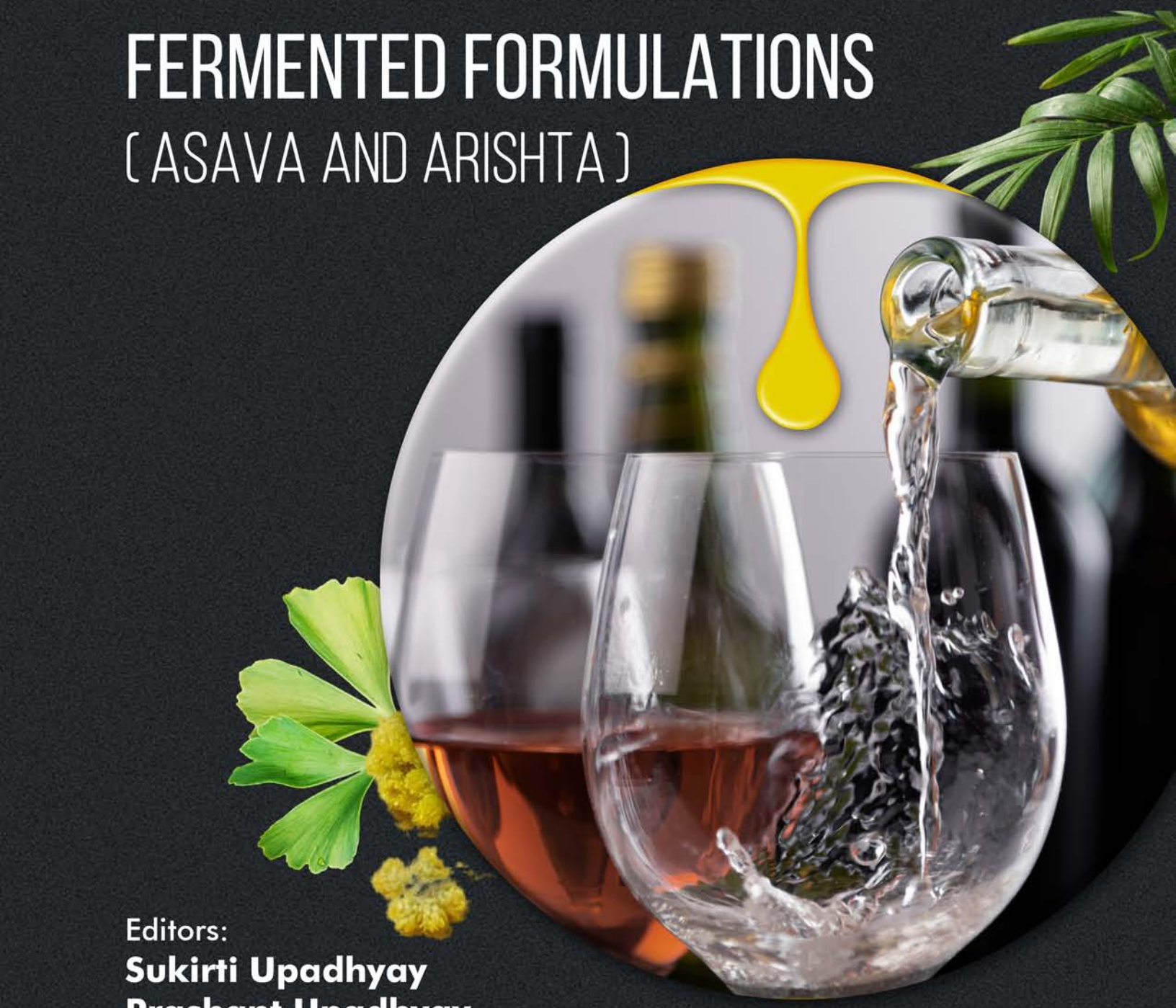
MEDICATED WINES

A REVIEW ON ANCIENT FERMENTED FORMULATIONS (ASAVA AND ARISHTA)



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Medicated Wines: A Review on Ancient Fermented Formulations (Asava and Arishta)

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FOREWORD

I am pleased to write the foreword for this academic work, "Medicated Wines: A Review on the Ancient Fermented Formulations (Asava and Arishta)." It is admirable that this book explores the depths of ancient knowledge and highlights the importance of traditional fermented formulations in the Indian System of Medicine, especially Ayurveda.

In Ayurvedic medicine, Asava and Arishta have long been valued not only as medicinal preparations but also as masterful fusions of fermentation technology, science, and tradition. Long before the development of contemporary microbiology and pharmacology, our ancestors had an intuitive awareness of microbial activities and bioenhancement, as exemplified by these compositions, often referred to as "medicated wines."

The historical, pharmacological, and therapeutic aspects of these special preparations are adequately covered in this book. The book is useful for academicians and practitioners alike because the writers have expertly assembled traditional references, production techniques, ingredient profiles, and modern scientific interpretations. The contextual relevance of Asava and Arishta is further expanded by the comparative insights into global analogs of medicated wines, demonstrating their enduring value in contemporary health paradigms.

This book comes at a good time, as interest in natural and holistic health remedies is increasing quickly. It promotes a novel understanding of fermented Ayurvedic formulations and encourages further research by bridging the gap between traditional practices and modern scientific approaches. I have no doubt that this work will encourage scholars, practitioners, and students to delve deeper into this specialized but incredibly rich area of traditional medicine.

I commend the writers for their careful investigation and well-considered presentation and hope this book will be a valuable addition to the international discussion on complementary and alternative medicine.

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Preface

Fermented traditional medicines are potent and biocompatible; they harness the power of microbial transformation to convert complex phytoconstituents into effective therapeutic agents. The medicinal wines of ancient India, known as Āsava and Ariṣhta, are among the best examples of this concept. These were used primarily in the age-old system of Āyurveda.

When studied scientifically, these formulations were found to be advanced natural fermentation products, thoughtfully designed to improve patient compliance, extend shelf life, and enhance medical performance.

