IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Standardization Of Ayurvedic, Siddha And Unani Drugs :A Critical Review Of Methods And Challenges

[1]Rutika R. Patil, [2]Vijay R. Salunkhe, [3] Rounak A. Mulla

[1] M. Pharm. ,[2]M.Pharm, PhD,[3] M.Pharm

[1]Pharmaceutical Quality Assurance ,

[1]Rajarambapu College of Pharmacy, Kasegaon . Dist- Sangli , Maharashtra, India.

Abstract: Standardization is a crucial process that guarantees the efficacy, safety, and quality of medicines used in Ayurvedic, Siddha, and Unani medicine. These traditional medical practices rely on minerals, plants, and animal waste as natural resources. Their origins are in antiquated customs. Because raw materials and processing methods differ greatly, standardization is required to guarantee uniformity in their composition and therapeutic outcomes. This abstract examines the methods and standards utilized in the standardization process, such as pharmacological testing, marker compound identification, physicochemical analysis, and safety evaluations. It also discusses the regulatory frameworks and challenges associated with standardizing these complex mixtures, highlighting how important it is to integrate state-of-the-art scientific techniques with conventional wisdom to confirm the medicinal effects of these mixes. Ultimately, To increase the legitimacy, acceptability, and international acknowledgment of Ayurvedic, Siddha, and Unani medicines in modern medical practices, uniformity is crucial.

Index Terms – Ayurvedic, Siddha, Unani, Standardization.

1.1 INTRODUCTION

India is well-known for its traditional medical practices, which include Unani, Siddha, and Ayurveda. Even the ancient Vedas and other writings reference medical systems. In India, the Ayurvedic philosophy first emerged and evolved between 2500 and 500 BC Ayurveda literally translates to "science of life," as the ancient Indian medical system placed a strong emphasis on understanding the human condition. It has been noted that having a balanced metabolism is a prerequisite for good health. Ayurveda provides a thorough strategy to living a long and healthy life, earning it the moniker "science of longevity." It provides programmes that use nutrition and food to revitalise the body. It provides cures for numerous common illnesses, including food allergies, for which there are currently few effective therapies.[1]

The oldest system of traditional medicine is called the Siddha system, and it dates back to ancient Tamilnadu in South India. According to palm leaf writings, Lord Shiva initially explained the Siddha system to his wife Parvathi. There are 96 thathuvas on which siddha treatment is founded. The siddha system states that nutrition and way of life have a significant impact on both overall health and illness recovery. This system holds that the elements earth, water, fire, air, and space make up every object in the universe, including the human body. There are 32 types of internal medicine and 32 types of external medicinal preparations accessible for therapy in siddha medicine.[2]

One of the first traditional medicinal systems, the Unani System has worked for centuries to prevent and treat a wide range of illnesses. The Arabic name for Ionian, or Greek, is unani. Because Arabs expanded and improved it via methodical experimentation, most notably by using Avicenna, unani medicine is Also referred to as unani Tibb or Graeco-Arab medicine. The seven essential physiological concepts according to Unani

theology, or alumoor al-tabiyah, are said to maintain the homeostasis of human body and preserve its health. Arkan, or elements, mizaj, or temperament, akhlat, or humours, or organs, arwah, or vital spirit, quwa, or faculties or powers, and afl‖al, or functions, are a few examples of these maintaining equilibrium among these seven physiological principles upholds the body's inherent composition. Every person's constitution possesses a self-regulating ability or power known as tabiyat (or mudabbira-e-badan), which translates to "immunity" to maintain the seven components in balance.[3]

1.2 Standardization

The demand for products generated from plants has increased recently in wealthy nations. Demand for these goods is rising as cosmetics, nutraceuticals, and pharmaceuticals. developing accurate, focused, With careful quality assurance procedures utilising a blend of traditional and contemporary scientific methods of analysis has become crucial to maintaining good coordination between the quality of raw materials, in-process materials, and finished goods. To guarantee the quality control of the herbal medications, standardisation is an essential parameter.[4]

A herbal product cannot be regarded as scientifically valid if the medication being tested has not been verified and described to guarantee repeatability in the product's production process. Furthermore, a number of hazardous and fatal side effects, including as direct toxic effects, allergic reactions, contaminant effects, and combinations with herbal medications, have lately been recorded. The phytochemical components of a herbal preparation determine its therapeutic activity. One of the biggest challenges facing scientists is the development of reliable, authentic analytical techniques that can profile the makeup of phytochemicals. These techniques include quantitative evaluations of additional significant components and marker/bioactive compounds.[5]

Need of standardization:

Sound experimental data, toxicity investigations, and human clinical research form the foundation of the modern medical system. however, pharmacopoeial requirements for products' raw materials and final goods are not accessible. In the herbal sector, the toughest minimal standards for medicinal plant products are neither maintained nor regulated, nor are cGMPs well defined. Hepatotoxicity to death are just a few of the minor to significant side effects that have been caused by the lack of quality standards. Because of this, instruments are needed to assess the identity, purity, and quality of herbal substances. These instruments also need to meet GMP requirements and be technically sound, quick, and affordable. The World Health Organisation has created exact guidelines for assessing the quality, safety, and efficacy of herbal remedies. It is difficult to standardise herbal drugs since a variety of factors affect their bioefficacy.

2. Formulation under ayurvedic system of medicine

2.1. Arishta and Asava

To make Arista and Asava, the powdered or decocted herbs are soaked for a predetermined amount of time in a sugar or jaggery solution. It goes through a fermentation process over time that produces alcohol, which helps to extract the active ingredients in the herbs.10 Essential liquid remedies, such decoctions or juices, are stored for fermentation in order to make them as the classics advise. Ethyl alcohol is not added from an outside source; rather, it is created as a byproduct of the production process. Herbal medicines are extracted along with a host of other chemical molecules, including acetic acid and alcohol, in addition to ethyl alcohol. Compared to previous formulations, these ones have a longer half-life, faster absorption and activity, and greater therapeutic efficacy.

