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ANALYSIS OF TRADITIONAL TECHNIQUES AND PHARMACEUTICAL PROGRESS IN THE FORMULATION OF AYURVEDIC ARISHTA AND ASAVA

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ABSTRACT: Ayurveda, the science of life, has a rich history in India and has been utilized for millennia to address various health issues. Ayurveda is deeply established in the application of mixtures of various herbs and medications to address numerous health issue. It includes a vast array of remedies, two of which are fermented: Asava and Arishta. These alcohol-based medicines are created by fermenting herbal liquids or decoctions with the addition of sugars. Asava and arista are considered unique Ayurvedic dosage forms due to their unlimited shelf life. Naturally produced alcohol in these preparations amplifies the medicinal and therapeutic properties of the treatments. Ayurvedic formulations like Asava and Arishta are highly regarded due to their unique characteristics that render them more beneficial compared to other preparations. This study provides an overview of the latest available information regarding Arishta and Asava.

INTRODUCTION: Ayurveda is an ancient practice recognized for its healing, preventive, and longevity benefits for over 5,000 years. The World Health Organization (WHO) has endorsed Ayurveda, leading to its growing popularity in countries such as the United States, Germany, Italy, and the Netherlands. In India, Ayurvedic practices are acknowledged on par with conventional medicine and modern medical practices. India boasts a rich variety of natural resources that form the basis of traditional medicine across various therapeutic systems, including Ayurveda, Siddha, Unani, Homeopathy, and naturopathy. For centuries, herbal remedies and traditional healthcare systems have been developed throughout India. Recently, researchers have documented 20,000 species of medicinal plants, and around 500 traditional communities utilize about 800 different plant species for treating various health conditions. According to a WHO report, approximately 70% of the Indian population relies on traditional and alternative medicine to address various diseases [1, 2]. Ayurveda, a dynamic and evolving science, has illuminated the way to aid those afflicted by illnesses. It provides a variety of herbal and herbo-mineral remedies, along with both single and compound dosage forms aimed at both preventing and treating serious health conditions. The choice of a specific dosage form is based on the optimal extraction of the active ingredients necessary for the patient's medical issue. Asava and Arishta, the primary products of Sandhana Kalpana, have been recognized since the Vedika Period and remain well- regarded among Ayurvedic practitioners. These preparations are particularly effective in treating various diseases, as they possess both medicinal and nutritional benefits.

In comparison to other formulations, they offer a longer shelf life, faster absorption, and enhanced bioavailability. The essential components needed for this dosage form include Drava dravya (liquid media), Madhura dravya (sweeteners), Prakshepa dravya (spices), and Sandhana dravya (fermenting

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agents). The naturally occurring alcohol plays a crucial role in elevating these preparations, both from a pharmaceutical and therapeutic perspective. Both the properties of solvents, such as water and alcohol, are incorporated into the preparation of Asava-Arishta [3].

Evolution of Arishta and Asava throughout History:

The Vedic period (1500 – 500 BCE): Is noted for its literature, including the Rigveda, Yajurveda, and Atharvaveda, which provide insight into the fermentation process. Yogurt, an acidic product made from fermented milk, was widely utilized in the creation of nutritional dairy products. Various fermented preparations, such as strong distilled alcohol and the fresh juice from the plant 'Soma,' were made using wooden containers. Soma rasa is a distinct sweet liquid formulation that is produced through fermentation techniques. The Rigveda describes 'Sura,' an alcoholic beverage that was made by fermentation. While Soma rasa was offered to the deities, 'Sura' was intended for human consumption [4].

The Kautilya Arthashastra: References the use of fruit juice and molasses in Sandhana kalpana preparations, which were kept for a specific duration. These liquid concoctions, produced through fermentation using kinva and surabeeja (microbial inoculums), were termed Medaka, Prasanna, Asava, and Arista [5, 6].

In the Post-Vedic Period: Grape and sugarcane juices, along with the juices from Kharjura and the bark of medicinal trees, were utilized in creating fermented products, together with rice, barley, and other grains. Additionally, honey and the flowers of Madhuka (*Madhuca longifolia* Koen) and Dhataki (*Woodfordia fruticosa* L. Kurz) were incorporated to facilitate the fermentation process [6]. These fermented medicines were routinely prepared during and following the Vedic period through the fermentation method [7].