They have broad pharmacological applications in the treatment of chronic diseases. This book, “Medicated Wines: A Review on the Ancient Fermented Formulations (Asava and Arishta)," aims to provide a comprehensive analysis of their historical context, traditional methods of production, pharmacological effects, constituent profiles, and contemporary significance. By briefly contrasting similar fermented medicinal liquids from different traditional medical systems worldwide, this work also emphasizes a global perspective.

This book provides insightful information on a timeless therapeutic technique to all readers, whether you are an Āyurvedic student, a pharmacognosy researcher, an integrative medicine practitioner, or just an inquisitive mind interested in the intersection of tradition and science.

We devote our endeavors to the ancient academics who established the principles of holistic treatment, as well as to the contemporary intellectuals who are now investigating and confirming that knowledge. I hope this book inspires further research and fosters a deeper appreciation for the therapeutic potential of nature’s remedies.

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CHAPTER 1

Introduction to the Uniqueness, Differences, and Similarities of Fermented Formulations (Asava and Arishta) as Medicated Wines

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Abstract: Ayurveda, an Indian indigenous system of medicine, dates back to the Vedic period (1500-800 B.C.) and is utilized for a healthy life. Ayurvedic medicine is a traditional system of healthcare and is regarded as a spiritual gift to humanity. Ayurvedic formulations are available in exclusive dosage forms, including *churna*, *tail*, *vati*, and *bhasma*. Among those, Asava and Arishta are valuable formulations in Ayurveda for hundreds of years, and their use is rooted in historic practice for reinforcing therapeutic benefits and curing a wide variety of illnesses. The fundamental ingredients used in those formulations are derived from plants, animals, or mineral origin. Asava and Arishta are fermented formulations in which alcohol is self-generated during fermentation, serving as a preservative and extraction solvent within the components. Fermentation additionally reduces undesirable sugars and toxins, making them safe and effective, compared to other dosage formulations, due to their long shelf life, quick absorption, and better efficacy. They may be gaining popularity. Western countries, including Japan and Germany, have shown great interest in these formulations. This chapter aims to disseminate the large body of information on traditional Indian medicine and offer the specified impetus to researchers for the improvement and production of fermented Ayurvedic formulations. In the modern age, we seek to uncover the underlying rationale in the Acharyas' approaches for translating tradition into the technological realm.

Keywords: Absorption, Asava, Arishta, Avleha, Ayurveda, bhasma, churna, discover, dosage, efficacy, fermentation, formulations, indigenous, medicine, safe, shelf-life, traditional, tail, vedic.

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INTRODUCTION

Ayurvedic medicine is a well-established, conservative ancient medicinal system practiced for many centuries. It combines science and religion, which enhances well-being and longevity. The term derives from the Sanskrit inception, *Ayur* (life) and *Veda* (knowledge) [1].

Ayurveda is not just a science of remedies for the sick, but also encompasses the whole gamut of happy human life, covering the physical, metaphysical, and spiritual aspects. Ayurveda posits that fitness and well-being are controlled by equilibrium between body, mind, and soul [2]. Even today, with all its satisfaction and glory, it is widely considered an opportunity for a system of medicine. The Ayurvedic pharmacopeia incorporates more than 1200 plant species [3].

Ancient background

From the beginning of the Vedic period until the advent of the Mohammedan dynasty, Ayurveda was the prevailing system of medicine [3]. The potent components separated from indigenous traditional plants provide therapeutic drugs as well as serve as molecules for a new drug discovery incorporated in novel dosage formulation [4]. Indigenous herbal drugs have gained significant position among users [5]. This practice was prevalent in India until about the 7th century A.D. The origins of Ayurveda date back approximately 5,000 years, encompassing scientific knowledge about the eight branches of Ayurveda, known as Astanga Ayurveda. The knowledge we have today could be derived from the ancient Ayurvedic texts *Charak Samhita*, written by Charak (Father of Medicine), and *Shushruta Samhita*, written by Shushruta (Father of Surgery) [6, 7].

Definition of Asava and Arishta

Asava and Arishta are liquid Ayurvedic dosage formulations obtained by mixing a crude drug in a solution of sugar, or jaggery, for a specified time to undergo fermentation, which generates alcohol that acts as an extracting solvent within the formulation [8].

In Ayurveda, Asava and Arishta, one-of-a-kind dosage forms, are applied for diverse healing purposes. Asava and Arishta are naturally fermented alcoholic liquid formulations. Fermentation is initiated through the addition of Dhataki flora. Alcohol is generated internally, which assists in the extraction of the crude drug and also acts as a preservative. Both Asava and Arishta comprise up to 12%

alcohol; consequently, they are additionally referred to as medicinal wines. Arishta is prepared using a decoction of herbs in boiling water, whereas Asava is prepared through the direct use of fresh, naturally fermentable juice [9, 10].

In the Ayurveda system, various documented Ayurvedic texts are available that describe the Asava-Arishta formulation. In Charaka Samhita, 30 Asava–Arishta formulations are quoted; in Sushruta Samhita, 21; Ashtanga Hridaya, 09; Ashtanga Sangraha, 17; Sharangadhara Samhita, 13; Gada Nigraha, 67; Yogaratnakara, 12; Bhaishajya Ratnavali, 44; Pharmacopoeia Standards for Ayurvedic Formulations, 36; A Manual of Indian Pharmacopoeia, 21; Ayurvedic Pharmacopoeia of India, 24; and Ayurvedic Formulary of India, 57 [11 - 13].

Method of preparation for Asava and Arishta

Asava

The required amount of sugar or jaggery powder is boiled with water, and then cooled. Afterward, it pours into the fermentation pot or vessel. The crude drug in the form of powder is kept inside the fermentation pot with a lid. The edges of the fermentation pot are covered with a clay cloth, which consists of seven layers. To allow fermentation, the pot is placed underground in a consistent temperature. After the indicated time, the top lid is removed, and the contents inside are examined to determine if the fermentation is over. The liquid is decomposed and filtered after two to three days. It is transferred to the bottle once the fine suspended particles have fully settled.