2.1.1Standardization of Asava and Arishta :

1) Methodology concerning raw materials and equipment

The procedure and the final product are significantly influenced by the quality of the raw materials, herbs, and other substances utilised in these preparations. The raw materials used in these preparations need to be verified and checked for the necessary quality.

It is planned to test the limits of heavy metals, microbes, and residual pesticides because these may affect the primary fermentation process and may cause certain contaminants to be retained.

Prior to being used in the primary production process, these raw materials need to be stored properly.

The elements that will affect the process are the kind of equipment utilised, the materials used for the fermentation and storage vessels, the treatment techniques, the temperature, and the storage conditions.

2) A strategy for manufacturing process standardization

The following three factors are the most important ones for asava and arishta standardisation:

i. Effect of temperature

- The fermentation process is influenced by temperature. In comparison to the hot arishta, the cold arishta has a lower specific gravity, total solids, and total sugar content. After fermentation or decoction, alcohol is formed when arishta is cooled, but it is not present on the day of filtration.
- Arishta made from a heated decoction has a higher titratable acidity and lower pH values than a cold one made from fresh juice. High temperatures are detrimental to the fermentation process because they damage yeast cells. Less heat prevents yeast cells from destroying themselves.

ii. Fermentation time

- When the arishta is kept for an extended length of time, its specific gravity, total solid content, and sugar content decrease over time. The maximal rise in alcohol level that corresponds with this can be achieved within six months. The pH doesn't change, though.

iii. Utilising different vessels and settings for fermentation

- You can use glass, aluminium, tinned copper, stainless steel, porcelain jars, and earthen pots to make various asava and arishta recipes. The TLC pattern and analytical values of the arishtas derived from a decoction made in several material containers remain unchanged.
- It would have been better to use tinned copper vesels for the fermenting process. Nonetheless, there are traces of metal in the decoction made in the aluminium vessel.
- The amount of alcohol produced does not differ significantly between earthen pots and glass vessels. The dishes made in glass containers will have a higher acidity than those from an earthen pot.

(3) Method for standardising the final product's qualities and attributes

1. Organoleptic evaluation:
   The formation's colour, flavour, and aroma are assessed. The asava and arishta are transparent liquids with no foam. They taste slightly sweet and have the nice, aromatic smell of alcohol. It should be mentioned that they shouldn't taste acidic.
2. Physical and chemicals parameters:
   physical-chemical characteristics such as pH, specific gravity, density, extractive value, viscosity, surface tension, and refractive index, as well as total solid content. To standardise asava and arishta, One commonly used criterion is phytochemical screening for alcohol, total sugar, reducing and non-reducing sugars, tannins, and alkaloids. Additionally tested are iron, magnesium, calcium, phosphate, sulphates, ash value, sodium, and potassium.
3. Analytical studies:
   A technique called thin layer chromatography, or TLC, is used to test arishta and asava. Studies on the quantitative measurement of proteins, lipids, and nitrogen content have also been done as further test parameters.[6]

2.2 Rasayana churna

The Rasayana churna was made following the general procedure outlined in the Indian Ayurvedic Formulary. The ingredients were individually shade dried and pulverised, filtered through an 80# sieve, and combined in equal amounts to create a smooth, blended churna. and mixed by using a grinder into a coarse powder. At last, they were separated and sieved (80#) separately.

Table 1: Name Of Plant Used

Sanskrit Name	Scientific Name	Part used
Guduchi	*Tinospora cordifolia* (Willd.) Miers.	Dried stem
Gokshur	*Tribulus terrestris* Linn.	Dried fruit
Amalaki	*Emblica officinalis* Gaertn.	Pericarp of dried fruit

2.2.1Standardization

1. Organoleptic Parameters:

For every raw material, analyses of the organoleptic criteria of colour, flavour, and odour were conducted. The visual identification of raw materials was aided by these parameters.

2. Determination of Physicochemical parameters:

Measurements like moisture content (loss on drying), total ash, acid insoluble ash, water soluble ash, alcohol soluble extractive, and water soluble extractive are among the parameters that are determined. (2001 API)

3. Determination of pH:

Using a pH metre, a 1% solution of the samples was made in distilled water.

4. Heavy Metal Analysis:

Shimadzu AA-6300 was used for heavy metal analysis. The CEM MARS Express microwave digestive machine was used to digest the sample. Weigh the sample (0.5 g), then fill the Teflon PFA 75 ml jars with 8 ml of 69% nitric acid. Power 400 W at 100% and ramp time of 20 minutes to reach and maintain a temperature of 150^{O}C were the parameters employed for the digestion. Following the digestion process, the sample was filtered using Whatman filter paper No. 1 and diluted with distilled water to a volume of 50 millilitres. The calibration curves for lead (Pb), cadmium (Cd), arsenic (As), and mercury (Hg) were developed and set as standards. These standard curves were used in the analysis of the samples. It was indicated how much heavy metal content was acceptable.

5. Microbial Limit Test:

The standard protocol for microbial analysis was followed (Indian Pharmacopoeia, 2010). It contained Salmonella ebony, Pseudomonas aeruginosa, S.aureus, E.coli, and total fungal and bacterial counts.[7]

2.3. Triphaladi Taila

Kalpana, a medicated oil in Ayurveda, holds a pivotal role in treatments, serving both external and internal purposes. The standardization of Ayurvedic formulations stands as a crucial measure for ensuring consistent chemical profiles and quality control, thereby establishing their biological efficacy during production.[8]

2.3.1Method of Preparation

The same amount of both Shodhita Loha churna and Triphala were ground in a grinder. This combination was combined to form a paste by adding an adequate amount of water. The tila tail was placed over a heating device over a moderate fire and kept in a wide-mouthed vase.To the Tila taila, Kalkaof Triphala and Sodhita loha churnawa were added. After adding Bhringaraja Swarajawa to Taila, the mixture was well mixed. The heating process was maintained till the Kharapakalakshna was achieved. Subsequently, a fresh cloth was used to filter the contents to extract Triphaladi taila.A clay container was obtained, and the interior of the container was coated with ghrita. This clay jar was filled with prepared Triphaladi Taila. Next, a lid was placed over the pot, and fabric and multanimitti were used to seal the joints. After that, it was dried. The pot was set inside a hollow. After that, the pit was entirely filled in with mud and left alone for a month. The clay pot was removed from the pit after a month. Afterwards, Triphaladi Taila was put into bottles.