During the Samhita Period (300 - 500 BCE): The Vrihat trayee (the three great classics of Ayurveda) Charaka Samhita, Sushrut Samhita, and Ashtang Hridaya provide comprehensive details regarding the pharmaceutical and therapeutic aspects of fermentation for two categories of fermented products, 'madya' (wines) and 'Asava-Arista.' These formulations underwent biological testing and were documented within the Vrihat trayee. These three key classics offer insights into ancient techniques for producing fermented products [8].

In the Charaka Samhita: Acharya Charaka details Asavas, which can be created from nine potential herbal sources: Dhanya (cereals), Phala (fruits), Mula (roots), Sara (exudate), Puspa (flowers), Kanda (branches), Patra (leaves), Tvak (bark), and Sarkara (sugar). The 'Charaka Samhita' states that a total of eighty-four Asavas can be derived from these sources. Charaka identifies thirty distinct Asavarista for treating various ailments.

According to Chakrapani, Arista is produced using Aushadha, Kwatha, Madhu, and similar substances. Charaka thoroughly describes the fermentation procedure, methods of preparation, specifications for containers, the exact duration of fermentation, criteria for specific testing, the final product's outcomes, and its therapeutic applications. Charaka defines Soma as 'Aushadhinam Shreshtha', meaning the best among all medicinal preparations, and Sura as 'Shrama-haranam Shreshtha', referring to the most refreshing beverage [9].

The Sushruta Samhita: References numerous fermented products utilized during surgical procedures as anesthetics and treatments for various health issues. Within this text, Sushruta Samhita lists 21 fermented Asava-Arista and 46 Madya products, including Madya, Sura, Prasanna, Jagala, Surasava, Madhvasava, Shukta, and Dhanyamla. Sushruta Samhita incorporates botanical ash (from Apamarga and Palasha) as components for certain therapeutic Asava-Arista formulations. Acharya Sushruta characterizes Asava as Madya, which encompasses a variety of medicines, Guda, and Dhatakipuspa, among others. The 44th chapter of the 'Susruta' Sutra notes the term 'Arista' with the phrase 'Arista Dravya Samyoga Samskaradadhikogunaih', indicating that it possesses enhanced properties and effects compared to other formulations due to 'Dravya Samyoga' (the combination of various drugs) and 'Samskara'(special treatment). Dalhana, the commentator of 'Susruta', was the pioneer in distinguishing between 'Asavas' and 'Aristas'.

He asserts that‘ Aristas’ focus more on ‘dravy as’ (drugs), while in ‘Asavas’, the liquid aspect is more significant. The Sushruta Samhita highlights a primary emphasis on liquid components in Asava preparation versus solid ingredients in Arista formulations. The 45th chapter of 'Susruta' discusses the ‘Medya Varga’, which consists of twenty-seven varieties of fermented preparations (Sandhana kalpana) and ‘Asavaristas’. This text organizes the Sandhana kalpana into the ‘Madya’ and‘ Sukvta’ categories based on their characteristics [10].

TABLE 1: LIST OF ASAVA ARISHTA MENTION IN DIFFERENT CLASSICS AND AYURVEDIC BOOK

Name of treatise	Number of Asava and Arishta
Charak samhita	30
Sushruta samhita	21
Ashtanga hridaya	8
Ashtanga sangraha	17
Sharangadhara samhita	13
Gada nigraha	60
Yogaratnakara	12
Bhaishaiva ratnavali	44
Pharmacopoeial standards for ayurvedic formulations	36
A manual of indian pharmacopoeia	21
Ayurvedic pharmacopoeia of India	24
Ayurvedic formulary of India	57

Preparation of Arishta and Asava: Ayurveda, the age-old Indian medical system, describes particular methods for creating Asava and Arishta, highlighting the careful selection of herbs, exact measurements, and traditional fermentation methods.