Arishta

In Arishta, a decoction called Kasaya with an herbal drug is prepared by boiling coarse powder of the drug with water. Further, the prepared Kasaya is placed into a fermentation pot or vessel. The required amount of sugar or jaggery, honey, is boiled with water and cooled. It is then added inside the fermentation pot and closed with the lid. The edges of the fermentation pot are covered with a clay cloth, which consists of seven layers. To allow fermentation, the pot is placed underground at a consistent temperature. After the indicated time, the top lid is removed, and the contents inside are examined to determine if the fermentation is over. The liquid is decomposed and filtered after two to three days. It is transferred to the bottle when the fine suspended particles have fully settled [14 - 16].

CHAPTER 2

Asava and Arishta for CNS Disorders

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Abstract: The complexity and chronic nature of illnesses of the Central Nervous System (CNS), such as epilepsy, dementia, Parkinson's disease, and mental health issues, present serious obstacles to contemporary healthcare. Through formulations like Asava and Arishta, which are fermented herbal preparations enhanced with neuroprotective and adaptogenic herbs like Brahmi, Ashwagandha, and Shankhapushpi, Ayurveda, the traditional Indian medical system, offers possible supplementary therapies. Their therapeutic roles in CNS illnesses are examined in this chapter from both an Ayurvedic and scientific standpoint. According to Ayurveda, these compositions enhance mental clarity and neurological health while balancing the doshas, mainly Vata. According to science, their botanical ingredients have anxiolytic, anti-inflammatory, neuroprotective, and cognitive-enhancing qualities. According to case studies and clinical data, Asava and Arishta may help with memory enhancement, seizure control, prevention of neurodegeneration, and overall cognitive function improvement.

Keywords: Asava, Arishta, CNS, Brahmi, Ashwagandha, Shankhapushpi.

INTRODUCTION

The Central Nervous System (CNS) is an essential and intricate part of the nervous system that controls brain activities and manages the body's functions. CNS disorders refer to conditions that impact brain function, resulting in neurological issues [1].

According to the World Health Organization (WHO) report, around 1 billion people globally are impacted by neurological disorders, with nearly 7 million deaths occurring annually due to these conditions [2].

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Worldwide, 65–80% of people use herbal remedies to prevent and address different health issues, often because modern medicines are either unavailable or too expensive [3].

The most prevalent mental health issues include depression, anxiety, stress, autism, obsessive-compulsive disorders, and others [4].

Additionally, Alzheimer's and Parkinson's diseases are among the most common neurological disorders, currently impacting 50 million people worldwide [5].

Moreover, recent studies have stated that ayurvedic medicine proves better results in treating neurological disorders. Ayurveda is regarded by many researchers as the most ancient system of healing. The term “Ayurveda” comes from Sanskrit and translates to “The Science of Life.” This body of knowledge originated in India over 5,000 years ago and is often referred to as the “Mother of All Healing” [6].

Ayurveda is a healing system that remains commonly used across the Indian subcontinent, and it translates to the knowledge (*Veda*) of life (*Ayur*). The goal of Ayurvedic medicine is to enhance well-being rather than simply treating diseases. In everyday life, Ayurveda emphasizes sustaining balance between nature and the person, promoting overall health and wellness [7].

Ayurveda is a primeval Indian medicinal system, having a unique approach to treat a variety of brain disorders [8].

In Ayurvedic treatments, the primary medicines are typically fermented extracts or decoctions (arishta) or fermented brews or infusions (asava) [9].

Arishta and asava are utilized to address a range of issues in paediatrics, as well as in the nervous, circulatory, and blood systems. They are also used for conditions affecting the respiratory, digestive, excretory, urinary, reproductive, and immune systems [10].

Overview of Asava and Arishta in Ayurveda

Arishtas and asavas are naturally occurring herbal fermentations within the traditional Ayurvedic system. These alcoholic remedies are created by fermenting herbal liquids or their extracts with the addition of sugars. They are generally prepared with a higher alcohol content [11].

Asava is made by directly fermenting fresh herbal juices. It is an alcoholic preparation made through the fermentation of Apakwa Aushadha. It is typically

created using Sheet Virya Dravya. Being less potent than Arishta, it is primarily used in paediatric treatment, with exceptions, such as Kumaryaasava, Drakshaasava, and Lodhraasava. Asava improves taste, helps reduce insomnia, boosts physical strength, and promotes a sense of well-being and happiness.

Arishta is produced by boiling herbal decoctions in water. It is an alcoholic preparation derived from the fermentation of Pakwaaushadha. It is made by preparing a decoction of herbs and is typically created using Ushna Virya Dravya. Known for its strong potency compared to asava, it is commonly used in adults and elderly patients, with the exception of Takraarishta. Arishta functions as an appetite stimulant, a remedy for reducing Pitta Dosha, a cure for Kapha and Vata imbalances, a laxative, and is beneficial in treating conditions like Grahni, Pandu, Shosha, Arsha, and Jwara [12, 13].

Key Ingredients

The herbal ingredients commonly found in Asava and Arishta preparations in Ayurveda include herbs with greater potential for activity.

1. *Draksha* (Grapes) – Known for its rejuvenating and digestive properties [14].
2. Ashwagandha (*Withania somnifera*) – Used for its adaptogenic and strength-boosting qualities [15].
3. *Chandan* (Sandalwood) – Known for its cooling and soothing effects [16].
4. Vata (Indian Ginseng) – Used to balance Vata dosha and promote vitality [17].
5. Guduchi (*Tinospora cordifolia*) – Known for its immune-boosting and detoxifying effects [18].
6. Ginger (*Zingiber officinale*) – Aids digestion and has anti-inflammatory properties [19].
7. *Tulsi* (Holy Basil) – Often used for its antibacterial and immune-supporting properties [20].
8. *Dhania* (Coriander) – Known for aiding digestion and providing a cooling effect [21].
9. Brahmi (*Bacopa monnieri*) – Often used for enhancing mental clarity and memory [22].
10. Amla (Indian Gooseberry) – Known for its high vitamin C content and antioxidant properties [23].

