

Formulation and Evaluation of Herbal Churna for Digestion

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Abstract: The objective of the present study was to evaluate stability study of Rasayana Churna. Accelerated stability study (Temperature: $40^{\circ}\text{C} \pm 2$, Relative Humidity (RH): $75\% \pm 5$) and real time stability study (Temperature: $25^{\circ}\text{C} \pm 2$, Relative Humidity (RH): $60\% \pm 5$) was conducted as per ICH guideline Q1A (R2). The change in organoleptic parameters, physic-chemical parameters and microbial load was observed 6 month for accelerated stability and 1 year for real time stability study at an interval of 0,1,3,6 and 12 months. Real time stability was comparatively carried out to evaluate actual degradation rate of Rasayana Churna with respect to accelerated condition. No change was observed in color, odour and taste of Rasayana Churna up to storage of 6 months at accelerated condition. Results of different physico-chemical parameters were taken in consideration to evaluate intercept and slope. Extrapolated shelf life of Rasayana Churna was calculated with 10% degradation rate from physico-chemical parameters at accelerated condition $40^{\circ}\text{C} \pm 2$ and $75\% \pm 5$ RH. The present investigation supports that the Rasayana Churna was suitable at accelerated condition up to 6 month storage. it can be extrapolated that shelf life of Rasayana Churna is 25.12 months (2.09 years) for countries which comes under climatic zone I & II and 16.60 months (1.38 years) for countries which comes under climatic zone III & IV. Real time stability data of Rasayana Churna showed very good stability up to 1 year.

Keywords: Rasayana Churna

I. INTRODUCTION

Churna is define as the mixture of powdered herb use in Ayurvedic medicine. Churna is an Ayurvedic term that refers to powdered herbal formulations. It is a traditional method of preparing and using herbs for medicinal purposes. Churna is created by grinding various herbs into a fine powder, which can then be mixed with other ingredients or consumed as it is. The word "churna" itself means "powder" in Sanskrit. Ayurvedic practitioners believe that by grinding herbs into a powder, their medicinal properties are enhanced and can be easily absorbed by the body. [1]

Churna formulations can vary widely depending on the specific health condition they are intended to address. Different herbs are selected and combined to create a blend that targets a particular ailment or promotes overall well-being. The use of churna in Ayurveda is based on the belief that it helps balance the body's doshas (energies) and supports the body's natural healing processes. Churna can be taken orally, either mixed with water, honey, or ghee, or it can be applied topically as a paste or poultice. It's important to note that while churna is a popular and widely used form of herbal medicine in Ayurveda. Before utilizing any churna or herbal medicines, it's always a good idea to speak with a licensed Ayurvedic practitioner or healthcare provider. In recent years, there has been a growing interest in the utilisation of traditional medicinal plants as a source of nutraceuticals, owing to their rich phytochemical composition and diverse therapeutic properties. The integration of herbal remedies into daily dietary regimens offers a promising Avenue for promoting holistic health and wellbeing, harnessing the synergistic effect of multiple botanical to address multifaceted health concern. In this context, the present study endeavours to develop a polyherbal nutraceutical churna formulated with meticulously selected botanical ingredient renowned for their individual and collective health promoting properties. Each component of the churna has been carefully chosen based on traditional knowledge, scientific evidences and historical uses, with aim of providing comprehension nutritional support and promoting optimal physiology function. The subject of this study is the herbal churna that was made using the Indian Ayurvedic



Formulary. The churna is used to treat digestive disorder stomach upset, constipation etc. The churna was prepared using senna leaves, liquorice, cinnamon and clove. Senna leaves (cassia senna) Made from the leaves and fruit of the senna plant, senna is a natural laxative. It is used to relieve constipation, or trouble pooping.

Liquorice (*Glycyrrhiza glabra* Linn.) Liquorice helps in relieve indigestion. It offers comprehensive benefits for digestive health, which are connected to immune system and host metabolism regulation. Cinnamon (*Cinnamomum zeylanicum*) cinnamon has been used to treat digestive discomfort. Health benefits of cinnamon can help treat digestive imbalance and flatulence. Clove (*Eugenia caryophyllus*) may manage stomach-related diseases (loose motions, flatulence, nausea, indigestion, vomiting, gastric irritability, diarrhoea). Through the synergistic combination of this botanicals the polyherbal nutraceutical churna aims to provide comprehensive support to various physiological system, ranging from bone and immune health to digestion and congestive function. By harnessing the therapeutic potential of traditional medicinal plant, this formulation offers the natural and holistic approach to promoting overall health and vitality. Building upon the successful development of polyherbal churna, we have further advance our research by formulating vati (tablets) derived from the same synergistic.

