012.
5. Solunke A. Encyclopedia of microbial media. 2018.
6. Vohra P, Patil S, Khan W. Herbal medicated gummies: A flange approach in management of depression and anxiety. Dept of Pharmacy, H.K. College of Pharmacy; n.d.
7. Carbonell C, Marisol M. NSU works likability and efficacy of gummy oral sedative by pediatric patients. 2019;76.
8. Cohen PA, Avula B, Wang Y, Katragunta K, Khan I. Quantity of melatonin and CBD in melatonin gummies sold in the US. *JAMA*. 2023;329(16):1401-1402. doi:10.1001/jama.2023.2296
9. Demars LL, Ziegler GR. Texture and structure of gelatin/pectin-based gummy confections. *Food Hydrocolloids*. 2001;15(4-6):643-653.
10. Moloughney S. Functional confectionery: Finding the sweet spot. *Nutraceuticals World*. 2011, 2011-2013