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TRADITIONAL HERBAL SYRUP: A REVIEW

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ABSTRACT
Syrups, solutions, emulsions, or suspensions containing one or more active ingredients in an appropriate vehicle are examples of liquid oral formulations. Some oral liquid formulations are made by diluting concentrated liquid preparations for drops or syrups in a suitable vehicle. Syrups are aqueous formulations with a sweet flavor and the appropriate viscosity. A suitable combination of polyols, sweetening agents, aromatic, and flavoring agents can be used to achieve an acceptable sweet taste. The stability of the active and inactive ingredients is a significant concern for the formulator in liquid oral formulation. Active ingredients are typically lower stability in aqueous formulations than in solid dosage forms. As a result, it is critical to stabilize and preserve the water-containing liquid oral formulation. Herbal medicine refers to the use of extract for therapeutic purposes, and the majority of herbal syrup was initially obtained from plants. In addition to alternative dosages from natural medications, herbal syrups were also developed. Herbal syrup is now utilized to treat a variety of conditions and to alleviate disease symptoms. Herbal syrup is characterized as a prepared, combined, and concentrated decoction with honey sugar or, on occasion, alcohol. The base of this syrup is a strong herbal decoction, which is thickened and preserved by mixing it with sugar honey. Herbal plants and formulations are used to treat a number of illnesses, like as cough syrup and other illnesses. This review discusses the extraction processes, standardization, phytochemical analysis and evaluation parameters of herbal syrup.

INTRODUCTION
Herbal Syrup: Herbal syrup it is a defined as a prepared and combination and concentration decoction with Honey sugar or either some time use alcohol. The base of such a syrup is a powerful herbal decoction, and thickening it with sugar honey helps to preserve it. Herbal plants and formulations are used to treat a variety of ailments, including cough syrup and other illnesses. Many varieties of herbal plants are utilized for cough syrup, including pudina, Tulsi, Cinnamon, and honey, and the entire plant has been used for manufacturing herbal medicine for many years.

Herbal formulation is the most often used method of health treatment in both developed and developing countries. The cough syrup medication is a liquid dose form, and the use of oral liquid pharmaceuticals has been confirmed on the basis of basic simplicity of administration to those who have difficulty swallowing solid prescription dosages. Syrup is a concentrated solution made of sugar and pure water. In syrup, as opposed to other types of syrup solutions.

The syrup may or may not contain medication or a flavoring agent mixture. Flavored or non-medicated syrup is syrup that does not contain medication but does contain a flavoring agent. Flavored syrup is frequently used as a vehicle for the unpleasant test results of medications (found as) in medicated syrups. The presence of syrup in high concentrations predisposes them to bacterial infection, so they frequently as a preservative.[1]

Syrups are a popular delivery vehicle for anti-tumor medications because they are easier to swallow (ingest) than tablets and capsules. This medication is quickly noticed. There are synthetic cough preparations available, but they have a number of negative side effects. As a result, the current study demonstrated that violet herbal cough syrup contains natural elements with no side effects. In general, health professionals are having difficulty accessing effective and safe natural treatments (therapy). A number of allopathic medication products have not been studied on a large scale, and they are generally solid without knowledge of their mechanism of action or side effects.

Even though the use of complementary medication is sometimes helpful and the confirmation of the effectiveness of some of this all-medication literature is limited, they are frequently sold with the drug store.[2] A successful formulation of liquid as well as other dosage forms necessitates a combination of scientific acumen and pharmaceutical "art".[3] Because harmful changes

occur more easily in solution, oral liquid medicines are gradually being replaced by tablets and capsules. Nonetheless, a large number of liquid oral preparations are still available in the official books.

In fact, the absorption of medicaments in solution from the GI tract into the systemic circulation is expected to be faster than that of other oral dosage forms of the same medicinal agent. Ayurvedic formulations are typically administered orally, and the majority of orally administered Ayurvedic formulations are in the form of a liquid drug or drug combination. Herbal medicinal combination, on the other hand.

Types of herbal syrup

1. Flavored syrup
2. Medicated syrup
3. Artificial syrup.[4]

Herbal syrup is manufactured by combining a concentrated decoction of herbs with honey or sugar, as well as alcohol. The herbal syrup is created through a decoction process. By combining a herb decoction with sugar, the formulation can be thickened and preserved. This was responsible for extending the shelf life of the formulation. The addition of sweetener can also help to improve the palatability of some herbs. The syrup that was eventually obtained was delicious. As defined, it is a thick, sticky liquid made up of a concentrated solution of sugar and water, with or without the addition of flavorings, agents, or medicinal substances.[5]