Drugs mentioned in patha, are cleaned properly, dried thoroughly, pulverised and then sieved. The churna is free flowing and retains its potency for one year, if preserved in an airtight containers. Triphala churna, Trikatu churna, Drakeshadi churna and Sudharsana churna are some of examples. Churna formulation are similar to powder formulations in Allopathic system of medicine. In recent days churna is formulated into tablets in order to fix the dose easily. These forms of medicament are prescribed generally because of their particle size. Smaller the particle size greater is the absorption rate from g.i.t and hence the greater is bioavailability. It is prescribed by the Ayurvedic physician for treating conditions such as diabetes, indigestion, constipation etc. Indigestion is a common ailment affecting the general population and in allopathy system antacids are commonly prescribed. Since the usage of such aluminium containing antacids cause deleterious effects like Alzheimer's disease upon long term usage, we explored an alternative and safe remedy for indigestion. Hence we prepared a churna with natural ingredients commonly used by mankind for culinary purposes. Thus the present study examined the favourable influence of four spices formulated into churna said to have digestive property. The common ingredients of these churna were Ginger (*Zingiber officinale*), Ajowan (*Trachyspermum ammi*), Cinnamon (*Cinnamomum zeylanicum*) and Fennel (*Foeniculum vulgare*). The formulated churna derived from above said drugs is reported to have a wide range of biological activity. Ginger contains aromatic principle like Zingiberine and bisabolone while pungent principles are gingerols and shogaols. Other components are nerol, geraniol, d-camphor, β -Phellandrene, linalool, α -farnesene, [1] Shagoal, [2] and also diarylheptanoids such as gingerone A&B. This is used in the treatment of flatulence, colic, indigestion, vomiting constipation. It also maintains the tonicity of intestine muscle [3,4].

This is used in traditional medicine for the treatment of indigestion and also as antispasmodic [5]. Cinnamon contains cinnamaldehyde, which is a phenylpropene derivative [6]. It was found to possess antibacterial property and is mostly used as carminative. Fennel contains anethole and fenchone. This is mainly used as a carminative [7,8,9,10]. An earlier report on the digestive and carminative property of the mentioned ingredients prompted us to formulate and evaluate the digestive enzyme activity namely amylolytic, lipolytic and proteolytic activity in comparison with GASTRAP (marketed formulation) used as a digestive agent. Churnas are powdered medications. They can be made with individual or a combination of medications. The ingredients for making churna, as described in classical texts such as Ashtangahridaya, Sahasrayoga etc. are checked, weighed, dried, cleansed and ground into a powder by means of disintegrators. The fine powder is obtained by means of mechanical sifters. The quality control laboratory tests the following criteria related to churna quality: pH, total ash, acid-insoluble ash, alcohol-soluble extractive, water-soluble extractive, and loss on drying. The Kanjikkode factory of Arya Vaidya Sala produces the churnas

II. AIM AND OBJECTIVES

Aim :- To formulate and evaluate of Herbal Churna.

Objectives:-

- Formulation of Herbal Churna
- Physical evaluation of Herbal Churna

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• **Physiochemical evaluation of Herbal Churna**

Herbal churnas are traditional Ayurvedic formulations that combine various herbs and spices to promote overall health and wellness. The objectives of herbal churnas can vary depending on their specific composition and intended use.

General Objectives of Herbal Churna :

1. Digestive health: Many herbal churnas are designed to support digestive health alleviate digestive issues, and promote regular bowel movements.
2. Immune system support: Some herbal churnas contain ingredients that may help boost the immune system and protect against infections.
3. Anti-inflammatory effects: Certain herbal churnas may have anti-inflammatory properties, which can help reduce pain and inflammation.
4. Antioxidant effects: Herbal churnas may contain antioxidants that help protect against cell damage and oxidative stress.
5. Overall wellness: Herbal churnas can be used to promote overall health and wellness, depending on their specific composition.

III. LITERATURE REVIEW

3.1) An Ayurvedic Polyherbal Formulation Kumar T. Chandrashekar KS, Tripathi DK, Nagori K, Pure S, Agrawal S, Ansari TJ. J Chem Pharm Res. 2011;3(3):742-9.

Abstract:

The study aimed to standardize Gokshuradi Churna, a traditional Ayurvedic polyherbal formulation commonly used for urinary disorders. Various physicochemical parameters, phytochemical screening, and chromatographic profiles were evaluated to ensure consistency and quality control of the formulation. The results demonstrated the presence of key bioactive constituents and established baseline data for the quality assessment of Gokshuradi Churna. This standardization process can aid in the quality assurance and therapeutic efficacy of this herbal product in clinical use.

3.2) Maurya N, Vishwakarma R, Bhanap K, Shah S, Patil S. Preparation and quality evaluation of hingwashtak churna: A polyherbal formulation. Journal of Pharmacognosy and Phytochemistry. 2020;9(3):1923-1927.

