IJTI | INTERNATIONAL JOURNAL OF THERAPEUTIC INNOVATION

Research article

# Formulation and evaluation of herbal syrup for its anti-obesity properties

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**Received** - 09-01-2025, **Revised** - 28-02-2025, **Accepted** - 02-04-2025 **(DD-MM-YYYY)**

**Refer this article**

Hemant S Mali, Pradip S Pawar, Amit S Sharma, Rajesh D Ahire, Purushottam S Marathe, Formulation and evaluation of herbal syrup for its anti-obesity properties. March-April 2025, V3 – I2, Pages - 39 – 48. Doi: https://doi.org/10.55522/ijti.v3i2.0111.

## ABSTRACT

Herbal medicine, which uses fruit extract for therapeutic purposes, is where the majority of herbal syrups originated. In addition to alternative dosages from herbal medications, syrup formulations are also available. Nowadays, syrup is used to treat a wide range of conditions and alleviate sickness symptoms.

**Keywords:** AI chatbots, mental health, emotional intelligence, depression, anxiety, human-AI interaction, ethical implications.

## INTRODUCTION

Herbal medicine is the use of any part of plants to heal and treat human and animal diseases. Plant medicines have been used for a long time by people all over the world, and about 35,000 plant species have been reported to be used for medical purposes in various human cultures worldwide. Some of these species have strong antimicrobial, antidiabetic, antiviral, anticancer, and antifungal properties.

Today, obesity becomes pandemic, according to the World Health Organization (WHO), more than 1.9 billion persons were overweight in 2014, and more than half a billion were obese. Obesity is one of the major risk factors for morbidity and mortality. Obesity, defined as abnormal excess buildup of fat in adipose tissue. Today's popular high-fat diet is one of the primary environmental factors contributing to obesity. One of the most significant risk factors for chronic illnesses is obesity Numerous health issues, both alone and in conjunction with other conditions including diabetes, hypertension, osteoarthritis, and heart disease, can be brought on by and made worse by obesity [1].

Obesity and overweight occurs due to imbalance between calories consumed and calories utilized.Globally, there have been two reasons for overweight and obesity: 1) an increased intake of energy-dense foods that are high in fat, salt and sugars but low in vitamins, minerals and other micronutrients;and, 2) a decrease in physical activity due to the increasingly sedentary nature of many forms of work,changing modes of transportation, and increasing urbanization. Overweight and obesity are now on therise in low- and middle-income countries, particularly in urban settingsWeight gain is linked to a variety of complex hormonal, neurochemical, and metabolic changes, as well as lifestyle, behavioural, and calorie imbalance interventions. In the meantime, weight loss of at least 5% or more is regarded as a clinically significant advancement in the treatment of obesity [2].

### Aim

To develop and assess a herbal syrup for its anti-obesity properties

### Need For Study

Obesity represents a prevalent health issue worldwide, contributing to numerous cardiovascular and cerebrovascular diseases. Although various medicinal formulations are available in the market, their use often entails significant side effects. Therefore, there is a pressing need for a medicinal formulation that minimizes adverse effects while effectively functioning as an anti-hyperlipidemic agent. Numerous commonly used plants possess properties that can aid in the management of obesity by targeting body fat. Ayurveda references several plants along with their pharmacological effects that are advantageous in obesity control. These plant materials can be utilized in formulation preparation by extracting their active constituents through various extraction techniques. A wide array of these natural products and medicinal plants, including both crude extracts and isolated compounds, can be employed to promote weight loss and mitigate diet-induced obesity [3].

### Objective of Study

To gather and verify the authenticity of Fenugreek and cinnamon plant components.

To extract Fenugreek seeds and Cinnamon bark utilizing the Soxhlet extraction technique.

To conduct a phytochemical analysis of the extracts from Fenugreek seeds and Cinnamon bark.

To formulate a herbal anti-obesity syrup using the extracts of Fenugreek seeds and Cinnamon bark.

The primary aim of this study is to enhance the utilization of naturally occurring materials.

**Work Plan**

The current study encompasses the following steps:

Comprehensive literature review.

Selection of plant species, materials, and methodologies.

Collection of plant specimens.

Identification and verification of the plant.

Drying, purification, and extraction of the plant parts.

Phytochemical analysis.

Formulation of herbal syrup.

Assessment of herbal syrup, including:

Color analysis

Odor analysis

Density measurement

Viscosity measurement

pH measurement

Specific gravity assessment at 25°C

Results and discussion.

Summary and conclusion [4].

Devkar et al. (2021) conducted a study to formulate and assess a polyherbal cough syrup utilizing widely accessible medicinal plants in Buldhana, aimed at alleviating both dry and wet coughs. The syrup was composed of Tulsi, Cinnamon, Pudina extract, and Honey, and was evaluated for its antitussive and antioxidant properties. The antioxidant-rich syrup was also employed in the treatment of cancer induced by various stress conditions and oxidative reactions in the body, which generate free radicals. The use of this syrup was found to mitigate such conditions. The formulation was developed and tested at the laboratory scale, focusing on several parameters including pH, viscosity, density, and stability testing. The evaluation confirmed that the formulation was stable and suitable for use in cough treatment.