Although most traditional healthcare systems are effective, they lack proper standardization. Standardization is an crucial step in establishing consistent biological activity, a specified chemical profile, or just a quality assurance programme for herbal formulation production and manufacturing. As a prerequisite for global harmonization, WHO has issued specific guidelines for assessing the safety, efficacy, and quality of herbal medicines. As a result, a polyherbal syrup was created by combining dried powder decoctions of various herbs. The current study includes the standardization of raw materials for their identity, quality, and development of polyherbal syrup, as well as the standardisation of the produced formulation and accelerated stability studies.[6]

IDENTIFICATION, EVALUATION AND STANDARDIZATION OF CRUDE DRUGS

In recent era, there has been great demand for plant derived products in developed countries. These products are increasingly being sought out as medicinal products, nutraceuticals, and cosmetics. There are around 6000 herbal manufacturers in India. Ayurvedic medications are manufactured in about 4000 units. World Health Organization (WHO) provide guidelines for the herbal standardization and analysis of herbs. WHO Guidelines for Herbal Drug Standardization and Evaluation The WHO guidelines for herbal drugs can be summarized as follows:

1. Identity of the drug: Botanical evaluation- sensory characters, foreign organic matter, microscopical, histological, histochemical evaluation, quantitative measurements etc.
2. Physicochemical character of the drug: Physical and chemical identity, Chromatographic fingerprints, ash values, extractive values, moisture content, volatile oil and alkaloidal tests, quantitative estimation techniques, and so on.
3. Pharmacological parameters, biological activity profiles, bitterness values, hemolytic index, astringency, swelling factor, foaming index etc.
4. Toxicity details: - pesticide residues, heavy metals, microbial contamination like total viable count, pathogens like E. coli, Salmonalla, P.aeroginosa, S. aureus, Enterobacteria etc.
5. Microbial contamination.
6. Radioactive contamination.[7]

Herbal Drugs: The herbal drugs define as whole or plants parts, algae, fungi in unprocessed state usually in dried form but sometimes fresh. Because of the ever-increasing use of plant-based medicines and the rapid growth of the global market for these products, the safety and quality of medicinal plant materials and final herbal medicines has become a major issue for the public health establishment.[8] There is significant diversity in the quality management of such materials and products, which has an influence on population health as contaminants in herbal medicines may represent preventable dangers It has implications for consumers, as well as international trade.[9]

The International Conference of Drug Regulatory Authorities (ICDRA) and the National Centres participating in the WHO Drug Monitoring Programme asked WHO to develop and continuously revise technical guiding principles on quality, safety, and efficacy of herbal medicines in order to reduce the risk of adverse events caused by precarious and low-quality herbal medicines. The process of standardisation is concerned with the physicochemical analysis of crude medication, completed product safety, effectiveness, and consistency evaluation, safety and risk qualifications based on experience, consumer product information stipulation, and product endorsement.[10]

Because polyherbal formulations combine more than one herb to provide the ideal therapeutic effect, evaluation is critical for maintaining the quality and safety of the product. It decreases batch-to-batch variation and assures the efficacy, safety, quality, and sufficiency of polyherbal formulations. This is accomplished by limiting the intrinsic divergence of natural product composition through the application of quality assurance practises to agricultural manufacturing procedures should take into contemplation each and every one phase that adds to the quality of the herbal drugs, specifically

accurate identity of the sample, organoleptic assessment, pharmacogenetic study, volatile matter, quantitative analysis, phytochemical evaluation test for the presence of xenobiotics, microbial load testing, toxicity study and biological activity.[11]

The various parameters for identification, evaluation and standardization.[7,12]

Sr.No.	Methods	Evaluation Parameters
1.	Authentication	A. Parts of plants collect like leaf, flower, root, stolen B. Regional status C. Family D. Biological source E. Chemical constituents
2.	Marphology or Organoleptic evaluation	A. Odour B. Taste C. Size D. Shape E. Special feature
3.	Microscopy evaluation	A. Leaf content B. Trichomes C. Stomata D. Quantitative microscopy
4.	Chemical evaluation	A. Chemical test B. Chemical assay C. Phytochemical screening
5.	Physical evaluation	A. Moisture content B. Viscosity C. Melting point D. Solubility E. Optical rotation F. Refractive index G. Ash value H. Extractive value I. Volatile oil content J. Foreign matter etc.
6.	Biological evaluation	A. Microbial contamination B. Pesticides contamination C. Pharmacological activity of drugs

EXTRACTION TECHNIQUES

Maceration, digestion, percolation, infusion, decoction, hot continuous extraction (Soxhlet), counter current extraction, aqueous-alcoholic extraction by fermentation, supercritical fluid extraction, microwave-assisted extraction, ultrasound extraction (sonication), and distillation techniques (steam distillation, water distillation, phytonic extraction) are all examples of medicinal plant extraction techniques (with hydro fluorocarbon solvents). Hydro water and steam distillation), hydrolytic maceration followed by distillation, expression, and effleurage (cold fat extraction) are all options for aromatic plants. Headspace trapping, solid phase micro extraction, protoplast extraction, and micro distillation are some of the most recent aromatic plant extraction technologies.[13]