Abstract:

Hingwashtak Churna is a well-known polyherbal Ayurvedic formulation traditionally used to manage digestive disorders, particularly indigestion, flatulence, and loss of appetite. The present study aimed to prepare Hingwashtak Churna as per classical Ayurvedic texts and evaluate its quality based on various physicochemical parameters. The formulation consists of eight ingredients including Hing (Ferula foetida) and other digestive and carminative herbs. Standardization was carried out through organoleptic evaluation, powder microscopy, and physicochemical tests such as loss on drying, total ash, acid-insoluble ash, and extractive values. The results confirmed the authenticity, purity, and uniformity of the formulation. The study emphasizes the importance of quality control in herbal formulations and validates the traditional claims regarding the efficacy of Hingwashtak Churna in digestive health.

3.3) Ramya Kuber B, Supriya M, Tejavani M. Preparation and Evaluation of Shatavaryadi Churna: An Ayurvedic Polyherbal Formulation. Journal of Chemical and Pharmaceutical Research. 2017;9(3):122-128.

Abstract:

The study focuses on the preparation and evaluation of Shatavaryadi Churna, a traditional Ayurvedic polyherbal formulation renowned for its rejuvenating properties and its role in alleviating stress and fatigue. The formulation was prepared following the guidelines of the Ayurvedic Formulary of India. Both a marketed formulation (SCMF-1) and an in-house preparation were subjected to comprehensive analyses, including organoleptic evaluation, preliminary phytochemical screening, and various physicochemical assessments such as bulk density, angle of repose, total and acid-insoluble ash values, extractive values, and moisture content. Additionally, in vitro antimicrobial activity was evaluated using the cup plate method. The in-house formulation demonstrated the presence of carbohydrates, amino



acids, flavonoids, and saponin glycosides, whereas the marketed formulation lacked saponin glycosides. Both formulations exhibited acceptable flow properties and complied with standard ash and moisture content values. These findings underscore the importance of standardization and quality control in ensuring the efficacy and safety of Ayurvedic polyherbal formulations.

3.4) Standardization of Ajmodadi Churna, a Polyherbal Formulation" by Sriwastava NK, Shreedhara CS, and Ram HA, published in Pharmacognosy Research in March 2010 (Volume 2, Issue 2, Page 98):

Abstract:

Standardization of herbal formulations is essential to assess the quality of drugs based on the concentration of their active principles. This study reports on the standardization of Ajmodadi Churna, a polyherbal Ayurvedic medicine used as a carminative and antispasmodic, known for its efficacy in treating conditions like sciatica, back stiffness, and digestive disorders. The churna was prepared as per the Ayurvedic Formulary of India. Both in-house preparations and marketed samples were evaluated based on organoleptic characteristics, physical properties, and physicochemical parameters. The established parameters were found sufficient to evaluate the churna and can serve as reference standards for quality control and assurance in pharmaceutical settings.

3.5) Pharmacopeial Standardization of Mahasudarshan Churna: A Polyherbal Formulation" by Chauhan S, Pundir V, and Sharma A, published in the Journal of Medicinal Plants Studies in 2013 (Volume 1, Issue 2, Pages 13–18):

Abstract:

Standardization of herbal formulations is essential to assess the quality of drugs based on the concentration of their active principles. Mahasudarshan Churna, an Ayurvedic formulation, is traditionally used as a diaphoretic and antimalarial agent. It is also beneficial in conditions like dyspepsia and loss of appetite.

This study aimed to standardize Mahasudarshan Churna to ensure its quality, based on the concentration of active principles, following World Health Organization guidelines. Various parameters were evaluated, including organoleptic characteristics and physicochemical properties. The established parameters were found sufficient to standardize Mahasudarshan Churna and can serve as reference standards for quality control and assurance studies, particularly for plant-based drugs used in primary healthcare. The results obtained may assist regulatory authorities, scientific organizations, and manufacturers in developing standardized formulations with enhanced efficacy.

3.6) "Preparation, Quality Control and Stability Studies of Avipattikar Churna" by Patil S. and Shah S., published in the Journal of Drug Delivery and Therapeutics on June 15, 2019 (Volume 9, Issue 3-s, Pages 531–536):

Abstract:

The study focuses on the preparation, quality control, and stability assessment of Avipattikar Churna, a traditional Ayurvedic polyherbal formulation widely used for managing gastrointestinal disorders such as hyperacidity, indigestion, and constipation. The formulation was prepared in accordance with the guidelines specified in the Ayurvedic Formulary of India. Subsequently, it underwent a series of evaluations to ensure its quality and stability. These evaluations included organoleptic assessments, physicochemical analyses (such as moisture content, ash values, and extractive values), and advanced instrumental techniques like High-Performance Liquid Chromatography (HPLC) and Infrared (IR) spectroscopy. The results from these assessments provided a comprehensive profile of the formulation's quality parameters, which are crucial for its standardization and quality assurance.