These ingredients are usually combined with fermented liquids, such as water, honey, or jaggery, which act as a medium for the fermentation process, enhancing the therapeutic effects of the herbs [14, 16].

CHAPTER 3

Asava and Arishta for GIT Disorders

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Abstract: Gastrointestinal (GI) disorders occupy a significant part of the worldwide health burden, which indeed requires the rigorous study of safe and effective treatment. Asava and Arishta, which are traditional ayurvedic fermented drug preparations, constitute a viable therapeutic option for managing GI dysfunctions because of their bioconversion-elevated bioavailability and synergy of multiple herbs. Such preparations, which are characterized by their self-induced alcohol content (5–12%), allow greater solubilization, adsorption, and targeted delivery of phytoconstituents. Some of the crucial formulations like Drakshasav, Pippalyasav, Abhayaristha, and Aragwadharishta have shown very effective gastroprotective, prokinetic, carminative, anti-inflammatory, and hepatoprotective activity. Mechanistically, they influence gut microbiota, boost digestive enzyme activities, modulate gastric acid secretion, reverse oxidative stress, and contribute to better gut homeostasis. Novel scientific evidence indicates that they alleviate functional dyspepsia, Irritable Bowel Syndrome (IBS), constipation, and acid-peptic disorders by synergistic modulation of gastrointestinal physiology. This chapter critically evaluates the phytopharmacological foundation, fermentation kinetics, molecular mechanisms, and clinical relevance of Asava and Arishta, emphasizing their translational value in integrative gastroenterology. Additional extensive pharmacokinetic, multi-omics, and clinical investigations are required to validate their mechanistic pathways and to maximize their therapeutic potential in modern medicine.

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Keywords: Asava, Arishta, gastrointestinal disorders, Ayurvedic fermentation, gut microbiota modulation.

INTRODUCTION

Prevalence and Global Burden of Gastrointestinal (GI) Disorders

Gastrointestinal (GI) disorders pose an important worldwide health burden, which is presently afflicting millions and thus contributing to major health expenses as well as morbidity. Such ailments vary from the Functional GI Disorders (FGIDs) of Irritable Bowel Syndrome (IBS) and functional dyspepsia to grave conditions, such as Gastroesophageal Reflux Disease (GERD), Peptic Ulcer Disease (PUD), Inflammatory Bowel Disease (IBD), and cancers of the GI tract [1].

FGIDs affect almost 40% of the population according to Rome IV criteria, and the prevalence of IBS is between 4% and 10%, most commonly in Western nations [2]. GERD is found in 10%–20% of people in Western populations and in about 5% in Asia, where obesity and food intake are the risk factors [3]. PUD, being most frequently induced by Helicobacter pylori and NSAIDs, develops in 5%–10% of individuals worldwide. Incidence of IBD is rising in the developing world, with as much as 0.5% in North America [4]. NAFLD, being associated with metabolic syndrome, affects 25% of the population of the world, and pancreatitis prevalence ranges from 5 to 50 per 100,000 individuals yearly [5]. Colorectal Cancer (CRC) is the third most frequent cancer in the world, propagated by diet and genetics.

The financial cost of GI disorders is high, accounting for 8%–10% of the healthcare expenditure in developed nations. The misuse of Proton Pump Inhibitors (PPIs) and increasing antimicrobial resistance in the treatment of *H. pylori* further highlight the necessity for cost-saving options, such as Ayurveda-based treatments [6].

Need for Alternative and Complementary Medicine

Current pharmacological therapies, such as PPIs, H_2 receptor antagonists, antibiotics, immunosuppressants, and biologics, are effective in symptom control but come with limitations in the form of side effects, drug dependency, and resistance [7]. Long-term use of PPIs is responsible for osteoporosis, kidney disease, and vitamin B12 deficiency, whereas H2 blockers, such as ranitidine, have been linked with carcinogenic adulterants. NSAIDs and corticosteroids add to the risk of GI mucosal damage and bleeding [8]. Increasing resistance to antibiotics diminishes the success of *H. pylori* eradication.

Pharmacotherapy for FGIDs, such as antidepressants and antispasmodics, has inconsistent outcomes and considerable side effects. Outrageous costs and restricted access to biologics also hinder their use, especially in Low- and Middle-Income Countries (LMICs). Due to these shortcomings, greater curiosity is found with respect to Ayurvedic drugs, such as Asava-Arishta, as complete and efficacious remedies [9].

Ayurvedic Perspective on Gastrointestinal Health

Based on Ayurveda, gastrointestinal conditions are primarily attributed to the weakening of Agni, the digestive fire responsible for the activation of metabolism and the maintenance of nutrient assimilation. With a slowing of Jatharagni, digestion is deranged, and Ama, a thick, toxic-like product, forms. It is believed to obstruct physiological channels (srotas) and thus induce systemic imbalance. Disorders, such as *Grahani*, which bear resemblance to modern conditions like irritable bowel syndrome and chronic malabsorption, are often observed when Agni is compromised, and Vata or Pitta doshas become aggravated. Ayurvedic physicians typically begin treatment by administering Deepana and Pachana herbs like Trikatu and Hingvastakachurna to stimulate digestion and metabolize residual Ama. Once the digestive fire is stabilized, purification therapies like Virechana (purgation) can be suggested to eliminate the excess augmented doshas. Notably, despite no clear description of gut microbiota in ancient texts, the concept of Koshtha (bowel nature) and the recommended use of PathyaAhara (dietary regimen) point toward an evolved understanding of management of the gut environment. Recent studies have confirmed that several Ayurvedic drugs possess prebiotic, anti-inflammatory, and gut-modulating effects. These findings have encouraged integrative practices, whereby traditional Ayurvedic knowledge is increasingly being combined with contemporary gastroenterology to offer holistic treatment for gastrointestinal disorders [10].