Table 2 : The Ingredients Of The Formulation

Name of the content	Quantity
Sodhita Lauha	3 parts
Triphala churna	3parts
Bhringaraja	6 parts
Tila Taila	6 parts

2.3.2 Standardization of Taila

1. Organoleptic Characters: Formulations colour, odor. Appearance , taste , touch were asseesed.
2. Determination of pH value: pH can be determined using ph meter.

3. Determination of Refractive Index: The refractive index of a substance is determined by dividing the sine of the angle of incidence by the angle of refraction site. Stated otherwise, it is the link between the speed of light in a vacuum and a particular material or medium. The refractive index of oils rises when unsaturation and fatty acid chain length both increase.

4. Loss on drying: An excessive quantity Putting water in products made of medicinal plants will promote the expansion of microbes, the existence of insects or fungus, and the subsequent deterioration after hydrolysis.

Therefore, water content limits ought to be established for each type of plant material. This is particularly crucial for materials that quickly degrade when there is water present or readily absorb moisture. It is the sample's weight loss following heating to 105°C until it reaches a constant weight.

5. Determination of Iodine Value: The saponification value of an oil or fat is the quantity of potassium hydroxide milligramme required to neutralise the fatty acids produced by the complete hydrolysis of one milligramme of the sample.

Safonication value = b−a X 0.01269 X 100/w

6. Determination of Acid Value: The amount of KOH milligrammes needed to neutralise the free acid in one gramme of the sample is the acid value of an oil or fat.

Acid value = a X 0.00561 X 1000/w

where "W" is the weight in grammes of the material ingested and "a" is the number of millilitres of 0.1 N potassium hydroxide needed.

7. Determination of Viscosity: The property of a fluid that characterises its resistance to flow is called viscosity. Fluids are resistant to both the flow of layers inside them with varying velocities and the direction in which submerged items move as they pass through them.

8. Determination of Volatile oil: The capacity to evaporate at ambient temperature, an oil-like appearance, and an aroma are characteristics of volatile oils. Chemically, they are often made up of combinations of sesquiterpenes, monoterpenes, and the oxygenated derivatives of these. Certain volatile oils contain mostly aromatic components. They are Occasionally called "essential oils" since they are thought to be the "essence" of the botanical substance and are frequently biologically active. Since it is more precise and defines the physical characteristics, the term "volatile oil" is recommended.

9. Microbiological Tests: The total number of aerobic viable cells, which is the total of the bacterial and fungal counts, indicates the level of microbial contamination. The assays enable mesophilic bacteria and fungi that can proliferate in aerobic environments to be quantitatively counted. The most-probable-number method, membrane filtration, and plate count techniques are utilised to calculate the total viable aerobic count. The acceptability limit for this, according to IP, is 102 fungus and no more than 103 bacteria per gramme or millilitre of the product.

10. Chromatographic Study of TLC: For the qualitative analysis of minute quantities of contaminants, thin-layer chromatography is especially useful. The method is widely used for assessing medicinal plant materials and their formulations since it is simple, straightforward to apply, and requires little expensive equipment.[8]

2.4. Brahmi Ghrita

An Ayurvedic polyherbal compound known as Brahmi Ghrita is used to represent the Snehakalpa group. The Brahmi (Bacopa monneri), Vacha (Acorus calamus), Kushtha (Sassurea lappa), Shankhapushpi (Convolvulos pluralis), and Purana Ghrita brought up the therapy of Apasmara (Epilepsy) and Graha illnesses were among the Brahmi Ghrita that was chosen for the current investigation.It is a significant formulation, with several compositions, that is referenced in the Charakasamhita and many other classic Ayurvedic literature for the treatment of different conditions.

2.4.1 Method of Preparation:

Murchhita Ghrita was used to make Brahmi Ghrita. Murchhita Gandhi was first cooked to a gentle temperature, where upon When the ghrita was just heated, Brahmi Swarasa was added and well stirred, continuing the heating process as it did so. Kalka dravya was then included. The entire mixture was continuously stirred after the addition of the kalka dravya. The first day's heating process involved bringing the entire material to a boil for an hour before stopping. The second day, the heating procedure was restarted and heated for an additional five hours. Once more, the heating process was stopped. The third day, the heating procedure was restarted and maintained until Sneha siddhi lakashana was obtained, which had characteristics like varti-vat Sneha kalka (a shape resembling a wick), sabdhinoagni nikshipto (which doesn't crackle when lit), etc. Ghrita was filtered using cotton cloth after Sneha siddhi lakashana was obtained. This purified ghrita was referred to as Brahmi ghrita. Consequently, three days of intermittent heating were needed to create Brahmi Ghrita .

2.4.2 Standardization

1. Organoleptic Properties: Formulations colour, odor. Appearance , taste , touch were asseesed.
2. PH: pH can be determined using ph meter.
3. Determination of Acid Value: The acid value of an oil or fat is the number of milligrammes of KOH needed to neutralise the free acid in one gramme of the sample.

Acid value = a X 0.00561 X 1000/w

4. Determination of Refractive Index: The index of refraction is calculated by dividing the sine of the angle of incidence by the sine of the angle of refraction. Essentially, it describes how the speed of light changes when it moves from a vacuum to a specific material or medium. The refractive index of oils rises when unsaturation and fatty acid chain length both increase.
5. Determination of Iodine Value:

The Qunatity of unsaturated fat in the Ghrita is determined by iodine readings. The amount of unsaturated bonds in the fat increases with the iodine number. Unsaturated fat supplementation has no negative effects on blood lipid levels and raises overall calorie intake from food within the suggested ranges. It also lessens systemic inflammation and enhances nutritional status.A high iodine content suggests that the lipids are an excellent a source of fats that are polyunsaturated, which have been demonstrated to have health advantages including the ability to control blood cholesterol levels.