3.7) A Review Article on Comparative Analysis to Report Quality Parameters of Triphala Churna" by Ritika Malik and Yashika Uniyal, published in the International Journal of Current Science (IJCS PUB), Volume 13, Issue 2, June 2023, pages 756–771:

Abstract:

Triphala Churna is a traditional Ayurvedic formulation composed of three fruits: Amla (*Phyllanthus emblica*), Baheda (*Terminalia bellirica*), and Haritaki (*Terminalia chebula*). Renowned for its digestive benefits, it is also rich in antioxidants and vitamin C, contributing to immune support and overall vitality.



3.8) Pharmacopeial Standardization of Mahasudarshan Churna: A Polyherbal Formulation" by Chauhan S., Pundir V., and Sharma A., published in the Journal of Medicinal Plants Studies in 2013 (Volume 1, Issue 2, Pages 13–18):

Abstract:

Standardization of herbal formulations is essential to assess the quality of drugs for therapeutic value. Mahasudarshan Churna, an Ayurvedic formulation, is currently used as a diaphoretic and anti-malarial agent. It is also beneficial in conditions like dyspepsia and loss of appetite. This study aimed to standardize Mahasudarshan Churna to ensure its quality, based on the concentration of active principles, following World Health Organization guidelines. Various parameters were evaluated, including organoleptic characteristics and physicochemical properties. The established parameters were found sufficient to standardize Mahasudarshan Churna and can serve as reference standards for quality control and assurance studies, particularly for plant-based drugs used in primary healthcare. The results obtained may assist regulatory authorities, scientific organizations, and manufacturers in developing standardized formulations with enhanced efficacy.

IV. PLAN OF WORK

4.1 Phase 1:

- Literature survey.
- Procurement of herbal ingredients .
- Authentication of herbal ingredients .
- Grinding of herbal ingredients

4.2 Phase 2:

- Pre-formulation studies .
- Formulation & optimization of churna.

4.3 Phase 3:

- ☐ Phytochemical Evaluation Of Churna.
- ☐ Test For Alkaloids
- ☐ Test For Carbohydrates
- ☐ Test For Proteins
- ☐ Test For Flavanoids
- ☐ Tannins
- ☐ Test For Phenol Chemical Evaluation Of Churna.
- ☐ Ash content
- ☐ Acid insoluble ash
- ☐ Total Acid soluble ash
- ☐ Water soluble ash
- ☐ Physical Evaluation of Churna
- Bulk Density
- Tapped Density
- Angle of repose
- Carr's index
- Hausner's ratio
- Total ash value



V. MATERIALS

5.1.1 Senna leaves: (cassia senna)



Fig No.1 Senna leaves

- Synonyms : Indian Senna
- Biological name : Cassia Senna
- Chemical constituents : the active ingredient of Senna, found in the leaves and fruits
- Uses : used as a laxative for short term treatment of constipation

Senna, or *Cassia angustifolia* Vahl., is an underbrush that is widely used as a natural remedy for a number of ailments, most notably constipation. The plant's main biological actions, including those that are antibacterial, antifungal, antiviral, anti-parasitic, anti- insecticidal, and antioxidant, are attributed to its abundance of anthraquinone glycosides, such as sensoside A, B, C, and

D, and flavonoids. The herb also has hepatoprotective, hypolipidemic, antidiabetic, and anti-cancer properties. The widespread recognition of *Cassia senna* as a safer laxative can be explained by its adverse acute toxic effects and almost little side effects from overdose in the majority of cases.

5.1.2 Liquorice: (Glycyrrhiza glabra Linn.)



5-456208299

Fig No.2 Liquorice

- Synonyms : Herbaceous plant
- Biological name : Glycyrrhiza glabra
- Chemical constituents : Liquiritin, liquiritenin



- Uses : a digestive remedy, including heartburn and constipation relief

The Glycyrrhiza genus has more than 30 species that are widely distributed around the world. It was the most often prescribed herb in East China, the West from the Former Han dynasty, East Egypt, Rome, and Greece. The antibacterial, anti-inflammatory, immunodeficiency, respiratory, liver, and throat infections are just a few of the conditions that licorice root extracts can help with. Digestion issues are also treated with it. However, traditional medicine is becoming more and more popular as a means of treating a wide range of illnesses. To discover the potential of novel chemicals to treat chronic diseases like respiratory, cardiovascular, anticancer, hepatoprotective, etc., it is crucial to screen medicinal plants. This paper, which will serve as a resource for upcoming clinical and basic studies, thoroughly analyzes the ethnopharmacological applications, phytochemistry, biological activities, clinical data, and toxicology of licoric