The role of Asava and Arishta in gastrointestinal disorders

Asava and Arishta, two different classes of Ayurvedic traditional fermented preparations, have been traditionally used as effective therapeutic drugs in the treatment of Gastrointestinal (GI) ailments. These products, prepared by natural fermentation of herbal decoctions or infusions with sugar or jaggery and yeast, result in bioavailable phytoconstituents with high alcoholic content (5–12%), contributing to quick systemic absorption [11]. Classical texts, such as Charaka Samhita and Bhavaprakasha Nighantu, report their efficacy in alleviating disorders ranging from indigestion (Ajirna), hyperacidity (Amlapitta), flatulence (Adhmana), and colic (Shoola) to chronic conditions, such as irritable bowel

CHAPTER 4

Asava and Arishta for the Female Reproductive System

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Abstract: The female reproductive system is highly complex and dynamic. It consists of external and internal organs, and it facilitates menstruation and procreation. This system helps to introduce gametes, regulate sex hormones, and sustain fertilized ova as they develop into fully formed fetuses prepared for parturition. Arishta and Asava are unique Ayurvedic dosage forms in which alcohol is produced through a fermentation process, and they have indefinite shelf life. Arishta is prepared by adding an herbal decoction, which undergoes fermentation (fermented decoction), and Asava is prepared by adding powdered drugs directly to honey or jaggery to form a fermented infusion. The fermentation process can be enhanced by adding the dried flowers of *Woodfordia fruticosa*. In the present study, the role of Arishta and Asava in female reproductive organs is established. There are many Ayurvedic plants that are known to exert beneficial effects on the female reproductive system. Plant drugs, such as *Cinnamomum zyelanicum, Solanum indicum, Glycyrrhiza glabra, Boerhavia diffusa, Piper cubeba, Strychnos potatorum, Mesua ferrea,* and *Syzigium aromaticum,* have been reported to be effective. These plants are widely used in the management of dysmenorrhea, amenorrhea, and infertility. Asava and Arishta, two important Ayurvedic formulations, have been used for over 3,000 years to treat various diseases. They are effective, tasty, stable, and most importantly, they have no side effects. All Arishta and Asava preparations are mediated by microbial fermentation processes. These compounds exhibit preservative properties and enhance medicinal potency through biotransformation facilitated by indigenous bacteria. Infertility caused by multiple factors is one of the most common health problems among married couples today. It affects approximately 15-10 percent of couples. Both male and female factors contribute to infertility.

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Keywords: Ayurveda, Arishta, Asava, Fermentation, Female reproductive system.

INTRODUCTION

The Ayurvedic medical system, known for its all-encompassing approach to health, places a strong emphasis on using natural remedies and healthy lifestyle practices to enhance well-being. Due to their distinctive preparation methods and remarkable health benefits, Asava and Arishta occupy a unique position among the wide range of medicinal formulations. In addition to their therapeutic efficacy, these traditional fermented formulations are valued for their extended shelf life and enhanced bioavailability. Asava and Arishta, which are made by natural fermentation, use herbal constituents to their full medicinal potential to provide an effective and easily absorbed treatment for a range of conditions, especially those affecting the female reproductive system [1].

With its complicated functions and intricate hormonal regulation, the female reproductive system frequently encounters disorders, including menstrual irregularities, infertility, and conditions, such as endometriosis and Polycystic Ovary Syndrome (PCOS). The health and quality of life of a woman can be greatly impacted by these problems. Through formulations, such as Asava and Arishta, Ayurvedic medicine offers a potential remedy through its individualized and integrative approach. These fermented preparations, enriched with bioactive ingredients, aim to enhance reproductive health, promote hormonal balance, and address underlying imbalances that contribute to various disorders [2, 3]. Formulations, such as *Ashokarishta*, *Kumaryasav*a, and *Dashmoolarishta,* have demonstrated significant benefits in the context of female reproductive health. These treatments address a wide spectrum of reproductive issues, such as hormonal imbalance, postpartum recovery, and menstrual irregularities. For example, *Kumaryasava* supports ovulation and hormonal balance, whereas *Ashokarishta* is frequently used to treat menorrhagia and dysmenorrhea [4].

These formulations are highly effective in treating complex reproductive health disorders due to the fermentation process and the synergistic effects of herbal constituents. This chapter examines the preparation methods, pharmacological properties, and therapeutic benefits of Asava and Arishta, highlighting their significant relevance in Ayurvedic medicine. Fig. (**1**) illustrates the female reproductive system, including its structure, functions, and common disorders affecting fertility and menstrual health. Table **1** represents the functions of ovaries, uterus and cervix.