6. Safonication value:

Short-chain fatty acids (SCFAs), compared to long-chain fatty acids found in fat, exhibit a higher saponification value. It is widely acknowledged that certain SCFAs serve as a crucial energy source for colonocytes, especially those in the distal colon. The development of diverticulitis and ulcerative colitis might involve a nutritional deficiency in SCFAs, as indicated by similarities in histology, endoscopy, and metabolism between the two conditions. Given the easy absorption of short-chain fatty acids, there might be a protective advantage if there is an increased production of SCFAs, particularly butyrate, and potentially enhanced transportation of SCFAs to the distal colon.[9]

3 Formulation under siddha system of medicine

3.1. Naga Chendhuram

"Naga Chendhuram" is a traditional Ayurvedic medicine popularly used in South India. It is primarily known for its purported benefits in treating various ailments, including respiratory issues, digestive problems, and skin disorders. The formulation typically includes natural ingredients such as herbs, minerals, and sometimes metals like mercury (parada) and sulfur (gandhaka), which are processed according to traditional Ayurvedic methods to enhance their therapeutic properties and minimize potential side effects. Naga Chendhuram is often administered under the guidance of Ayurvedic practitioners and is available in different forms such as powders, pills, or ointments. However, it's important to note that the efficacy and safety of traditional medicines like Naga Chendhuram may vary, and it's advisable to consult a qualified healthcare professional before using them.

3.1.1Method of Preparation

Melted nagam (zinc) is added to Madhuga longifolia (illupainei) oil. Do this ten times over. Now that zinc has been refined, Put into the gugai, this refined nagam (zinc) is melted with the ulai. Here, the powdered manosilai (red orpiment) is stirred with the aid of venkozhinji root (Baptisia bracfeata). The entire mixture is then transformed into parpam after that. Grind the parpam, soodham (mercury), and veeram (hydragramper chloride) with milk for four samam (12 hours) in a stone mortar.Then, ten cow dung cakes are added, potralaikarippan (Eclipta prostrata) is used to thoroughly grind the sulphur, and the mixture is burned. There should be six more repetitions of this incineration process. Chendurum is what it will eventually become.

3.1.2 Standardization

1. Percentage Loss on Drying

10 grams of NC were precisely weighed in an evaporating dish, air dried for five hours at 105 degrees Celsius, and then weighed again.

2. Determination of Total Ash:

Three grammes of the test substance The NC was precisely weighed in a silicon dish and burned at 400 oC until it turned white, indicating that It contained no carbon at all. The weight of the medication that has been air-dried will can be utilized to calculate the percentage of total ash.

Total Ash = Weight of Ash/Wt of the Crude drug takenX 100

3. Determination of Acid Insoluble Ash:
After doing a total ash test, 25 millilitres of diluted hydrochloric acid will be heated with the ash for six minutes. After being gathered in a crucible, the insoluble material is burned to a consistent weight after being cleaned with hot water. We shall compute the percentage of acid-insoluble ash based on the weight of air-dried ash.

Acid-insoluble Ash = Wt of Ash/Wt of the Crude drug taken X 100

4. Determination of Water Soluble Ash:
For 5 minutes, 25ml of water and the ash from the total ash test will be cooked together. After gathering the insoluble material in a crucible, After rinsing with hot water, it is ignited for a quarter of an hour at a temperature not exceeding 450 degrees Celsius. We will weigh the ash and subtract the weight of the insoluble material; the water-soluble ash is indicated by the weight difference.[10]

Water Soluble Ash = Weight of Ash/Wt of the Crude drug taken X 100

3.2. Gandhagapoora Parpam
The fine particles known as parpams are often made by calcining refined metals and minerals as well as animal-based products through particular methods. For the pudam process, they are oxidised in pits using closed crucibles and cakes of cow dung. Through a variety of processes, metals or minerals are transformed into sulphides or oxides in this process parpam is a type of acquire depending on the illness, nanoparticles are also taken with vehicles (Adjuvant) such milk, ghee, honey, etc. This makes them more readily available, which reduces their negative effects and improves their biocompatibility.

3.2.1Method of preparation :
A part of sulphur (Ganthagam) and one-fourth of calomel (RasakarPooram) were mixed and ground for approximately three hours in a stone mortar along with the juice of white onions (Samam). The mixture was then formed into pellets, sun-dried, weighed, and stored in an airtight container.

table 3: ingredients of gandhaga poora parpamstandardization

Name of Drugs	Quantity
Ganthagam (Sulphur)	300 grams
Pooram (Hydrargyrum subchloride)	75 grams
Vellai vengayam juice (Allium cepa)	1 liter

3.2.2 Physicochemical evaluation
1. Percentagė Loss on Drying:
Test drug (10 grammes) was taken, and it was precisely weighed in an evaporating dish.After five hours of drying at 105°C, the sample was weighed.

Percentage loss on drying = Loss of weight of sample/Wt of the sample ×100

2. Dėtermination of Total Ash:
The test medication GPP was weighed out in a silicon dish and burned at 400^{o} C till it turned white. colour that denotes a lack of carbon. The weight of the medicine that has been air-dried will be used to compute the percentage of total ash.

3. Determination of Acid insoluble Ash:
The GPP sample's ash, as determined by the total ash test, will be cooked for six minutes in 25 millilitres of diluted hydrochloric acid. Then the insoluble material is gathered in a crucible, cleaned using hot water, and burned to a steady weight. We shall compute the percentage of acid insoluble ash by comparing it to the weight of air-dried ash.