5.1.3 Cinnamon : (*Cinnamomum zeylanicum*)

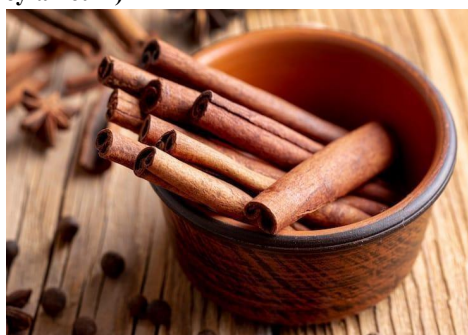


Fig No.3 Cinnamon

- Synonyms : Ceylon cinnamon
- Biological name : *cinnamomum verum*
- Chemical constituents : Eugenol, piperitone, coumorin
- Uses : helps people with inflammation, nerve pain, heart disease, cough and other condition.

The branches of trees belonging to the *Cinnamomum* family are the source of cinnamon, a spice. It is indigenous to Southeast Asia, South America, and the Caribbean. Since 2000 BC, people have used cinnamon, and the Egyptians valued it much. Physicians employed it in the Middle Ages to cure indigestion, sore throats, arthritis, and coughing. After black pepper, it is currently the second most popular spice in both Europe and the US. Cinnamon can be found as a spice in whole bark pieces or as a powder. Supplements and essential oil of cinnamon are also available for use. The two primary varieties of cinnamon are Ceylon and cassia. The nutritional compositions of the two are dissimilar. Cinnamon's components have been linked in certain studies to antibacterial, antidiabetic, anti-inflammatory.

5.1.4 Clove: (*Eugenia caryophyllus*)

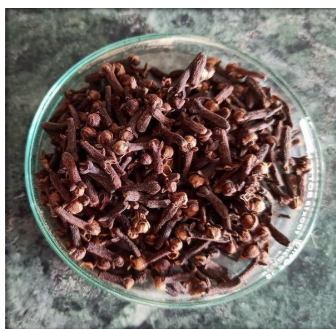


Fig. no.4 Clove



- Synonyms : Cleave
- Biological Name : syzygium aromaticum
- Chemical constituents: cloves contain flavonoids such as quercetin and kaemferol.
- Uses : cooking , medicine and cosmetics.

One of the most precious spices, clove (*Syzygium aromaticum*) has been utilized for many therapeutic and food preservation purposes for millennia.

Although cloves are originally from Indonesia, they are currently grown all over the world, especially in the state of Bahia in Brazil. This plant has a lot of promise for use in medicine, cosmetics, food, and agriculture. It is one of the greatest sources of phenolic chemicals, including gallic acid, eugenol, and eugenol acetate. It is use as antioxidant, digestion, antimicrobial, tooth ache, cancer, immunity booster, stomach upset etc.

5. Fennel (*Foeniculam volgur*) :



Fig no.5 Fennel

- Synonyms : Florence Fennel
- Biological Name : *Foeniculam volgur*
- Chemical Constituent : Fennel contains a variety of chemical constituents, including volatile oils and other compounds.
- Uses : It's used for flavoring foods, aiding digestion, and promoting overall well-being.

Fennel is a flowering plant species in the carrot family. It's commonly used as a vegetable, herb, or spice in various cuisines. Fennel has several health benefits, including:

1. Digestive aid: Fennel seeds and tea are often used to alleviate digestive issues.
2. Antioxidant properties: Fennel contains antioxidants that may help protect against cell damage.
3. Anti-inflammatory properties: Fennel may have anti-inflammatory effects. ## Volgograd

Volgograd is a city in southwestern Russia, located on the Volga River. It's known for its rich history, cultural landmarks, and industrial significance. Volgograd has played a significant role in Russian history, particularly during World War II.

6. Ginger (*Zingiber officinol*) :



Fig No.6 Ginger



- Synonyms : Canton Ginger
- Biological Name : Zingiber officinol
- Chemical Constituents : contains a wide array of chemical constituents, including terpenes, phenolic compounds, and various other compounds.
- Uses : Ginger is used in various herbal remedies.

Zingiber officinale, commonly known as ginger, is a flowering plant that belongs to the Zingiberaceae family. Ginger has been widely used for centuries in traditional medicine, cooking, and herbal remedies.

Health Benefits of Ginger

1. Digestive aid: Ginger has natural anti-inflammatory properties that may help alleviate nausea, bloating, and digestive discomfort.
2. Anti-inflammatory properties: Ginger contains compounds like gingerol and shogaol, which may help reduce inflammation and pain.
3. Antioxidant properties: Ginger has antioxidant properties that may help protect against cell damage and oxidative stress.
4. Cold and flu relief: Ginger has been traditionally used to help relieve symptoms of the common cold and flu.