C.V. Chandrasekaran et al. (2012) investigated herbal strategies for managing obesity. They conducted a comprehensive literature survey, both online and manual, to evaluate the extent of information available regarding herbal products for weight management. Their findings revealed that there is a scarcity of published data on many herbal and weight loss products, with a notable absence of clinical trials, resulting in limited evidence. The literature review they presented indicated that these herbal products either fall below an acceptable level of evidence, lack scientific validation, or possess a scientific rationale that does not meet acceptable standards.

Semalty A et al. (2015): This study investigated the anti-hyperlipidemic and anti-obesity effects of the ethanolic extract of Trigonella foenum graecum (seeds) sourced from the Himalayan region, using a model of diet-induced obesity in mice. The researchers prepared and assessed the ethanolic extract for its potential benefits in combating hyperlipidemia and obesity. The anti-obesity effects were evaluated by administering the extract orally at a dosage of 400 mg/kg to the obese mice, which had been subjected to a high-fat diet, over a period of one month. Subsequently, measurements of body weight, total lipid profile, serum creatinine, and serum potassium were taken and compared with those of the control and standard groups (atorvastatin, 400 mg/kg). At the conclusion of the treatment, the standard group exhibited a total body weight gain of 40.55%, while the extract group demonstrated a body weight gain of 43.64%, in contrast to the obese control group, which showed a gain of 51.97%.

Yanfei Liu and colleagues (2017) provided a comprehensive overview of herbal medicine as a treatment for obesity. Their research highlighted the numerous limitations associated with Western medical approaches to obesity, including their impact on monoamine neurotransmitters and the risks of drug abuse and dependency. They emphasized the need for enhanced safety measures regarding these medications. Herbal medicine, with a history of over 2000 years in disease treatment, has demonstrated proven efficacy. Numerous studies have validated the effectiveness of herbal medicine in addressing obesity, although the underlying mechanisms remain unclear. The article discusses the potential effects and mechanisms of herbal treatments for obesity that have been documented over the past decade.

V. Rao and S. H. Gan (2014) examined the various properties and applications of the cinnamon plant. Known scientifically as Cinnamomum zeylanicum and Cinnamon cassia, this perennial tree of tropical medicine belongs to the Lauraceae family. Cinnamon is among the most significant spices utilized globally on a daily basis. It primarily consists of essential oils and other compounds, including cinnamaldehyde, cinnamic acid, and cinnamate. Beyond its roles as an antioxidant, anti-inflammatory, antidiabetic, antimicrobial, anticancer, and lipid-lowering agent, cinnamon has also been noted for its potential benefits in addressing neurological disorders such as Parkinson's and Alzheimer's diseases. Their review highlights the pharmacological potential of cinnamon and its everyday applications.

Navrinder Kaur and associates (2019) investigated the impact of cinnamon on adiposity and its influence on the expression of metabolic genes in a diet-induced obesity model using zebrafish. They posited that preventing the development of an obese phenotype represents the most effective long-term strategy. Their alternative

approach to obesity treatment involved weight management through phytotherapeutics. In this study, they assessed the anti-obesity properties of cinnamon (Cinnamomum zeylanicum) in adult male zebrafish.

Arun et al (2021): Their study was designed with the object of preliminary phytochemical evaluation and the study of antimicrobial activity of the extracts of the aerial parts of Kedrostis rostrata plant. The results of preliminary phytochemical evaluation revealed the presence of alkaloids, glycosides, phenolic compounds, flavanones and flavonoids, carbohydrates, terpenoids, sterols and saponins. A significant presence of majority of phytochemicals were found in the methanol and ethyl acetate extracts comparing with other two, the petroleum ether, chloroform extracts. In the evaluation of antimicrobial activity, the methanol extract showed a significant antibacterial and antifungal activity against tested pathogens particularly E. coli, S. aureus, P. aeruginosa and Candida sp.,. Outcome of their study was beneficial and further investigation in the future may give more significant results.

Methaq Nazhan Mahmooda, Isra Khald Yahyab (2017): They have studied about the nutrient and phytochemical of Fenugreek (Trigonella Foenum graecum) Seeds. They analyzed the main phytochemical, nutrient and active groups composition of fenugreek seeds powder (Trigonella foenum graecum) by using aqueous extract and alcoholic extract. The preliminary tests of active groups in extracts were carried out. The study showed that fenugreek seed is a very rich energy and antioxidant. So that is very important to be entered the system of human nutrition, are economic nutritional source can be used as human food supplement, which contains important amounts of carbohydrates, protein, fat and amino acids.