Acid insoluble Ash = Weight of Ash/ Wt of the crude drug taken ×100

4. Measurement of alcohol-soluble extractives:

After soaking in a sealed flask with 100 ml of alcohol for 24 hours, with intermittent shaking during the initial 6 hours, the sample under examination was left to settle for 18 hours. Evaporate twenty-five millilitres of the filtrate in a shallow dish coated with tar until it dries completely. Weigh and dry the mixture at 105 degrees Celsius. Ascertain the proportion of alcohol-soluble extractive in relation to the air-dried medication.

Alcohol sol. extract= Weight of extract/Wt of the sample taken ×100

5. Determination of water-soluble Extractive:

After being macerated for a day under frequent shaking (3 to 4 times per day) in a closed flask containing 100 ml of chloroform water, the test sample was allowed to cool for eighteen hours. With care to prevent solvent loss, filter quickly. Then, in a shallow dish with a tarred bottom, evaporate 25 milliliters of the filtered solution until it dries out to a steady weight and weigh. Determine the proportion of water-soluble extractive in comparison to the medication that has been air-dried.

6. Microbial load sterility test by pour plate method :

The product's sterility was established using the pour plate techniques. When a contaminated or non-sterile sample (formulation) comes into touch with a medium rich in nutrients, it encourages the growth of the organism. After the prescribed amount of time, the growth of the organism was recognized by a distinctive pattern of colonies. The colonies are known as CFUs, or colony forming units.[11]

3.3. Mega sanjeevi mathirai

The primary uses of MSM, a herbo metallic Siddha medication, are infectious genital illnesses, STDs, chronic urinary tract infections, and cystitis, particularly in patients with chronic diabetes mellitus.

3.3.1 Method of Preparation

8.57 grammes of each of the following were consumed:

Lingam (cinnabar, or red sulphidė of mėrcury), Rasa Chenduram (mercury sulphide), Veeram (mercury perchloridė), and Pooram (mercury subchloride). Using certain solutions in the purifying procedure, each of the four inorganic raw elements underwent additional processing on its own (Suddhi Muraigal). Depending on the protocol, the aforementioned four raw inorganic minerals were either cooked with the liquids or dipped in them. Liquids such as hŏney, cŏw milk, lėmon fruit juicė, Acalypha indica leaf juice, Mukiya maderaspatna leaf juice, and Piper nigram seed decoction are added during the purifying process. Following the purification procedure, the aforementioned four inorganic components were combined with 35g of powdered dry fruit pericarp from Terminalia chebula, processed continuously for 15 hours with 300ml of lime juice added.

3.3.2 Standardization

1. Analyzing infrared spectra and inorganic element concentrations in raw materials

The inorganic components of all four raw materials were quantified using inductive coupled plasma optical emission spectroscopy and a cyclonic spray chamber with Sea Spray concentric nebulizer (Glass Expansion, Pocasset, MA). The nebulizer flow was set at 0.8/min-1 with a 1450 W radiofrequency power; the sample was introduced at a flush time of 20 s, the delay time was 10 s, the read time was 30 s, the wash time was 10 s, and there were three duplicates. To prepare the standards, 1000 mg l-1 stock solutions were diluted. Five to ten points, including the blank, were used to obtain the calibration curve. The raw materials were ground into powder, and the Perkin-Elmer FTIR Spectrophotometer was used to get the infrared spectrum characterisation within the scope of 4000–450 cm–1 using the KBr pellet technique.[12]

*3.4. **Linga mathirai***

Linga Mathirai is a herbomineral composition containing garlic, ginger, turmeric, and lime juice. Garlic's high sulphur content provides antibacterial and antiviral properties, making it a great flu fighter. It relieves stuffy noses, common colds, and throat infections.

3.4.1 Method of Preparation

1. To make a fine powder, grind equal parts of purified Lingam (65 g) and Vengaaram (65 g) separately in a kalvam (black stone mortar). Mix thoroughly and grind again till refinement is lost.
2. The combination was triturated for 3 hours in 250 mL of Mulaippal (Human Breast Milk), resulting in a non-sticky paste consistency.
3. The paste was hand-rolled into 5 mm diameter black pepper tablets under aseptic conditions.

3.4.2 Standardization

1. Organoleptic evaluation: The sample's organoleptic characteristics were examined, including colour, odour, and size.
2. Physicochemical investigation: Physicochemical studies such as total ash, water-insoluble ash, acid-insoluble ash, loss on drying at 105℃, and pH
3. Biochemical analysis: The biochemical study identified acidic and basic radicals in L. mathirai. Acid radicals include potassium, calcium, magnesium, ammonium, sodium, iron, zinc, aluminium, copper, and lead.Mercury and arsenic. Basic radicals include sulphate, phosphate, chloride, carbonate, nitrate, fluoride, and oxalate.
4. Microbial load: Availability of bacterial load By agar plating technique Live cell counts are commonly performed using the plate count technique.This approach is based on the premise that, when material containsCultured bacteria form visible colonies on a nutrient agar substrate. The number of colonies equals the number of organisms found in L. mathirai[13]

3. 5. Amukkara chooranum

Amukkara Chooranum Tablet was among the Siddha Sasthric Medicines in Fixed Regimen (SSM-FiRe) prescribed to the oral dose for COVID-19 individuals with asymptomatic and moderate symptomatic categories was safe and did not alter biochemical measures. Amukkara Chooranum reduced Candida albicans biofilm formation at a dosage of 20 µg/ml, resulting in a 60% inhibition Regular use of Amukkara Chooranum as an adjuvant in Rasa Chendruram can help reduce diabetes.

3.5.1Standardization

1. Organoleptic Properties**:**

Organoleptic property of the purchased drug was examined according to the conventional method given by Kokate 20. Organoleptic characteristics like colour, odour, appearance and taste were evaluated

2. Physico- Chemical Properties**:**

The solubility of the sample was tested using solvents like water, dichloro methane, ethyl acetate, ethyl alcohol, DMSO, acetone, chloroform, pet ether, and concentrated acids, and the characteristic changes were noted.

3. Loss on Drying:

Precisely, 2 grammes of the material were added to a crucible with its tare, and the starting weight was recorded. The sample was cooked for three hours in a Muffle furnace that was kept at 105–110°C. It was then allowed to cool in desiccators to room temperature for thirty minutes before being weighed. This process was carried out again until a steady weight was achieved.