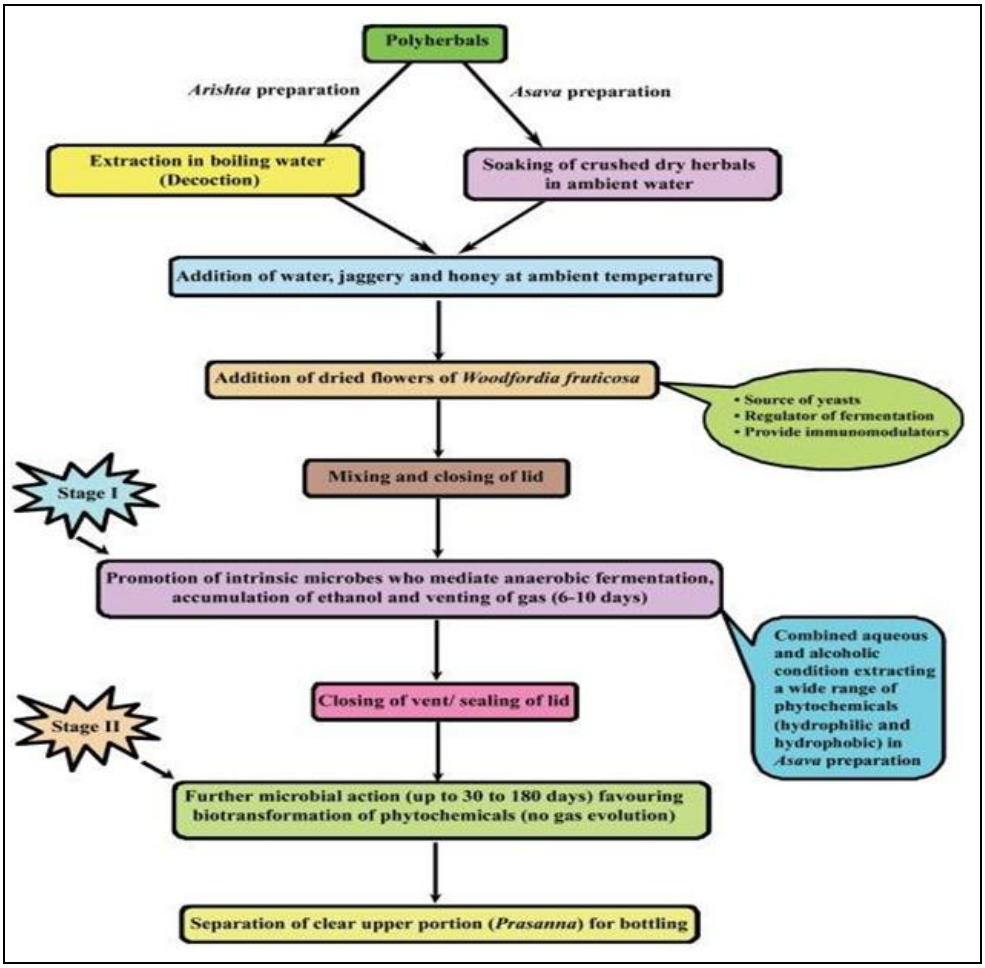

FIG. 1: METHODOLOGIES ASSOCIATED WITH THE CONVENTIONAL FERMENTATION PROCESSES OF ARISHTAAND ASAVA

Furthermore, modern advancements in Pharmaceuticals have brought about standardized manufacturing practices, quality control protocols, and sophisticated analytical techniques to improve the consistency, safety, and effectiveness of these preparations [11].

Ancient Method of Preparation:

Material Required: Herbs (according to the formulation, such as Dashmool for Dashmoolarishta, Draksha for Drakshasava), Water (used in the preparation of Arishta decoctions) Jaggery, honey, or sugar (agents that promote fermentation), Earthenware containers, glass jars for the processes wooden of fermentation and storage

Preparation Method:

Choosing Ingredients: Medicinal herbs, water, and jaggery or honey are chosen. The herbs are typically rinsed, dried, and chopped into smaller pieces for more effective extraction.

Preparation of Decoction (for Arishta): The herbs are simmered in water to create a decoction. This boiling process usually occurs in earthen pots or metal containers and continues until the liquid volume decreases to approximately one-fourth of what it originally was. This decoction is then strained to eliminate solid residue.