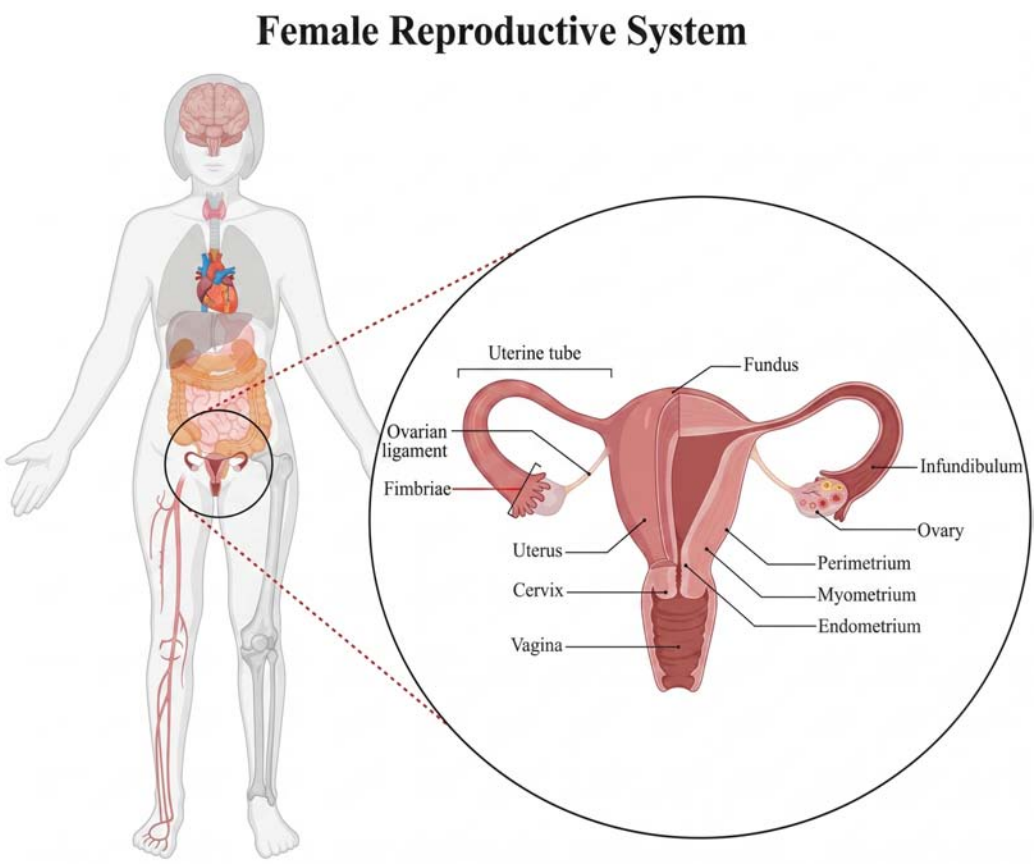

Fig. (1). Female reproductive system.

Table 1. Functions of the Organs.

Ovaries	1. Produce reproductive hormones (estrogen and progesterone) for the regulation of menses.
	2. Store ovarian eggs until menopause.
	3. Mature eggs during the follicular phase.
Uterus	1. Egg implantation.
	2. Development and nourishment of the embryo until the placenta forms.
	3. Development of the fetus.
Cervix	1. Sperm transport.
	2. Allows sperm to pass into the uterus during ovulation.
	3. Prevention of infections from entering the uterus and affecting the fetus.
	4. Dilates during childbirth for the baby's passage through the birth canal [1].

CHAPTER 5

Asava and Arishta for the Male Reproductive System

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Abstract: The Male Reproductive System [MRS] refers to the organs involved in sexual function and in the human reproduction process. The MRS consists of sex organs located outside the body and inside the pelvic cavity. The penis is the primary male sex organ, and the scrotum consists of testicles that produce semen as well as sperm. In Ayurveda, MRS is described in terms of the Shukra Dhatu [semen and sperm], and is considered to occur due to Vata Dosha [air and ether elements]. The problems associated with the male reproductive system are cancers [penile, prostate, testicular], infections [Herpes Genitalis, Herpes Simplex, Gonorrhea, Genital Warts], and other conditions [premature ejaculation, male infertility, erectile dysfunction, priapism]. As per Ayurveda, Vajikarana and Sutrameha are the therapies to manage spermatogenesis, healthy sexual potentiation, such as erectile dysfunctions [Klaibya], infertility [Bandhyatva], azoospermia, and premature ejaculation [Shukraghata Vata]. The significance of this field has grown considerably in recent times, as an increasing number of individuals are seeking clinical help for abnormalities in seminal parameters and sexual dysfunction. Ayurvedic treatment strategies use vrishya drugs, such as Ashwagandha [*Withania somnifera*], Draksh [*Vitis vinifera*], Madhuk [*Madhuka indica*], and Bala [Sida cordifolia], to treat reproductive disorders and improve sexual performance, with effects on the pituitary-gonadal axis. Investigations into such drugs and their various dosage forms are used in the management of various ailments in

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MRS. The present chapter presents an overview of the male reproductive system, the problems and ailments associated with MRS, treatment strategies with special emphasis on the Ayurvedic perspective of ancient fermented formulations, *viz*. Asava and Arishta, such as Chandanasav, Drakshasava, Ashwagandharishtha, Dasamularista, and a few more.

Keywords: Asava, Arishta, Male Reproductive System, Vajikarana, Sutrameha.

INTRODUCTION

A healthy life rests on three main pillars, *viz*., a balanced diet, adequate sleep, and a fulfilling sexual and marital life. In the present era, many people are reporting various disorders related to seminal parameters and sexual dysfunction. This is because of the stressful working environment, which also has a negative impact on their sexual life. Studies have also indicated a decline in sperm concentration and motility, as well as in the percentage of morphologically normal spermatozoa, in fertile men, independent of age [1].

AYURVEDIC PERSPECTIVE REGARDING THE MALE REPRODUCTIVE SYSTEM

According to Ayurveda, the male reproductive tissue, or shukra dhatu, is regarded as the source of male sexual energy. Both the tremendous potential energy for procreation and the energy for mental focus, concentration, and creativity are contained in this dhatu. It is important to consider how the diet impacts the general health of the reproductive system. The shukra is the last of all body tissues to be completely nourished during the digestive process. Improved eating practices that incorporate digestive and stimulating herbs like cardamom, fennel, cumin, and fenugreek can significantly support shukra dhatu nourishment.

One of Ashtanga Ayurveda's eight specializations, Vajikarana, addresses the enhancement of sexual potency and the pathophysiology of spermatogenesis [2]. This aphrodisiac treatment is recommended for a number of reproductive and sexual conditions, including Shukraghata Vata [azoospermia], Bandhyatva [infertility], premature ejaculation, and Klaibya [erectile dysfunction]. Sukra Janakam, or Vrishya, refers to any substance that promotes spermatogenesis. The technical term for the spermatogenic and aphrodisiac properties of a dravya (medicinal plants, spices, herbs, and foods), encompassing audio-visual, socio-religious, and sexual behavioral factors, is Vrishya, which is also referred to as Vajikara. Since more patients are visiting clinics with a variety of problems linked to sexual dysfunction and seminal characteristics, the significance of this branch

has grown significantly in recent years [3]. Excess fluid accumulates around the testicles in a hydrocele, a kapha-related ailment, or varicocele, a pitta-related condition brought on by elevated blood flow and temperature around the testicles and vas deferens. Pharmaceutical medications, endocrine problems, anatomical flaws that result in retrograde ejaculation, and persistent prostate infections are possible additional causes [4].