Loss on drying (%) = W / Loss in weight x 100

Where W = weight of the sample powder in g.

4. Total Ash Value**:**

AMC samples, weighing between two and three grams and air-dried accurately, were incinerated at a temperature not exceeding 700°C until carbon-free ash formed. Subsequently, the ash was allowed to cool and then weighed. The process was repeated until at least two consecutive consistent weights were obtained. The results were expressed using either the range or the mean value ± standard deviation. The percentage of ash was calculated with reference to the air-dried medication.

Ash % = W / Loss in weight x 100

5. Quantitative Estimation of Total Flavonoids:

The total flavonoid content was determined following a standardized method. The sample's 0.5 ml ethanol extract was combined with a recently made 2% ethanolic aluminium chloride solution .the mixture was left to incubate at room temperature for an hour. The sample started to become yellow, suggesting the presence of flavonoids. At 420 nm, the absorbance was measured using a UV-VIS spectro-photometer.

The total flavonoid content in the plant samples is commonly expressed as milligrams per gram of quercetin equivalent.The formula was used to determine the total flavonoid content based on the calibration curve.

$$Y = (0.217) \times (X)$$

Where X = absorbance

Y = quercetin equivalent.

6. Spectroscopic Analysis:

The sample's NMR, UV-visible, and infrared spectral fingerprints were captured. Science World AU-2701 was used to record the UV-visible spectrum. The Affinity - I Shimatzo FT - IR instrument was used to record AMC's infrared spectrum. A Clarus 680 GC was employed for the GC-MS study. Using DMSO solvent, the H1NMR of AMC was acquired using a 500 MHz Bruker Avance NMR apparatus.[14]

4. Formulation under unani system of medicine

4.1.Qurse Tabasheer

This dosage form mainly used for treatment of management of diabetes in patient. This medication is formulated using different ingredients such as , Tabasheer (Siliceous concretions) (Bambosa arundinaceae Rẻtz.), Gulẻ Surkh (Rosa damascena Mill. flower), Gulnar (Punica granatum Linn. flower), Tukhme kahu (Lactuca satisva Linn. seeds), Tukhmẻ khurfa (Portulaca oleraceae Linn. seeds), and Gile , Armani (Armenian bole).

4.1.1 Preparation method for Qurse Tabasheer

1% liquid paraffin was applied as a lubricant and 1% magnesium carbonates was added progressively as a glidant to the dried granules. Granulation is done using the GMP model oscillating granulation machine. For drying and compressing tablets, multi-station rotary presses are utilised along with hot air ovens. #100 mesh size, 20 % of the total weight of powder (16% in the formulation), 60 minutes for granule drying, and 30 minutes for post-compression drying at 60°C were selected as the final batch for physiochemical standardisation. These selections were based on predefined parameters, such as minimum friability (<1%), hardness near standard value (4 kg), and disintegration time <30 min. parameters related to pre-compression for the final batch, including angle of repose, compressibility index, tapped density, bulk density, and Hausner's ratio.

4.1.2 Standardization

Physiochemical parameters

Organoleptic properties:

Appearance, color, smell, and taste were evaluated.

Friability test:

Devices for testing the friability of materials Tablet friability was assessed using Roche's friabilator (Labinda mod. no. 1020). In a public space, this apparatus dropped the tablets six inches every revolution, combining the effects of shock and abrasion on the tablet.Tablets that had been weighed were put in a friabilator that rotated 100 times at 25 rpm. The tablet was weighed after being gently cleaned with a muslin cloth to remove dust.

$$F = (W1 - W2 / W1) \times 100$$

Where, W1 = Initial weight of tablets

W2 = Final weight of tablets

Tablet hardnẻss tẻst:

Three tablets were chosen at random, and a Monsanto hardness tester assessed each one separately to determine its level of hardness.

Disintegration test:

The disintegration test apparatus is utilized to determine the disintegration time.

Uniformity of diameter : Using a Vernier Calliper, the diameter of three tablets that were chosen at random was measured for each one in mm.

Ash value : The ash value is calculated by according to the testing protocol.

pH value: The pH values of the 1% and 10% solutions were measured using the procedure outlined in Unani Medicine Part IV's Physiochemical Standardisation.

Weight variation: Twenty tablets were chosen at random from the batch and weighed one at a time. We computed the average weight and compared each person's weight to the average. Tablets pass the USP test if there are no more than two that fall outside of the % limit.

Qualitative analysis of a chemical component

The extracts underwent tẻrpenoide and tannin testing.Using the techniques outlined in Physiochemical Standardisation of Unani formulation, glycoside, alkaloids (Dragendroff's test), protein (Millon's test), carbs (Fehling's test), stẻroids (Salkowaski reaction), and resins Tests for phenols (Ferric chloride test), saponins, flavonoids, and reducing sugar were also carried out.[15]

4.2. Unani TransdermalPatch for Antiemetic Therapy

Among the novel methods for systemic medication delivery through intact skin is the Transdermal medication Delivery System (TDDS) . Maximising the drug's flow through the skin while reducing its retention and metabolism there is the ultimate aim of this dose design. It also guarantees that substances reach the systemic circulation, ideally at a predetermined pace.

4.2.1 Preparation of Unani Transdermal Patch for Antiemetic Use.

The patch fabrication process involved the utilization of a solvent evaporation technique. Initially, a 4% solution comprising a mixture of water and ethanol in a 1:1 ratio was prepared. Subsequently, a 4% lactic acid solution was derived from this initial solution.

Following this, a volume of 5 mL of the lactic acid solution was heated and maintained at a temperature of 37 ± 1℃ using a hot plate. Then, 125 mg of chitosan was gradually introduced into the solution and dissolved through agitation with a magnetic stirrer until complete dissolution was achieved.

Once the chitosan was fully dissolved, 1 mL of Polyethylene glycol (PEG-400) was added, followed by the addition of 1 mL of distilled water. The resulting mixture was thoroughly stirred to attain a homogeneous and viscous solution.