Addition of Sweeteners: Jaggery, sugar, or honey is incorporated into the strained decoction or herbal juice. This sweetener serves as a fermenting agent.

Natural Fermentation: The mixture is placed in large earthen containers or wooden barrels and sealed with clay or leaves. The containers are kept in a warm environment to promote natural fermentation, which generally lasts from 15 to 45 days depending on the particular formulation. Throughout this time, naturally present yeast ferments the sugar, resulting in a small quantity of alcohol and improving the formulation's therapeutic effects.

Final Filtration and Storage: Once fermentation is complete, the liquid is filtered once more and stored in cool, dry, and dark places in earthen or wooden vessels. This storage medium maintains a steady temperature, enhancing fermentation and preservation.

Aging further enhances the medicinal qualities of Arishta and Asava [11, 12].

Merits and Demerits:

(Ancient Method) Merits: Traditional medicinal properties are maintained through natural fermentation. It is thought that clay or wooden vessels contribute minerals and improve effectiveness. Affordable materials are readily available in conventional Ayurvedic practices.

Demerits: The fermentation process is gradual and may be unpredictable, resulting in fluctuations in potency. Earthenware containers and storage methods can be prone to contamination. There is restricted control over microbial presence, affecting both product safety and duration of usability.

Modern Method of Preparation: The contemporary manufacturing of Arishta and Asava within pharmaceutical environments involves sterilization, temperature regulation, and accurate measurements to guarantee uniformity and quality.

Material Required: Herbs and extracts Stainless steel or glass fermentation vessels Controlled yeast strains to ensure reliable fermentation Sugar, honey, or jaggery (usually sterilized)

Preparation Method

Selection of Raw Materials: High-grade plant materials, water, and fermentative substrates (such as jaggery or honey) are selected. Raw materials undergo quality assessment and authentication to guarantee consistency and adherence to pharmacopoeial standards.

Extraction of Active Compounds: While traditional decoction methods are utilized, controlled heating and advanced extraction techniques (like percolation or continuous stirring) may be integrated to improve extraction efficiency. The decoction is then filtered to eliminate impurities.

Addition of Fermenting Agents: A carbohydrate source, such as jaggery, sugar, or honey, is incorporated to kickstart the fermentation process. A specific amount of herbal paste, often containing spices or flavoring herbs, is included to enhance flavor and medicinal benefits.

Controlled Fermentation: The mixture of decoction is placed in fermentation tanks with regulated temperature and pH levels to optimize the fermentation process. Specific strains of yeast (like *Saccharomyces cerevisiae*) may be used to ensure a consistent fermentation outcome. This process usually lasts between 15 and 45 days, depending on the particular formulation, with the setup sealed to prevent contamination.

Filtration and Clarification: After fermentation, the liquid is filtered and clarified to remove any suspended particles. Modern filtration methods (such as membrane filtration) are commonly employed to achieve clear, contaminant-free products.

Storage and Aging: The Asava or Arishta is stored in stainless steel or glass-lined containers, kept away from sunlight, to mature and enhance its therapeutic properties. The aging process is carefully monitored to maintain stability and avoid degradation.

Packaging: After aging, the product is filtered again, assessed for quality, and placed in sterilized, airtight containers [13, 14, 15].

Merits and Demerits:

(Modern Method) Merits: Regulated fermentation produces reliable, top-notch products. Increased safety from the use of sanitized equipment and selected yeast strains. Extended shelf life as a result of regulated storage and preservation techniques.

Demerits: Reduced compliance with traditional practices, which could affect authenticity. Elevated production expenses stemming from the need for specialized equipment. Depletion of possible natural fermentative microorganisms that might enhance effectiveness.