Adarsh A et al (2020): They have studied the Phytochemical Screening and Antimicrobial Activity of "Cinnamon zeylanicum". Cinnamon (Cinnamomum zeylanicum) has been using since the ancient perioddue to its medicinal values. They determined the microbial activity of Cinnamon zeylanicum by observing the zone of inhibition and thus the anti-microbial activityof the cinnamon extract was determined. They tested the antibacterial property was against Esherichia coli (gram- negative), Enterococcus faecalis (gram-positive) and Salmonella typhi (gram-positive) by agar diffusion method.

**Figure 1:** Trigonella foenum graecum plant

**Figure 2:** Trigonella foenum graecum Seeds

**Plant profile**

**Trigonella foenum graecum Seed Extract:**

**Synonym**: Fenugreek, Methi

**Biological name**: Trigonella foenum graecum

**Biological Source**: The seeds and green leaves of fenugreek are used in food as well as in medicinal application that is the old practice of human history.

**Family**: Fabaceae [5].

**Chemical constituents**

**Table 1:** Chemical Constituents of Trigonella foenum graecum

| Chemical Group | Compounds |
|---|---|
| Alkaloids | Trigonelline, choline, carpaine |
| Amino acids | Lysine, histidine,4-hydroxyisoleucine, tryptophan, tyrosine, cystine, arginine. |
| Coumarins | Methyl coumarin, trigocoumarin, trimethyl coumarin |
| Flavanoids | Naringenin, lilyn, kaempferol, vecenin-1, tricin 7-O-D glucopyranoside, saponaretin, isovitexin, isoorientin, Orientin, vitexin, luteolin, quercetin. |
| Saponins | Fenugrin, foengracin, glycoside, yamogenine, trigonoesides, smilagenine, gitogenine, sarsatogenine, yeccagenine, hederagine, diosgenine, tigonenine, neotigogenin. |
| Others | Vitamin A, folic acid, ascorbic acid, thiamine, riboflavin, biotin, nicotinic acid. |

**Pharmacological Activity**

**Antioxidant Properties**

Numerous antioxidants derived from plants are classified as flavonoids, which have demonstrated efficacy in biological systems by mitigating oxidative stress. For instance, the administration of Trigonella seeds has been found to restore the disrupted activity of cellular antioxidant enzymes, including superoxide dismutase (SOD), glutathione reductase (GR), catalase, and glutathione peroxidase (GPx), in tissues such as the heart, muscle, and brain during diabetic conditions.

**Anti-cancer Properties**

Trigonella foenum-graecum, which has been traditionally employed to address various ailments such as diabetes, elevated cholesterol levels, wounds, inflammation, and gastrointestinal issues, has recently been shown to exhibit potential as an anti-cancer agent [6].

**Antidiabetic Effect**

It is widely recognized that maintaining blood glucose levels is crucial for preventing tissue damage and secondary complications associated with diabetes, such as cardiovascular diseases, which include both micro- and macro-angiopathy, nephropathy, neuropathy, and retinopathy. However, achieving

effective blood glucose control poses significant challenges, and currently, no medication exists that can reliably accomplish this. Numerous studies have demonstrated that both crude and various extracts of Trigonella can effectively lower blood glucose levels in both experimental animals and human diabetic patients. Among the numerous medicinal properties attributed to Trigonella, its hypoglycemic or antihyperglycemic effects have been the most extensively researched and are frequently utilized by individuals with diabetes [7].

**Antihyperlipidemic Effect**

It is posited that managing lipid levels, particularly LDL-cholesterol and triglycerides, can significantly reduce the risk of various chronic inflammatory diseases linked to obesity-related low-grade inflammation. Research has indicated that Trigonella can effectively regulate lipid levels in experimental models. Specifically, fenugreek has been associated with reduced serum triglycerides and total cholesterol, as well as decreased hepatic lipid concentrations. In a study where fenugreek was administered at a dosage of 2.5 g twice daily for three months to healthy individuals, no significant impact was observed on blood lipid levels or fasting and postprandial blood sugar.

**Antigastric Effect**

Fenugreek seeds are frequently utilized as a seasoning in curries and various dishes, recognized for their nutritional benefits and ability to enhance digestion. Within the framework of Ayurveda, the traditional Indian medicinal system, fenugreek seeds have been employed to address several gastrointestinal ailments. Nonetheless, there has been a lack of experimental validation. A recent investigation by Pandian et al. (2002) demonstrated the antiulcer properties of fenugreek seeds. The efficacy of fenugreek seeds is found to be comparable to that of omeprazole, a well-known proton pump inhibitor used in the management of gastrointestinal conditions such as gastroesophageal reflux disease, gastric and duodenal ulcers, and gastritis [8].