Uses of Ginger

1. Culinary: Ginger is a popular ingredient in many cuisines, particularly in Asian and Indian cooking.
2. Herbal remedies: Ginger is used in various herbal remedies, such as teas, capsules, and supplements.
3. Traditional medicine: Ginger has been used in traditional medicine for centuries to treat various ailments.

7. Ajwain (*Trachyspermum ammi*) :



Fig No.7 Ajwain

- Synonyms : Carom seeds
- Biological Name : Trachyspermum ammi
- Chemical Constituents : contains a variety of chemical constituents, including essential oils, terpenoids, and other compounds.
- Uses : Ajwain seeds are used in Ayurvedic medicine

Trachyspermum ammi, commonly known as ajwain or carom seeds, is a flowering plant that belongs to the Apiaceae family. The seeds of the plant are widely used in traditional medicine, cooking, and as a spice.



Health Benefits of Ajwain

1. Digestive aid: Ajwain seeds are known for their carminative properties, which can help alleviate digestive issues such as bloating, gas, and indigestion.
2. Antimicrobial properties: Ajwain seeds have been shown to have antimicrobial properties, which can help protect against certain bacteria and fungi.
3. Anti-inflammatory properties: Ajwain seeds may have anti-inflammatory properties, which can help reduce inflammation and pain.

Uses of Ajwain

1. Culinary: Ajwain seeds are commonly used as a spice in Indian, Pakistani, and Middle Eastern cuisine.
2. Traditional medicine: Ajwain seeds have been used in traditional medicine for centuries to treat various ailments, including digestive issues and respiratory problems.
3. Ayurvedic medicine: Ajwain seeds are used in Ayurvedic medicine to treat a range of health conditions, including digestive issues and skin problems.

5.2 Methods :

Table 1: Formulation of Herbal Churna

Sr.No	Name of Ingredients	Quantity Taken	Uses
1	Senna Leaves	15 gm	Constipation
2	Liquorice	16.7 gm	Anti-inflammatory
3	Cinnamon	16.7 gm	Heart Disease
4	Clove	9.5 gm	Cosmetics
5	Fennel	16.7 gm	Medicinal Herb
6	Ginger	16.7 gm	Teas and Beverages
7	Ajwain	8.7 gm	Culinary & Medicinal

5.2.1 Selection of medicinal plant

Localities assisted in the identification of the plants using their vernacular names; following collection, precise scientific identification was achieved through the use of published studies and a review of the literature.

5.2.2 Preparation of churna

The herbal ingredients used in the preparation of churna are Senna leaves, liquorice, cinnamon, and clove, fennel, ginger, ajwain. These ingredients are properly cleaned and dried. Then they are passed through sieve no. 80. All ingredients are powdered and weighed separately and then mixed together in suitable proportion which is showed in Table 1. And after the preparation of churna it is kept in air tight containers in cool and dry place .

5.3 Characterisation and evaluation 5.3.1 Preliminary phytochemical study

The poly herbal formulation that was prepared underwent qualitative test to identify its constituent, including carbohydrates, proteins, alkaloids, glycosides, tannins, saponins, flavonoids, etc.

5.3.2 Alkaloids- test for alkaloids involved mixing dilant mixing dilute hydrochloric acid with a poly herbal churna, filtering the resulting solution and then subjeting the filtrate to additional treatment using various alkaloidal agents.

- Mayers test- Mayers reagent was introduced to the sample, the detection of a cream colour signifies the presence of alkaloid.
- Dragondorfs test- when the dragondorfs reagent was mixed with the sample and redish brown precipitate where observed this indicates the presence of alkaloids.



5.3.3 Carbohydrates-

- Feellings test- when felling solution a and BB are combined in a test sample and heated for 2 minutes, the confirmation of the presence of reducing sugar is indicated by the appearance of reddish brown colour.

5.3.4 Glycosides –

- Legal test- little anthrone and polyherbal churna was combined in a watch glass. A drop of concentrated H₂SO₄ was added, resulting in the formation of paste which was gently heated over water bath.

5.3.5 Saponins-

Foam test- the churna was diluted with 20 ml of water and the presence of saponin was confirmed if foam appeared in the top part of test tube.

Phenol test-Mixing a blind of various herb (poly herbal churna) with neutral ferric chloride solution Then adding a few drops of alcohol. The periods of the Louis green or red colour confirm the presence of phenols in the churna.

5.3.6 Tannins –The 10% lead acetate solution was mixed with poly herbal churna and the occurrence of white precipitate indicate the presence of tannins in the churna.