TABLE 2: COMPARISON OF METHOD

Aspect	Ancient Method	Modern Method
Fermentation	Slow, natural fermentation (months 4-6)	Controlled fermentation with yeast strains (1-3 months)
Materials	Earthen/wooden pots, natura fermentation	Stainles steel/glass, controlled Yeast fermentation
Storage	Earthenware/glass in cool, dark places	Sterilized glass or steel in temperature-controlled facilities
Duration	Longer fermentation and maturation	Shorter, consistent fermentation time
Consistency	Vriable due to natural fermentation	High consistency with controlled process
Shelf Life	Limited due to natural storage	Extended through sterile and controlled environment

Standardization:

Need For Standardization: Standardization guarantees that Arishta and Asava retain uniform therapeutic characteristics, which is important due to: Natural fermentation can differ depending on the raw materials, environmental factors, and methods of preparation.

In the absence of standardized preparation, the quality, potency, and safety of these medicines might fluctuate. Contemporary quality assessment methods ensure adherence to safety and quality standards for consumer protection.

Standardization and Quality Evaluation: Standardization plays a vital role in maintaining uniformity, strength, and effectiveness in Arishta and Asava preparations. Contemporary methods aid in monitoring quality and guaranteeing safety.

Organoleptic Properties: The attributes of appearance, color, aroma, and flavor are assessed to align with pharmacopoeial criteria. These characteristics are analyzed to ensure they conform with traditional descriptions.

Physicochemical Analysis:

pH: Arishtas and Asavas typically exhibit an acidic pH. A stable pH is essential for consistent product quality.

Alcohol Content: As fermentation results in alcohol production, the finished product is examined to verify the alcohol level is within accepted ranges (generally between 5-12% v/v).

Total Soluble Solids (TSS): Measured with a refractometer to evaluate sugar levels after fermentation.

Specific Gravity: Assessed to verify uniformity and detect any deviations from the standard formulation.

Chemical Profile Analysis:

High-Performance Thin Layer Chromatography (HPTLC): Employed to

identify and quantify active components or markers. High-Performance Liquid Chromatography (HPLC) or Gas Chromatography

(GC): These techniques analyze the presence and amounts of bioactive substances and monitor alcohol and volatile compounds.

UV-Visible Spectroscopy: Evaluates the absorbance spectra of particular phytochemicals to verify composition.

Microbial Analysis: Total Plate Count (TPC) and assessments for harmful microorganisms are performed to ensure product safety. Testing for yeast and mold is essential since fermentation relies on microbial processes.

Toxicity Testing: Heavy Metals and Pesticide Residues: Evaluated using Atomic Absorption Spectrophotometry (AAS) or Inductively Coupled Plasma Mass Spectrometry (ICP-MS) to confirm they remain within safe thresholds.

Mycotoxins: Checked to ensure no dangerous fungal toxins are present.

Stability Assessment: Evaluations for temperature endurance, longevity on shelves, and the impact of light exposure are performed to establish the durability of the product and its packaging needs. Regular sampling throughout time assists in tracking the consistency of active ingredients and the overall quality [16, 17, 18, 19, 20, 21].

RESULT:

Ancient Method: The traditional method for creating Asava involves immersing medicinal plants in water or herbal decoctions and allowing them to ferment with natural sugars, whereas Arishta is made by boiling the components in water before fermentation. Classical texts offer comprehensive instructions on choosing herbs, the duration of fermentation, and appropriate storage conditions.

Modern Advancement: Recent developments in pharmaceuticals include standardized production processes, quality assurance protocols, and the application of advanced analytical methods. Contemporary formulations focus on improving bioavailability, stability, and consistency. A review of classical Ayurvedic texts uncovers a wealth of information regarding Asava and Arishta preparations. These documents provide knowledge on herb selection, preparation techniques, and therapeutic uses. Modern pharmaceutical innovations have brought about technological changes while still maintaining adherence to traditional practices. The employment of climate controlled environments for sandhana sthala and the use of yeast as sandhaneeya dravya exemplify these modern adaptations.

CONCLUSION: This review highlights the importance of carefully balancing time-honored Ayurvedic knowledge with modern pharmaceutical developments in the formulation of Asava and Arishta. Though modern approaches put a higher priority on consumer safety and standardization, ancient methods are prized for their cultural relevance and organic approach. Ensuring safety and effectiveness through standardization, validation, and scientific reassessment is crucial for these formulations within today's healthcare environment. This research adds to the ongoing conversation between traditional Ayurveda and contemporary pharmaceutical methods.

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