Subsequently, 1 mL of a previously optimized emulsion was carefully added drop by drop into the solution and mixed well. The resulting solution was then poured into a mold measuring 4 × 2 cm^2 and left to dry overnight at room temperature. Upon drying, two patches, each measuring 2 × 2 cm^2, were obtained from the mold.

4.2.2 Standardization

1. Organoleptic Characteristics: After that, the solution was poured into a 4 x 2 cm2 mould, and it was left overnight to cure at room temperature. Following drying, two 2 × 2 cm2 patches were produced.

2. Thickness: Vernier calipers were employed to measure the thickness of the patch at multiple points, and an average thickness was calculated.

3. Weight Uniformity: To look for weight fluctuation, three identically sized patches were taken and weighed on an electronic scale.

4. Folding Endurance: The patch was taken and repeatedly folded in the same place until it broke. It was noted how many times. The patch could be folded without experiencing any fractures.

5. Moisture Content: The created patch was weighed and stored in the desiccator with fused calcium chloride for about a day. It was then removed and weighed once more.

Percentage of moisture content = [Initial weight − Final weight]/ Final weight × 100.

6. *Drug Content*: After dissolving the patch in methanol, 100 millilitres of distilled water were added to the remaining volume. Following filtering, the solution's absorbance at 304 nm was measured, and the concentration was computed.[16]

4.3 Jawarish-e-Amla Sada

Jawarish-e-Amla Sada (JAS) is a polyherbal Unani blend renowned for its therapeutic application in addressing various gastrointestinal and cardiac ailments. It is traditionally employed to alleviate conditions such as stomach weakness, liver weakness, heart weakness, palpitations, stomach flatulence, and biliary diarrhea. This formulation comprises six medicinal herbs: Amla khushk, Post-e-Turanj, Sandal Safaid, Mastagi, Dana Heel Khurd, and Gulnar Farsi.[17]

4.3.1 Method of preparation:

table 4: formula composition of jas

Unani name	Botanical identity	Quantity (g or mL)

Amla Khushk	Pericarp of *Emblica officinalis* L.	50
Post-e-Turanj	Fruit peel of *Citrus medica* L.	10
Sandal Safaid	Stem of *Santalum album* L.	10
Mastagi	Gum resin of *Pistacia lentiscus* L.	5
Dana Heel Khurd	Seeds of *Elettaria cardamomum* L. Maton	5
Gulnar farsi	Flowers of *Punica granatumL.*	5
Qand safaid Sugar 375	Sugar	375
Asal	Honey	375
Aab	Water	375

1. Preparation of Qiwam (Base for Jawarish) and Powdered Mixture:
To create the base for Jawarish-e-Amla Sada (JAS), known as Qiwam, a meticulous process was followed. Initially, 375 grams of Qand Safaid (white sugar) were dissolved in 375 mL of water (Aab). This mixture underwent filtration through a muslin cloth to eliminate any foreign particles or impurities. Subsequently, the filtered solution was combined with 375 mL of Asal (honey), and the mixture was heated gently in a vessel while continuously stirring. The heating process continued until the mixture achieved the desired consistency, akin to that of a single thread (one Tar).Meanwhile, the powdered form of each plant-based ingredient specified in the JAS formulation composition (as outlined in Table) was separately weighed and meticulously blended.

4.3.2. Preparation of The Formulation
The powdered mixture was gradually incorporated into the Qiwam while stirring consistently. This process continued intermittently until a uniform, semi-solid blend of JAS was achieved. Once the mixture reached the desired consistency, it was allowed to cool down to room temperature. Finally, the prepared JAS was carefully stored in a sealed glass container to maintain its quality and potency.

4.3.3Standardization
1. Physicochemical Evaluation: The levels of crude fiber and reducing sugar in JAS were assessed using the Dutch method and the Dinitrosalicylic acid (DNSA) method, respectively.

2. Preliminary Phytochemical Evaluation : The presence of key secondary metabolites such as flavonoids, essential oils, tannins, glycosides, alkaloids, and resins in JAS was determined through a phytochemical screening. This screening involved conducting preliminary tests as per the reported methodology.

3. Chromatographic Evaluation
Extraction of Phytochemical Constituents from Jawarish-e-Amla Sada and its Ingredients :
To extract gallic acid, a phenolic compound, from JAS (both in-house and commercial) and its constituent ingredients, samples weighing 1.0 g were mixed with 10.0 mL of methanol. After vortex mixing for 1 minute, the mixture was allowed to stand overnight. Subsequently, the solution was filtered through Whatman filter paper No. 1 to remove any particulate matter. The filtrates obtained were then analyzed using HPTLC (High-Performance Thin Layer Chromatography) to achieve optimized separation of gallic acid.[18]

4.4. *Habbe Irqun Nisa* - A Unani anti-inflammatory formulation
Habbs, an ancient dosage form within the Unani system of medicine, were pioneered by Hakeem Seelon. Among the plethora of formulations crafted as Habbs, one stands out prominently: Habbe Irqun Nisa (HI), extensively documented in Qarabadeene Azam and the National Formulary of Unani Medicine (NFUM). This formulation, composed of three primary ingredients—Sibr, Post Halela Zard, and Suranjan Shirin—has garnered widespread usage and recognition.Sibr, derived from the dried juice of Aloe barbadensis, exhibits notable analgesic, anti-inflammatory, and hepatotonic properties. Post Halela Zard, sourced from the dried pericarp of Terminalia chebula, boasts astringent, diuretic, and laxative qualities, with additional effectiveness in addressing gout and rheumatism. Suranjan Shirin, obtained from the dried corns of Colchicum autumnale, contributes analgesic and anti-inflammatory attributes, making it a valued resource in the treatment of gout and rheumatism.