5.3.6 Flavonoids: Shinoda test- mix the poly herbal churna with alcohol into which magnesium pieces were slowly added along with concentrated hydrochloric acid and then heated. The development of purple colour indicates the presence of flavonoids.

5.4 Standardization of herbal churna

5.4.1 Organoleptic characters-the sensory attributes involve assessing the composition through its Colors, smell and odor.

5.4.2 Physio chemical identification-This evaluation covers parameters such as total ash content, water soluble ash, acid insoluble ash and physical properties including bulk tap density, bulk density, hausner ratio, angle of repose and carr's index.

5.4.3 Total ash content – approximately 2-3 grams of dried powder were carefully weighed in a silica dish or tared platinum that had been previously ignited and weighed. The Powder drug was spread evenly across the dish surface and then incinerated gradually, ensuring the heat did not exceed a dull red glow. Until all carbon was eliminated. The resulting Ash was allowed to cool before being weighed. If carbon free Ash was not achieved with this method, After applying hot water to the burned area, the residue gathered on the Ashley filter paper. The filtrate was added back, dried out by evaporation, and torched at a low temperature after the residue and filter paper were burned. The percentage of ash was calculated on the weight of the air dry drug used as a reference.

5.4.4 Acid insoluble ash- 25 millimetres of 2 M hydrochloric acid was heated with h for 5 minutes. The insoluble residue was gathered using a gooch crucible or a ashles's filter, washed with hot water and then subjected to ignition and cooling in a desiccator for before weighing. The percentage of ash resistant to acid was determined related to the air dry drug.

5.4.5 Water soluble ash- 25 mm of water was heated together with Ash for 5 minutes, after which the insoluble matter was gathered using sintered glass crucible or ash filter. The collected matter was washed with hot water and then ignited for 15 minutes at a temperature below 450 degree Celsius. The weight of the residue in milligram was subtracted from the total ash weight.

5.5 Physical evaluation –

5.5.1 Bulk Density

By precisely transferring the sample's weight using a funnel into a graduated cylinder, bulk density—which is the ratio of mass to bulk volume—was ascertained. The original volume of the sample was then measured, and the ratio of the volume's occupied weight was computed.



Bulk density= w/v_0 g/ ml Where, w=mass of powder
 v_0 =untapped volume

5.5.2 Tapped density

Tapped density was assessed by introducing a measured weight of powder into a graduated cylinder, followed by a prescribed number of tapping cycles. The initial volume prior to tapping was recorded, and subsequent to tapping was recorded, and subsequent to tapping for duration of 1015 minutes, the final volume was noted. Density calculations were then derived from the ratio of the powder mass to the tapped volume.

Tapped volume= w/v_f g/ml Where,

W= mass of the powder V_f = tapped volume

5.5.3 Carr's index

The compressibility of the powder reflects its ability to be compacted, which is influenced by both its apparent bulk density and tapped density. The % compressibility of the powder is determined using the following formula.

Carr's index= $[(V_0 - V_f)/V_0] \times 100$

5.5.4 Hausner ratio

Hausner's ratio, a metric utilized to assess the flow properties of powder, is calculated as the ratio between the bulk density and tapped density of the powder.

Hausner ratio= Tapped density/Bulk density

5.5.5 Angle of Repose

The angle of repose, characterized as the angle formed between the surface of the powder pile and the horizontal surface, is measured by allowing the powder to flow through a funnel and accumulate at a fixed height of 4cm within a burette. Subsequently, graph paper is positioned beneath the funnel on the table to facilitate the measurement of pile height and radius, with calculations conducted using the formula provided below.

Angle of repose = $\tan^{-1}(h/r)$

VI. RESULTS AND DISCUSSION

Polyherbal formulations were prepared following a specific procedure and the constituents of herbal churna are mentioned in table no 1. A qualitative test was conducted on these formulations to identify various classes of components including Proteins, carbohydrate, Alkaloids, Tannins, Saponins, glycoside and Flavonoids, with results detailed in Table 2. The organoleptic properties of the formulations are outlined in Table 3, and the physical characteristics of the polyherbal churna are described in Table 4. Ash values (acid-insoluble ash, total ash and water-soluble ash) can be found in Table 5.

Table No 4. Organoleptic Evaluation Of Herbal Churna

Colour	Odor	Taste
Brown	Odor of liquorice	Sweet

Color: The brown color of the mixture could be a result of several factors. Firstly, it could be influenced by the natural colors present in the ingredients used. For example, liquorice, cinnamon, and cloves all possess varying degrees of brown hue. Additionally, the interaction of different compounds during the preparation process might contribute to the overall color. The presence of glycosides, tannins, and other phenolic compounds, which are common in many herbal ingredients, can also impart a brown color to the mixture.