**Uses**

Weight loss

Skin health

Hair health

Digestion

Exercise performance

May benefit diabetic patient

May treat high cholesterol and heart disease

Possible treatment and prevention of cancer

**Cinnamomum Zeylanicum**

**Synonym**

Cinnamon bark, Dalchini, Ceylon cinnamon

**Biological Source**

Dried inner bark of the shoots of the trees of Cinnamomum zeylanicum. Must contain.

Less than 1.0% volatile oil. Found in Sri Lanka and Malabar Coast of India.

Lauraceae [6].

**Figure.3:** Cinnamon zeylanicum

**Figure 4:** Cinnamon zeylanicum plant

**Chemical constituent**

**Table 2:** Chemical Constituents of Cinnamomum zeylanicum (09)

| Parts of cinnamon | Dominant Ingredient (s) |
|---|---|
| Leaves | Eugenol : 70.00 to 95.00% |
| Bark | Cinnamaldehyde : 65.00 to 80.00% |
| Root bark | Camphor : 60.00% |
| Fruit | Trans-cinnamyl actene : 42.00 to 54.00% |
| Buds | Terpene hydrocarbons: 78.00%, alpha-Bergamotene; 27.38% |
| Flowers | (E) –cinnamyl acetate : 41.98%, trans-alpha –bergamotene :7.97% |

**Pharmacological Activity**

**Cholesterol and Lipid Reduction**

The introduction of cinnamon into the diet of mice demonstrated a beneficial impact on their lipid profiles, resulting in decreased levels of high-density lipoprotein (HDL) cholesterol and a reduction in plasma triglycerides. Furthermore, a separate investigation revealed that rats receiving a 15% Cinnamomum cassia powder supplement for 35 days experienced a decline in total cholesterol, triglycerides, and low-density lipoproteins. Additionally, the application of cinnamon oils was found to lower cholesterol levels in broiler chickens [9].

**Anti-Inflammatory Activity**

A recent investigation revealed that 2'-hydroxycinnamaldehyde, extracted from the bark of C. cassia, demonstrated an inhibitory effect on nitric oxide production by obstructing the activation of the nuclear factor kappa-light-chain-

enhancer of activated B cells (NF-κB). This finding suggests that this compound may serve as a potential anti-inflammatory agent.

**Antioxidant Activity**

Research conducted on rats indicated that administering a 10% powder of C. verum bark over a period of 90 days resulted in notable antioxidant effects, as evidenced by the activity of cardiac and hepatic antioxidant enzymes, lipid conjugate dienes, and glutathione (GSH) levels. Additionally, a 1:1 aqueous and alcoholic extract of cinnamon showed significant inhibition of fatty acid oxidation and lipid peroxidation in vitro. Various flavonoids isolated from cinnamon exhibited free-radical-scavenging activities and antioxidant characteristics. An examination of the inhibitory effects of cinnamaldehyde and other cinnamon compounds on nitric oxide production indicated that cinnamaldehyde has potential activity against both nitric oxide production and the expression of inducible nitric oxide [10].

**Antidiabetic Activity**

A compound derived from cinnamon has been identified as the "insulin-potentiating factor" (IPF), and the antidiabetic properties of cinnamon bark have been demonstrated in streptozotocin-induced diabetic rats. Multiple studies have also shown that cinnamon extracts can reduce not only blood glucose levels but also cholesterol levels.

**Uses**

It contains phytochemicals with protective antioxidant properties.

It exhibits anti-inflammatory effects.

It appears to be beneficial in combating infections.

Research indicates that cinnamon may offer protection against colds and flu.

It may assist in regulating blood sugar levels.

Evidence suggests that cinnamon could help mitigate the risk of insulin resistance.

Cinnamon contains compounds that may slow the progression of conditions such as Alzheimer's disease.

Regular consumption of cinnamon may contribute to lower blood pressure [11].

It aids in reducing cholesterol levels.

**Excipients profile**

**Tulsi**

**Synonyms:** Holy basil, sacred basil.

**Biological source:** It consists of dried leaves of ocimum santumlinn.

**Family:** Labiatae [12].

**Figure 5:** Pudina

**Chemical Constituents**

The main constituents of menthol (40.7%) and menthone (23.4%), further components were (+-) menthyl acetate,1,8-cinecole, limonene, beta-pinene and betacaryophyllene.

**Uses**

Flavouring agent.

Carminative, digestive, spasmolytic.

Also use in one herbal syrup preparation.

It promotes digestion.

It can help weight loss.

It improves memory.

It is good for your skin health.

**Honey**

**Synonyms:** Madhu, Madh .

**Biological source**

Honey is viscid and sweet secretion stored in the honey comb by various species ofbees. i.e Apis florea , Apis dorsata, Apis florea, Apis indica.

**Family:** Apideae [11].

**Figure 6:** Honey

**Chemical Constituents**

Fibers test for artificial invert sugar.

Reduction of feelings solution.

Limit test

**Uses**

Laxative, bactericidal.
Sedative, alkaline characters.

It is use in food cold.

It is use in flavoring agent.