4.4.1 Method of Preparation :

Table 5: formula composition of HIN

Ingredients	**Botanical Name**	**Quantity**

Sibr	Aloe barbadensis	5
Post Halela Zard	Terminalia chebula	5
Suranjan Shirin	Colchicum autumnale	5

Habbe Irqun Nisa (HI) was meticulously crafted into circular pills through manual preparation. Initially, To create a uniform dough, the 15 grams of powdered HI components were combined., termed as "lubdi," by incorporating an appropriate amount of Loabe Samaghe Arabi gum acacia (1% w/w). The gum acacia solution, prepared by dissolving 0.15 grams of Samaghe Arabi in 2.5 ml of distilled water (DDW), was combined with the 15 grams of powder to create the lubdi. The lubdi was then shaped into uniform-sized sticks using fingers, ensuring a consistent thickness of 6 mm, which was measured using a vernier caliper to maintain precision. These sticks were meticulously cut into equal-sized pieces using a sharp knife, with careful attention to achieving the desired size and weight. Each piece was rounded manually between the fingers to form pills, known as Huboob. To finalize the preparation, the pills were subjected to drying in a hot air oven. Remarkably, there was uniform loss of weight across all pills post-drying, ensuring consistency in their composition and properties.

4.4.2 Standardization :

1. The physicochemical studies carried out included the following parameters:
   - Organoleptic characters like appearance, color, smell, texture, taste
   - pH in 1% and 10% solution
   - Moisture content by toluene distillation method
   - Loss of weight on drying at 105°C for 5 hour
   - Ash values
   - Extractive values
   - Water and alcohol soluble matter
   - Total alkaloidal estimation
   - Weight variation test
   - Uniformity of diameter
   - Hardness test
   - Friability
   - Disintegration time.

2. Thin layer chromatography (TLC) [19]

Conclusion :

The national health authorities (national drug regulatory authorities, DCC) should ensure that all ASU pharmaceutical products under their jurisdiction adhere to quality, safety, and efficacy standards and that all facilities and procedures used in the production and distribution of these products meet GMP standards. This includes drug standardization and the future direction of the ISM drug manufacturing sector, AYUSH, and academia. This will ensure that up until the product is delivered to the final customer, it will continue to comply with these criteria.

REFERENCES

1. Pandey MM, Rastogi S, Rawat AK. Indian traditional ayurvedic system of medicine and nutritional supplementation. Evidence-Based Complementary and Alternative Medicine. 2013 Oct;2013.
2. Bakya Lakshmi C. and Kingsly A. World journal of pharmacy and pharmaceutical sciences. Drug review on siddha drug – venpoosani kirutham Volume 11, Issue 4 06 March 2022

3. Ansari S, Khan QA, Anjum R, Siddiqui A, Sultana K. Fundamentals of Unani system of medicine-a review. European Journal of Biomedical and Pharmaceutical Science. 2017 Sep 7;4:219-23.
4. Choudhary N, Sekhon BS. An overview of advances in the standardization of herbal drugs. Journal of Pharmaceutical Education and Research. 2011 Dec 1;2(2):55.
5. Verma NK, Singh AP, Roshan A. Standardization of ayurvedic preparation: A review. Int J Res Pharm Nano Sci. 2019;8:128-39.
6. Mishra AK, Gupta A, Gupta V, Sannd R, Bansal P. Asava and aristha: An ayurvedic medicine–An overview. Int J Pharm Biol Arch. 2010 Apr;1(1):24-30.
7. Soni H, Bhatt S, Patgiri B. Standardization of Rasayana Churna-A classical Ayurvedic formulation. Int J Res Pharm Sci. 2013;4(2):283-9.
8. Pudi R, Sridurga C. Analytical Standardization Of Triphaladi Taila.
9. Yadav KD, Reddy KR, Agarwal A. Preliminary physico-chemical profile of Brahmi Ghrita. AYU (An international quarterly journal of research in Ayurveda). 2013 Jul 1;34(3):294-6.
10. Sreedhana CR, Mustafa MM. Formulation, Standardization and Physiochemical evaluation of Novel Siddha Preparation Naga Chendurum as per AYUSH guideline. Int. J. Adv. Res. Biol. Sci. 2017;4(11):16-21.
11. K.Megala, S. Janani, V. Velpandian. Standardization of Siddha Formulation "Gandhagapoora param " by using modern technique . International journal of health sciences and research , vol 12 issue 5 may 2022.
12. Sathish R, Murugesan R, Amuthan A. Chemicalstandardization of mega sanjeevimaathirai, a herbometallic siddha drug. International Journal of Pharmaceutical Sciences Review and Research. 2012 Mar 1;13(2):35-8.
13. K. Balagurusamy1 , S. Balamurugan2 , S. Semalatha3 . Anti Pyretic Activity of Linga Mathirai (Mercuric Sulphide Preparation) in Experimental Animals , International Journal of Science and Research (IJSR), Volume 11 Issue 5, May 2022.
14. . Saravanan K, Venugopal S, Shilpa R. STANDARDIZATION OF AMUKKARA CHOORANUM-SIDDHA DRUG.
15. . Ali W, Shaikh H, Ansari A, Khanam S. Standardization of unani antidiabetic tablet-Qurse Tabasheer. Pharmacognosy Research. 2016 Apr;8(2):147.
16. . Saleem MN, Idris M. Formulation design and development of a unani transdermal patch for antiemetic therapy and its pharmaceutical evaluation. Scientifica. 2016 Jun 15;2016.
17. Shailajan S, Yeragi M, Purohit A. Optimized separation and quantification of eugenol from a traditional Unani medicine Jawarish-e-Bisbasa using HPTLC. Int J Pharm Sci Rev Res. 2011;9:146-51.
18. Sunita Shailajan SS, Gauri Swar GS, Archana Matani AM, Bhavesh Tiwari BT. Quality evaluation and standardization of a traditional Unani formulation Jawarish-e-Amla Sada.
19. Husain SF, Ahmad I, Shamsi S. Standardization of the finished product: Habbe Irqun Nisa:-A Unani anti-inflammatory formulation. Ancient Science of Life. 2012 Jul 1;32(1):38-44.