The internal structures that make up the Male Reproductive System (MRS) are the epididymis, prostate gland, seminal vesicles, testes, and vas deferens. The exterior structure includes the penis along with the scrotum. These vascularized structures have several glands with ducts that facilitate the formation of vital androgens. These are necessary for masculine development as well as the generation, storage, and ejection of sperm for insemination [5, 6]. Fig. (**1**) represents a general male reproductive system.

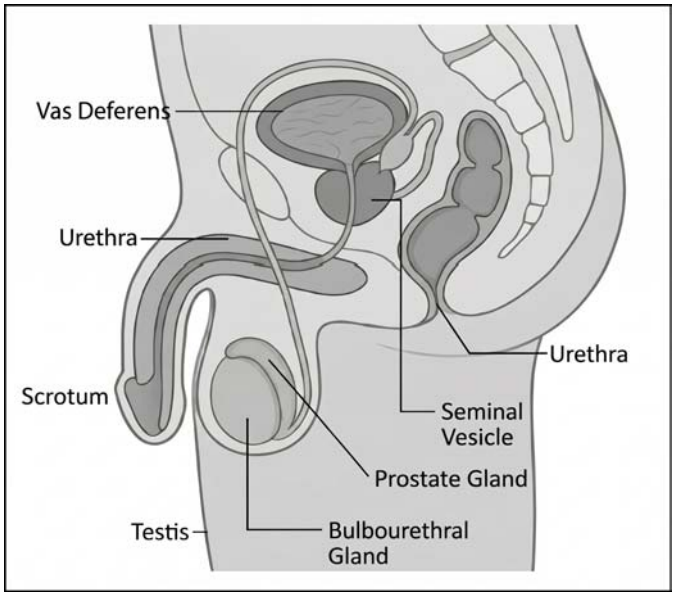

Fig. (1). Male reproductive system.

In the testes, testosterone is the primary androgen produced by Leydig cells. Around the periphery, testosterone is transformed into more active forms, such as estradiol by aromatase or dihydrotestosterone by 5-alpha-reductase. Mullerian-inhibiting substance and Inhibin B hormone are two more important hormones that are generated by Sertoli cells. Luteinizing Hormone [LH] and Follicle-Stimulating Hormone [FSH] are secreted from the anterior pituitary gland. They are controlled by Gonadotropin-Releasing Hormone [GnRH], which is generated

CHAPTER 6

Asava and Arishta as Immunity Boosters

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Abstract: Asavas and Arishtas are fermented preparations used for various medical conditions. Asavas and Arishtas have been regarded in Ayurveda as effective immunity boosters and health tonics, due to their synergistic blends of herbs that, when taken regularly, stimulate and reinforce the immune system to fight infections and maintain overall health and well-being. The fermentation process enhances the bioavailability of the herbal constituents. These preparations often include herbs that support the body's immune system, such as Amla, Ashwagandha, Aloe, Brahmi, Giloy, Tulsi, and Neem. These Asavas and Arishtas contain powerful herbs, and their constituents undergo reduction to support the body's nutrition while simultaneously enhancing their therapeutic benefits. The combined amino acids from these herbs have strong antioxidant properties and help eliminate harmful free radicals that attack and damage essential cell tissue, further strengthening the immune system. Many herbs in these formulations are also known as adaptogens, which means they help the body cope with stress while maintaining stability, enabling strong immunity. The formulations of these herbs are known for their added support for the body, including strength, stamina, and immune system boosting, which aid in overcoming ailments and reducing the risk of long-term deterioration in health. In the modern era, day-to-day life can add stress, making it hard to maintain good health and immunity, but being healthy requires making decisions and taking actions towards the right path and further steps to reach the desired goal.

Keywords: Asavas, Arishtas, fermented preparations, adaptogen, immunity boosters.

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INTRODUCTION

Traditional Ayurvedic formulations, Asava and Arishta, gain their reputation from distinct natural fermentation methods used in their preparation. Herbal medicines have remained essential elements of Ayurvedic practice for centuries because they demonstrate therapeutic effectiveness while maintaining durability over time [1, 2]. During fermentation, the medicinal properties of the constituent herbs are preserved while their bioavailability and potency are enhanced. Current scientific research has uncovered the immunomodulatory effects of various Asava and Arishta formulas, indicating their potential to regulate immune function and enhance immune defense mechanisms [3 - 5].

Traditional Ayurvedic perspective on immunity

In Ayurveda, the concept of immunity is summarized by the term Vyadhikshamatva, which means the body's innate capacity to resist disease and maintain balance. The system in Ayurveda focuses on balancing physical, mental, and spiritual health to develop strong immunity [6].

Most Important Aspects of Immunity as per Ayurveda

Ojas: Being the essence of all body tissues, Ojas is essential for maintaining life and immunity. It is the extremely subtle essence that sustains and protects the body, giving strength and resistance. A lack of Ojas can cause weakness and increased vulnerability to disease.

Bala: Meaning strength. Bala refers to the ability of the body to resist diseases. It is divided into:

Sahaja Bala: Natural immunity from birth.

Kalaja Bala: Seasonal and temporal factors affect immunity.

Yuktikrita Bala: Acquired immunity through diet, habits, and practices, such as Rasayana (rejuvenation therapies).

Agni: The fire of digestion, Agni, is the focus of health in Ayurveda. The balance of Agni maintains proper digestion and nutrient absorption, and it directly affects the constitution of Ojas and, hence, immunity itself [7].

Causes Affecting Vyadhikshamatva

Diet (Ahara): Maintaining a balanced diet that is compatible with one's constitution (Prakriti) promotes effective immune functioning

Lifestyle (Vihara): Following day-to-day and seasonal regimens (Dinacharya and Ritucharya) helps in bringing about balance and enhancing immunity.

Mental Health: Emotional balance and stress reduction are important, as emotional disturbances can drain Ojas and impair immune function.

Rasayana Therapies: These restoration therapies are meant to increase energy and immunity, usually by means of certain herbs and practices [8, 9].