1. **Plant tissue homogenization:** Researchers have employed homogenization of plant tissue in a solvent extensively. Fresh plant components are ground to fine powder in a blender, then mixed with a specific amount of solvent and shaken rapidly for 5 to 10 minutes or after 24 hours, the extract is filtered after that.. To evaluate the concentration, the filtrate can be dried under decreased pressure and redissolved in the solvent. However, other researchers centrifuged the filtrate to clarify the extract.[14]
2. **Serial exhaustive extraction:** Another popular extraction approach comprises sequential extraction with changing polarity solvents to assure that a wide polarity range of components can be extracted, from a non-polar (hexane) to a more polar (methanol). Some researchers use an organic solvent to do soxhlet extraction of dried plant material. This approach is not suitable for thermolabile chemicals because prolonged heating may cause degradation.[14]
3. **Soxhlet extraction:** When the target molecule has a low solubility in a solvent in which the impurity is insoluble, soxhlet extraction is required. If the desired component has a high solubility in a solvent, it can be separated from the insoluble substance using simple filtration. The advantage of this approach is that instead of passing multiple batches of warm solvent through the sample, only one batch

is recycled. This approach is not suitable for thermolabile chemicals since prolonged heating can cause degradation.[15]

4. **Maceration:** In maceration (for fluid extract), whole or grinded plant-drugs are held in contact with the solvent in a tight-fitting container for a set period of time, with regular agitation, until all soluble materials is dissolved. This approach is most effective when dealing with thermolabile pharmaceuticals.[16]
5. **Decoction:** This method is used for the extraction of the water soluble and heat stable constituents. This process involves boiling a crude medication in water for 15 minutes, chilling, filtering, and pouring enough cold water through it to generate the required volume.[17]
6. **Infusion:** It is a dilute solution of the crude medications' readily soluble components. Fresh infusions are made by macerating materials in cold or hot water for a small time period.[17]
7. **Digestion:** This is a type of maceration in which the maceration extraction process is heated gently. When a relatively raised temperature is not undesirable and the menstrual solvent efficiency is increased, it is employed.[17]
8. **Percolation:** In the production of tinctures and fluid extracts, this is the method most commonly used to extract active substances. In most cases, a percolator (a thin, cone-shaped jar with openings on both ends) is utilised. The solid materials are soaked with an adequate amount of the prescribed menstruum and let to stand for around 4 hours in a tightly sealed container, following which the mass is compressed and the percolator's lid is closed. A shallow layer of menstruum is poured above the mass, and the combination is macerated for 24 hours in a closed percolator. The percolator's outlet is then opened, allows the inside liquid to gradually drop out. As required, menstruum is added more and more till it percolate reaches approximately three-quarters of the finished product's volume. After pressing the marc, the liquid is poured into the percolate. The required amount of menstruum is added, and the mixed liquid is purified by filtration or standing followed by decanting.[18]
9. **Sonication:** Frequency of ultrasound waves ranging from 20 to 2000 kHz are used in the technique, which enhances the permeability of cell walls and causes cavitation. Although the method is effective in particular situations, such as rauwolfia root extraction, its use on a broad scale is limited due to the increased costs. One downside of the process is the known but rare adverse effect of ultrasonic energy (more than 20 kHz) on the active ingredients of medicinal plants, resulting in the production of free radicals and, as a result, unwanted alterations in the drug molecules.[18]

PHYTOCHEMICAL ANALYSIS

Phytochemical examination as per the standard methods:[13,19]

Sr.No.	Phytoconstituent	Test
1.	Alkaloids	Mayer's test
		Dragendorff's test
		Wagner's test
		Hager's test
2.	Glycosides	Legal's test
		Keller-killiani's test
		Borntrager's test
3.	Carbohydrates	Molisch's test
		Fehling's test
		Benedict's test
4.	Tannins	Ferric chloride test
		Gelatin test
		Lead acetate test
5.	Phytosterols	Liebermann-burchard's test
		Salkowski's test
6.	Reducing sugars	Fehling's test
		Benedict's test
7.	Flavonoids	Ferric chloride test
		Shinoda test
		Alkaline reagent test
		Lead acetate test
8.	Saponins	Foam test
9.	Proteins and amino acids	Biuret test
		Ninhydrin test

EVALUATION PARAMETRS

1. Colour

The syrup's colour is examined directly with our naked eye.[20,21]

2. Odour

Individually, 5ml of final syrup was smelled, and the odour was identified.[20,21]

3. Taste

To determine the taste, a pinch of the final syrup was placed on the tongue's taste bud.[21]

4. Determination of pH

Take 10ml of final syrup in the volumetric flask and fill up the volume upto 100ml with distilled water. A digital pH meter was used to measure the pH.[21,22]