It is use in medium in preservative of cornea.

Sweetening agent.

Vehicles.

**Material and Instruments**

**Material Used** Materials used for research work were as follows [13].

**Experimental work**

## MATERIAL AND METHODS

**Collection, Identification and Preparation of Plant Materials**

**Extraction of Trigonella Foenum Graecum Seeds**

Seeds of Trigonella foenum graecum were collected and dried at room temperature and ground in a manual mill. A 100 g of crushed fenugreek seed was extracted using a hydroalcoholic solvent (100 mL) and a Soxhlet extractor for 16 h at (70-75°C). Then, the mixture of solvent-oil was filtered through a filter paper and the extract transferred in a volumetric flask. The yield of extraction was calculated using following equation [14].

**Table 3:** List of Chemicals

| Name | Company Name |
|---|---|
| Trigonella foenum graecum seeds | Collected from local Market |
| Cinnamomum zeylanicum bark | Collected from local Market |
| Tulsi leaves | Collected from local Market |
| Pudina leaves | Collected from local Market |
| Honey | Collected from local Market |
| Potassium Iodide | fisher scientific, mumbai. |
| Mercuric Chloride | labline stock centre, mumbai. |
| Ninhydrin Solution | Dipa chemical industries, MIDC, Aurangabad. |
| Sodium Hydroxide | LABLINE Stock Centre, Mumbai. |
| Chloroform | DLC |
| Lead Acetate | Research Lab Fine Chemical, Industries |
| Molish Reagent | |
| Copper Sulphate | NICE Chemicals (P) Ltd., Kerala, India. |
| Ferric Chloride | LABLINE Stock Centre, Mumbai. |
| Sodium Chloride | NICE Chemicals (P) Ltd., Kerala, India. |
| Sulphuric Acid | SDFCL, Mumbai. |
| Glacial Acetic Acid | LABLINE Stock Centre, Mumbai. |
| Ethanol | NICE Chemicals, Pvt. Kochi. |
| Iodine | NICE Chemicals, Pvt. Kochi. |
| Distilled Water | DJPS College of Pharmacy, Pohetakli, Tq. Pathri, Dist.Parbhani |

**Instruments Used:** Instrument used for research work were as follows:

**Table 4:** List of Instruments

| Name | Model | Manufacturer |
|---|---|---|
| Heating Mantle | | LABLINE, Mumbai. |
| Digital Balance | AA-2200 | LABLINE, Mumbai. |
| Soxhlet Apparatus | | LABLINE, Mumbai. |

**Extraction of Cinnamomum Zeylanicum Bark**

Bark of Cinnamomum zeylanicum were collected and dried at room temperature and ground in a manual mill. The extraction of cinnamon essential oil was carried out using Soxhlet extraction method. A 100 g of crushed Cinnamon bark was extracted using a hydroalcoholic solvent (100 mL) and a Soxhlet extractor for 16 h at (70-75°C). Then, the mixture of solvent-oil was filtered through a filter paper and the extract transferred in a volumetric flask. The yield of extraction was calculated using following equation [13].

$$\text{Percentage of essential oil} = \frac{\text{Essential oil weight}}{\text{Sample weight}} \text{x} 100$$

**Extraction of Tulsi leaves**

Leaves of Tulsi were collected and dried at a room temperature and ground manually using mortar pestle. The extraction of tulsi leaves was carried out by simple boiling method. A 5gm of tulsi was extracted using water (200ml) as a solvent and boiled carefully under by using a water bath for 3hrs. The mixture was boiled until total volume become one fourth of the volume. Then the decoction was cooled and filtered. Filtrate was taken to prepare final syrup.

**Extraction of peppermint leaves**

Leaves of Peppermint were collected and dried at a room temperature and ground manually using mortar pestle. The extraction of peppermint leaves was carried out by simple boiling method. A 5gm of Pepppermint was extracted using water (200ml) as a solvent and boiled carefully under by using a water bath for 3hrs. The mixture was boiled until total volume become one fourth of the volume. Then the decoction was cooled and filtered. Filtrate was taken to prepare final syrup.

## Organoleptic properties of extract

**Table 5:** Fenugreek Seeds

| Organoleptic Characterisation | Description |
|---|---|
| Color | Cuboid, yellow- to amber |
| Odor | Pungent aroma, maple syrup-like odour |
| Taste | Tangy, bitter |

**Table 6:** Cinnamon Bark

| Organoleptic Characterisation | Description |
|---|---|
| Color | Brown |
| Odor | Strong, warm, and spicy |
| Taste | Warm sweet flavor and pungent aroma |

**Table 7:** Tulsi Leaves

| Organoleptic Characterisation | Description |
|---|---|
| Color | Green |
| Odor | Aromatic |
| Taste | Astringent and bitter |

**Table 8:** Peppermint Leaves

| Organoleptic Characterisation | Description |
|---|---|
| Colour | Dark green |
| Odour | Strong, pungent |
| Taste | Warm, Fresh, Aromatic |

Preliminary Phytochemical Characterisation of extract: To determine Phytoconstituents in seeds extract and bark extract, Tests for alkaloid, carbohydrates, flavonoids, steroids, terpins, saponins, tannins and phenols were carried out as per following procedure [16].