Odor: The fact that the mixture carries an odor reminiscent of liquorice suggests that liquorice is likely a dominant ingredient in terms of aroma. Liquorice root is known for its distinct, sweet, and slightly woody scent. However, it's also possible that other aromatic ingredients, such as cinnamon and cloves, contribute to the overall aroma, albeit to a lesser extent. These spices often possess warm, spicy, and sweet fragrances that could complement the liquorice aroma.



Taste: The sweet taste of the mixture aligns well with the presence of liquorice. Liquorice root contains a compound called glycyrrhizin, which imparts a characteristic sweetness. This natural sweetness makes liquorice a popular ingredient in confectionery and herbal preparations aimed at masking bitter or unpleasant tastes. Additionally, the sweet taste could be enhanced by other ingredients such as cinnamon and cloves, both of which also have naturally sweet undertones.

Table No 5. Physical Characters Of Polyherbal Churna

Sr. No.	Parameters	Readings
1	Bulk density	0.308 g/ml
2	Tapped density	0.491 g/ml
3	Carr's index	37.27%
4	Hausners ratio	1.594
5	Angle of repose	45.957°

1. Bulk density (0.308 g/ml): Bulk density refers to the mass of a powder per unit volume when it is poured loosely into a measuring container. In this case, the bulk density indicates that the material has a relatively low density, meaning the particles are not tightly packed together.
2. Tapped density (0.491 g/ml): Tapped density represents the mass of the powder per unit volume when it is subjected to tapping or vibration to settle the particles. The higher tapped density compared to bulk density suggests that the material can be compacted under pressure, indicating potential for good flow properties.
3. Carr's index (37.27%): Carr's index, also known as the compressibility index, is a measure of the powder's ability to decrease in volume under pressure. It is calculated as $(\text{tapped density} - \text{bulk density}) / \text{tapped density} \times 100$. A lower Carr's index indicates better flowability and compressibility of the powder. In this case, Carr's index suggests moderate compressibility and flowability of the material.
4. Hausner's ratio (1.594): Hausner's ratio is the ratio of tapped density to bulk density and provides an indication of the flowability of the powder. A higher Hausner's ratio suggests poorer flow properties. Hausner's ratio exceeding 1.25 in this case indicates that the powder may have fair to poor flowability.
5. Angle of repose (45.957°): The angle of repose is the maximum angle at which a pile of powder can remain stable without sliding or slumping. It provides insight into the flowability and cohesion of the powder. A higher angle of repose suggests poorer flow properties. The angle of repose provided falls within a moderate range, indicating fair to good flow properties.

Table No 6. Physio-Chemical Characteristic Of Herbal Formulation

Sr. No	Factors	o
1	Ash content	15.6
2	Acid insoluble ash	2.54
3	Water soluble ash	5.72

1. Ash Content (15.6%): Ash content refers to the residue left behind after the complete combustion or incineration of a substance. It represents the inorganic mineral content of the material and is typically expressed as a percentage of the original sample weight. A higher ash content often indicates a higher mineral concentration or the presence of inorganic impurities in the substance.
2. Acid Insoluble Ash (2.54%): Acid insoluble ash is the portion of the ash that remains undissolved when treated with acid. It represents the insoluble mineral components of the material, such as silica and certain metal oxides. Acid insoluble ash is often used as an indicator of the purity of herbal or botanical extracts, as well as the presence of inert materials or contaminants.
3. Water Soluble Ash (5.72%): Water soluble ash refers to the portion of the ash that dissolves in water. It typically consists of soluble mineral salts such as potassium, sodium, calcium, and magnesium. Watersoluble ash is a measure of the water-soluble mineral content of the substance and can provide insights into its nutritional value and bioavailability.



VII. CONCLUSION

In conclusion, the formulation and evaluation of herbal churna represent a significant contribution to the field of pharmaceutical sciences and traditional medicine. Through this study, we have explored the potential of herbal ingredients to create effective and safe formulations for therapeutic use. Overall the uses of this formulation is for digestive problems such as indigestion, stomach upset, laxative etc. Our research has demonstrated that herbal churna offer a promising approach to harnessing the medicinal properties of natural ingredients. By carefully selecting and combining herbs with complementary effects, we have developed formulations that address specific health concerns and promote overall well-being. The evaluation of these herbal churna has provided valuable insights into their efficacy, safety, and quality. Through various analytical techniques. Overall, this thesis underscores the importance of integrating traditional knowledge with modern pharmaceutical science to develop novel and effective herbal formulations. By validating the efficacy and safety of herbal churna through rigorous scientific methods, we can enhance their acceptance and integration into mainstream healthcare practices. Moving forward, further research is needed to explore additional herbal combinations, dosage forms, and therapeutic applications. Additionally, clinical trials are essential to validate the efficacy of herbal churna in human subjects and establish evidence-based recommendations for their use in healthcare settings.

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