5. Determination of viscosity

The viscosity of syrup can be measured using an ostwald viscometer. First, carefully clean the ostwald viscometer with warm chromic acid or acetone. Fill the water up to the mark "G" in the dry viscometer and place the viscometer vertically on a suitable platform. Take note of the time it takes for water to flow from mark A to mark B. Repeat the filling operation at least three times and record the time to acquire reliable readings. Now rinse the viscometer and fill it with test liquid (syup) till mark A, then calculate the time it takes for the liquid to flow to

mark B. A specific gravity bottle can be used to determine density.[22,23]

Formula for viscosity

$$\text{Viscosity} = \frac{\text{Density of test liquid} \times \text{Time required to flow test liquid} \times \text{Viscosity of water}}{\text{Density of water} \times \text{time required to flow water}}$$

6. Determination of density

The density of syrup can be calculated using the specific gravity of the bottle. Use chromic acid or nitric acid to thoroughly clean the specific gravity bottle. Rinse the bottle two to three times with distilled water. Take note of the weight of the empty dry bottle with the capillary tube stopper (w1). Fill the bottle with unknown liquid, close it, and wipe the excess liquid out of the bottle with unknown liquid in analytical balance (w2). Finally, compute the weight in grammes of an unknown liquid (w3).[23]

Formula for density:

$$\text{Density of liquid under test (syrup)} = \frac{\text{Weight of liquid under test}}{\text{Volume of liquid under test}}$$

$= w3/v$

7. Determination of specific gravity

After cleaning with chromic acid or nitric acid, rinse the bottle with filtered water two to three times. If necessary, rinse and dry the bottle. Take the weight of an empty dry bottle with a capillary tube stopper (w1). Fill the bottle with distilled water, screw on the stopper, and wipe away any surplus liquid from the outside of the tube. And, using an analytical balance, weigh the bottle with distilled water (w2). After emptying and drying, repeat the procedure by replacing water with the liquid under test (syrup). Weigh the container with the stopper and the liquid under test on an analytical balance (w3).[23]

Formula for specific gravity

$$\text{Specific gravity of liquid under test (syrup)} = \frac{\text{Weight of liquid under test}}{\text{Weight of water.}}$$

$= w3/w2.$

ADVANTAGES OF HERBAL SYRUP

1. Production costs are low.
2. With chronic conditions, it is effective.
3. Various options are available.
4. They could have less negative side effects.
5. It's simple to adapt the dose to the weight of the child.
6. There is no need for nursing.
7. They are usually harmless.
8. Herbs can be found almost anywhere.
9. As a syurp is sweet in flavour, it's good patient complimac, especially for paediatric patients.
10. Because of the high osmotic pressure, it acts as a preservative by inhibiting the growth of bacteria, fungi, and mould.

DISADVANTAGES OF HERBAL SYRUP

1. There are no dosing instructions.
2. Wild herbs provide a risk of poisoning.
3. Solid sedimentation occasionally results in the formation of a foot.
4. It is impossible to attain dose precision unless the syrup is packaged in unit doses.
5. If preservation is not added in the correct proportion, microbiological contamination can occur.
6. An additional drawback of herbal medication is the risk of self-dosing of herbs, which is very rare.

CONCLUSION

In today's world, herbal products are a symbol of safety, as contrast to synthetic pharmaceuticals, which are considered unsafe to both humans and the environment. Herbs have been valued for decades for their medicinal, flavouring, and aromatic properties. When designing a herbal medication formulation, it is essential to have a complete knowledge of the drug's organoleptic properties, phytoconstituents, pharmacological action, and standardisation in relation to numerous parameters using various approaches.

Monographs, which are compiled in standard books such as the Indian Pharmacopoeia, Ayurvedic Pharmacopoeia of India, Wealth of India, and Ayurvedic Formulary, provide all the details for the various tests to be performed in order to determine the conformity of the crude or formulated herbal drug with the standards established. The involved governing authorities, such as CDSCO and the US-FDA, have established numerous rules on the standards of herbal pharmaceuticals, as well as standard testing techniques to determine the drug's conformity with prescribed standards.

The herbal syrup is a sweet, viscous, concentrated, or a nearly saturated aqueous solution of sucrose-containing 66.7% w/w of sugar (USP contains 64.74%w/v of sugar) having a specific gravity of 1.31. Syrups should be kept in a cool, dark place, in a well-dried, filled, and well-stoppered bottle. They are kept at a temperature of no more than 25°C. A bottle should be filled, tightly closed, and kept dry. Syrups are self-preservatives. Preservatives such as methylparaben, sodium benzoate, benzoic acid, glycerin, and others are used to prevent bacteria and mould growth.

The world of herbal medications is vast and there is still much to learn about them. It’s time to spread awareness about them all across the world.

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