**Preliminary Test for Fenugreek Extract**

**Test for Alkaloid**

Mayer's Test: The acidified filtrate (2ml) was treated with Potassium mercuric iodide solution (1ml), shake well from creamy ppt observed.

**Dragendroff's Test**

The acidified filtrate (2ml) was treated with potassium bismuth iodide solution (2ml) and observed for the presence of orange red precipitate.

**Test for Carbohydrates**

**Molisch Test**

The filtrate 2(ml) was treated with few drops of Molisch reagent and concentrated sulphuric acid (2ml) was added through the side of the test tube without shaking and observed for the presence of violet ring at the junction of two solutions.

**Bendict's Test**

The filtrate (2ml) was treated with benedict's reagent (2ml). Then the mixture was heated in boiling water bath and observed for the presence of reddish precipitate.

**Test For steroids**

**Salkowski Test**

The residue was dissolved in chloroform and an equal volume of concentrated H2SO4 was added to it and observed for the red colour in the lower layer.

**Libermann Burchard Test**

The residue was taken a dry chloroform (1ml) and then it was mixed with (2ml) of specially distilled acetic anhydride followed by a few drops of conc. H2SO4 through the sides of the test tube and observed for the formation of green colour in the upper portion which changes to bluish violet [17].

**Test for Protein and Amino acid**
**Ninhydrin test**

Littler quantity of dried extract was treated with few drops of ninhydrin solution and heated on water bath and observed for the presence of violet colour.

**Biuret test**

Little quantity of dried extract was treated with a few drops of 2% copper sulphate solution was added and observed for the formation of violet coloured solution.

**Test for Phenolic compounds and Tannins**
**Ferric Chloride Test**

A small quantity of the dried extract was mixed with water and treated with dilute ferric chloride solution (5%) and observed the presence of blue colour.

**Gelatin Test**

The dried extract dissolved in water was filtrated. To the filtrate, 2% solution containing 10% of sodium chloride (NaCl) was added and observed for the presence of milky white precipitate.

**Lead Acetate Test**

The dried extract dissolved in water was treated with 10% lead acetate solution and observed for the presence of milky white ppt.

**Test for Saponins**
**Foam Test**

A small quantity of dried extract was diluted with distilled water (20ml) in a graduated cylinder. The suspension was shaken for the 15 min and observed for the formation.

**Test for Flavonoids**

Lead Acetate Test: 10mg of seed extract was taken and few drops of 10% lead acetate solution were added. Appearance of yellow colour ppt in indicates presence of flavonoid [18].

**Test for Glycosides**
**Killer-killiani Test**

The test consists of boiling about 1gm of finely powdered fenugreek with 10ml, 70 % alcohol for 2 to 3 minutes. The extract is filtered. To the filtrate is added 5ml water and 0.5ml strong solution of lead acetate shake well and separate the filtrate. The clear filtrate is treated with equal volume of chloroform and evaporated to yield the extractive. The extractive is dissolved in glacial acetic acid and after cooling 2 drops of ferric chloride solution added to it. This content transferred a test tube containing 2ml concentrated sulfuric acid. A reddish brown layer acquiring bluish green colour after standing is observed due to the presence of fenugreek.

**Preliminary Test for Cinnamon Extract**
**Test for Alkaloid**
**Wagner's Test**

The acidified filtrate (2ml) was treated with wagner's reagent (1ml) and observed for the presence of reddish brown precipitate.

**Test for Carbohydrates**
**Molisch Test**

The filtrate (2ml) was treated with few drops of Molisch reagent and concentratred sulphuric acid (2ml) was added through the side of the test tube without shaking and observed for the presence of violet ring at the junction of two solutions.

**Test for Steroids**
**Salkowski Test**

The residue was dissolved in chloroform and an equal vol. of conc. $H_2SO_4$ was added to it and observed for the red colour in lower layer.

**Test for Flavonoids**
**Aqueous sodium hydroxide**

Aqueous sodium hydroxide solution was added to the little quantity of dried extract and observed for the yellow colouration of the solution.

**Test for Reducing Sugar's**
**Benedict's Test**

The filtrate (2ml) was treated with benedict's reagent (2ml). Then the mixture was heated in aboiling water bath and observed for the presence of Reddish precipitate.

**Test for Amino Acid**
**Ninhydrin Test**

Little quantity of dried extract was treated with few drops of Ninhydrin solution and heated on a water bath and observed for the presence of violet colour.

**Test for Glycoside**
**Killer-killani Test**

The test consists of boiling about 1gm finely powdered cinnamon with10ml, 70 % alcohol for 2 to 3 minutes. The extract is filtered. To the filtrate is added 5ml water and 0.5ml strong solution of lead acetate shake well and separate the filtrate. The clear filtrate is treated with equal volume of chloroform and evaporated to yield the extractive. The extractive is dissolved in glacial acetic acid and after cooling 2 drops of ferric chloride solution added to it. This content transferred a test tube containing 2ml concentrated sulfuric acid. A reddish brown layer acquiring bluish green colour after standing is observed due to the presence of cinnamon.

**Test for Phenol**
**Ferric Chloride Test**

A small quantity of the dried extract was mixed with water and treated with dilute ferric chloride solution (5%) and observed for the presence of blue colour [19].

**Test for Saponins**
**Foam Test**

Asmall quantity of dried extract was diluted with distilled water (20) ml in a graduated cylinder. The suspension was shaken for 15min and observed for the formation of froth.

**Formulation of Syrup**

**Table 9:** Herbal Syrup was formulated by using Fenugreek and Cinnamon extract

| Ingredient % w/v | Category | Quantity |
|---|---|---|
| Pudina | Anti-Oxidant | 8ml |
| Tulsi | Anti-Oxidant | 8.5ml |
| Cinnamon | Anti-obesity | 8.5ml |
| Fenugreek | Anti-obesity | 8.5ml |
| Honey | Base viscosity modifier | In 50% |

**Preparation of Syrup**

To prepared final herbal syrup 8ml of Pudina decoction and 8.5ml of Tulsi, 8.5ml of cinnamon decoction and 8.5ml of Fenugreek decoction was added ad 50% of honey preservative was mixed slowlyby side by side continually stirring. The final herbal syrup was prepared and then subjected for evaluation. Herbal syrup

was prepared and solubility was checking by observing clarity of Solution visually [20].

**Evaluation of Formulated herbal syrup**

Evaluation of herbal syrup was done according to ''Bureau of Indian Standards'' and these test were performed for all herbal syrup formulation. This test includes [21].

**Physical Examination**

All these physical parameters of the formulation were checked visually-

**Color**

5 ml final syrup was taken into watch Glass and placed against white back ground in white tube light. It was observed for its color by naked eye.

**Odor**

2ml of final syrup was smelled individually. The time interval among two smelling was kept 2 minutesto nullify the effect of previous smelling.

**Taste**

A pinch of final syrup was taken and examined for its taste on taste buds of the tongue. Or simply apinch of syrup was put on tip off tongue for determining test.

**pH**

Determination of pH placed an accurately measured amount 10 ml of the final syrup in a 100 ml volumetric flask and made up the volume up to 100 ml with distilled water. The solution was sonicated for about 10 minutes. pH was measured with the help of digital pH meter [24].

**Density**

Density of the syrup was determined by using the density bottle method by measuring the weight andthe volume, by the density bottle.

**Viscosity**

The viscosity of the syrup was determined by using viscometer mainly capillary viscometer, the averageviscosity of any syrup at 21-30°c temperature is 700-1300 centipoises or cp.

**Specific gravity at 25°C**

A thoroughly cleaned and dry Pycnometer was selected and calibrated by filling it with recently boiledand cooled water at 25°C and weighing the contents. Assuming that the weight of 1 ml of water at 250°C when weighed in air of density 0.0012g/ml was 0.99602g. The capacity of the Pycnometer was calculated. Adjusting the temperature of the final syrup to about 20°C and the Pycnometer was filled with it. Then the temperature of the filled Pycnometer was adjusted to 25°C, any excess syrupwas removed and weight was taken. The tare weight of the Pycnometer was subtracted from the filled weight. The weight per ml was determined by dividing the weight in air, expressed in g, of the quantity of syrup which fills the Pycnometer at the specified temperature, by the capacity expressed in ml, of the Pycnometer at the same temperature [25].

## RESULT AND DISCUSSION

**Pharmacognostic Characterization**

The detailed pharmacognostic examination of plant for its habitat, leaf, flower, bark with color, fruit with color, weight and dimension, height of stem etc was done with the help of botanist. Overall, approximately 250 species have been identified among the cinnamon genus, with trees being scattered all over the world [26].

**Trigonella foenum graecum Seeds Extraction**

**Table 10:** Pharmacognostic characterization of Fenugreek plant

| Part of plant | Description | Observation |
|---|---|---|
| Leaves | Pale Green | Greeen |
| Flower | White | White |
| Stem | Greenish | Greenish |
| Seed | Pale brown to golden yellow | Golden Yellow |

**Figure 7:** Extraction of Trigonella foenum graecum Seeds

**Cinnamomum zeylanicum Bark Extraction**

**Table 11:** Pharmacognostic characterization of Cinnamon plant

| Part of plant | Description | Observation |
|---|---|---|
| Leaves | Green | Green |
| Bark | Dark yellowish brown | Dark Yellowish Brown |

**Tulsi**

**Table 12:** Pharmacognostic characterization of Tulsi plant

| Part of plant | Description | Observation |
|---|---|---|
| Leaves | Green | Green |
| Flower | Purple | Reddish Purple |
| Fruits | Nutless | Nutless |
| Stem and Bark | Strongly scented and Hairy | Strongly scented and Hairy |

**Pippermint Plant**

**Table 13:** Pharmacognostic characterization of Pippermint plant

| Part of plant | Description | Observation |
|---|---|---|
| Leaves | Dark green | Dark green |
| Flower | Pinkish lavender | Lavender |
| Stem and Bark | Square and smooth | Square and smooth |

**Figure 8:** Decoction of Tulsi

**Identification and Authentication of plants**

Plant specimen of Fenugreek and Cinnamon were collected in a plastic bag from Tq. Pathri Dist. Parbhani, Maharashtra, India during the month of April and then it was processed and mounted on herbarium sheet as per procedure of botanical survey of India for identification and authenticated by Proff. Ms. Ugale P.N. In Botany, Department of Botany, College of Agriculture, Pathri Dist. Parbhani, Maharashtra, India.

After identification the seeds and bark were washed gently with tap water followed by distilled water to remove the adhering dust and soil particles, and dried in the shaded place at room temperature for 10 days in order to prevent the decomposition of active compounds. After drying, the seeds and bark were chopped into small pieces and grinded into fine powder by using mortar and pestle.

**Phytochemical and physiological characterization of plant**
**Physiological characterization**

Organoleptic characteristics of the extract were assessed using natural sense like nose, eyes, mouth; physicalappearance, odour, colour and nature.

**Table 14:** Organoleptic characterization of Fenugreek extract

| Parameter | Observation |
|---|---|
| Physical appearance | Yellow liquid |
| Colour | Yellowish brown |
| Odour | Characteristic |
| Taste | Bitter |

**Table 15:** Organoleptic characterization of Fenugreek extract

| Parameter | Observation |
|---|---|
| Physical appearance | Brown liquid |
| Colour | Dark brown |
| Odour | Aromatic |
| Taste | Warm, sweet & aromatic |

**Phytochemical Characterization**

Preliminary phytochemical test were performed to determine the phytoconstituents present in the extract.Results are given in the table below [27].

**Table 16:** Results of phytochemical characterization of Fenugreek extract

| Class of Compounds | Test performed | Results |
|---|---|---|
| Alkaloids | Mayer`s test | + |
| Carbohydrates | Molisch test | + |
| Steroids | Salkowski test | - |
| Protein and Amino acids | Ninhydrin test | + |
| Phenolic compounds and tannins | Ferric chloride test | - |
| | Lead acetate test | - |
| Saponins | Foam test | + |
| Flavonoids | Lead acetate test | - |
| Glycosides | Keller-Kiliani test | + |
| Terpenoids | Salkowski test | + |

**Table 17:** Result of phytochemical characterization of Cinnamon extract

| Parameter | Result |
|---|---|
| **Color** | Reddish Brown |
| **Odor** | Aromatic |
| **Taste** | Sweet |

**Evaluation of Herbal Syrup**
**Physical examination**

All these physical parameter of the formulation were checked visually [28].

**Figure 9:** Final Herbal Syrup

**PH examination**

PH of the final preparation of syrup was determined by using digital pH meter and observed pH of syrup is 6.15.

**Density**

**D**ensity of syrup was determined by using the density bottle method and observed density of final syrup is 1.43 g/ml.

**Viscosity**

The viscosity if syrup was determined by using a viscometer mainly capillary viscometer and the observed viscosity of the final syrup is 880cp [29].

**Summary**

Plants have been used for health and medicinal purpose from several years. Nowadays herbal preparations are more popular because of their less side effects and disease curing properties. Aim of present work was to formulate herbal syrup using plant extract of Trigonella foenum graecum seeds and Cinnamomum zeylanicum bark which possesses antiobesity properties. Formulation was subjected to various evaluation tests like colour, odour, taste, pH, density, viscosity. The prepared syrup was found to be stable effectibe and safe, thus the syrup containing Trigonella foenum graecum and Cinnamomum zeylanicum extract may be used for the treatment of obesity by oral preparation [30].

## CONCLUSION

Herbal products are safe for use having fewer side effects and free from harmful chemicals and substances. Formulated herbal syrup contains ingredients having antiobesity action and useful for treatment of obesity. It can be useful for the treatment of obesity by reducing the accumulation of excess fat in the body. The formulated herbal syrup has antiobesity activity due to Trigonellum and Cinnamaldehyde present in the Trigonella foenum graecum and Cinnamomum zeylanicum extract respectively. Formulated herbal syrup was successfully evaluated using different evaluation parameters including antiobesity characteristics. This syruip is low cost and safely used in treatment of obesity.

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