Importance of Fermented Herbal Formulations in Enhancing Bioavailability

Fermented herbal preparations have been the backbone of ancient systems of medicine, such as Ayurveda, owing to their enhanced therapeutic activity and bioavailability of active compounds. Fermentation is a natural process where microbes transform complex phytochemicals into more bioactive and manageable forms, thereby enhancing the health effects of herbal medicines. Bioavailability is increased by fermentation.

Bio-transformation of Phytochemicals: Fermentation degrades complex plant compounds into more bioavailable forms. For instance, certain glycosidesare hydrolyzed to aglycones during fermentation, which are better absorbed in the human gastrointestinal tract and thus become more bioavailable [10].

***Reduction of Anti-Nutritional Factors*:** The reduction of anti-nutritional substances, such as tannins and phytates, by the fermentation process enhances the bioavailability of minerals and other valuable constituents of herbal preparations [11].

Pre-Digestion through Microorganisms: Microbial activity in fermentation is a form of pre-digestion, breaking down complex molecules into simpler ones. Pre-digestion microbial activity can be especially helpful for people with damaged digestive systems. The individual does not have to rely solely on his digestive ability, which facilitates the absorption of nutrients in the form of simple molecules [12].

***Reduced Sugar Levels*:** Microbial fermentation of herbal materials can reduce sugar content, which may benefit individuals who are monitoring their sugar intake. In addition to improving flavor, fermentation can enhance the bioavailability of important chemical constituents in herbs [13].

CHAPTER 7

Breath of Wellness: Ayurvedic *Asava* and *Arishta* for Respiratory Health

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Abstract: Asava and Arishta are Ayurvedic traditional fermented preparations that have been in widespread use with regard to respiratory disorders. Such preparations are produced using an exclusive fermentation method that improves the bioavailability and effectiveness of the active constituents of herbs. This chapter presents an overview of several Asava and Arishta formulas with beneficial effects on the respiratory system, including Vasarishta, Kantakaryarishta, Dasamularishta, Drakshasava, and Pushkaramoolarishta. All these compositions are expectorants, bronchodilators, anti-inflammatories, immunomodulators, and antimicrobials; hence, they are quite effective in conditions, such as asthma, bronchitis, chronic cough, and lung congestion. This chapter covers the ingredients, preparation, mechanism of action, and therapy of these drugs. It also discusses clinical relevance, dosage recommendations, safety precautions, and side effects. Designed holistically, Asava and Arishta can help heal respiratory diseases, provide symptomatic relief, and offer long-term benefits to patients. They have a traditional application with pharmacological credibility and, as such, exist as complementary therapies in respiratory well-being management. This chapter provides a comprehensive overview of these Ayurvedic formulations and their importance in maintaining lung well-being and treating respiratory diseases.

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Keywords: *Asava*, *Arishta*, Ayurvedic formulations, respiratory disorders, bronchitis, asthma, chronic cough, fermentation, herbal medicine, expectorant, bronchodilator, immunomodulator, anti-inflammatory.

INTRODUCTION

The health of the respiratory system is central to the health of a living being. The respiratory disorders are the leading cause of morbidity and mortality all over the world, and diseases like asthma, COPD, bronchitis, pneumonia, and tuberculosis cause a considerable burden to the health sector [1, 2]. Asthma is a serious global health issue, as its prevalence has increased over the past decades [3]. Moreover, advanced cases of air pollution and lifestyle issues have worsened the situation of respiratory disorders, which necessitate efficient and affordable treatment. Although the regular treatment involves only the use of inhalers, bronchodilators, corticosteroids, and antibiotics, the long-term use of these drugs may be linked to undesired side effects, especially immune suppression, and may increase the need to use alternative or complementary methods that provide natural, non-invasive counteractions to the illness [4]. The ancient Indian Ayurvedic system of medicine provides comprehensive approaches to respiratory health, including harmonizing the body through herbs, diet, and lifestyle changes [5].

The main objective of this chapter is to discuss the role of Asava and Arishta in Ayurvedic medicine, with reference to the respiratory health of individuals. They are alcohol-based fermented formulations used in Ayurveda to treat a multitude of respiratory conditions. This chapter provides a detailed analysis of the pharmacology of Asava and Arishta, their preparation mechanisms, therapeutic effects, and their present use as compounds to treat respiratory disorders, such as asthma, syndromes of chronic bronchitis, and COPD. This chapter also addresses the market availability of these Ayurvedic medicines and their growing popularity in contemporary health care as alternative treatments.

Respiratory Disorders

Common Respiratory Diseases: The healthcare burden associated with respiratory illnesses is a significant burden worldwide. Some of the most common diseases affecting the respiratory system are asthma, COPD, bronchitis, and pneumonia.

1. Asthma: Asthma is a chronic condition characterized by inflammation and irritation of the airways, leading to wheezing, shortness of breath, chest tightness, and coughing. Asthma attacks are commonly triggered by allergens, cold air, and physical exertion. Although the disease is most prevalent among

children, it can occur at any age [6].

2. Chronic Obstructive Pulmonary Disease (COPD): It is a chronic lung condition that entails emphysema and chronic bronchitis. The main cause of COPD is the frequent exposure to harmful compounds, *e.g*., cigarette smoke or environmental pollutants, which causes irreparable damage to the lungs [7].
3. Bronchitis: It is characterized by swelling of the bronchial tube. It is either temporary or long-term. A persistent cough and mucus are characteristic of chronic bronchitis, as well as a major element of COPD [8].
4. Pneumonia: Pneumonia is a condition characterized by inflammation of the air-filled chambers of the lungs, usually caused by bacteria, viruses, or fungi. Common symptoms include cough, fever, dyspnea, and chest pain [9].

Pharmaceutical treatment, which includes corticosteroids, bronchodilators, and mucolytics, is usually used to treat these conditions. The continued application of these medicines, however, has some side effects, including immune suppression, weight gain, or bone loss. As a result, most people are resorting to alternative or supplementary treatments, including Ayurvedic treatments, to aid respiratory health.

Respiratory Disorders Pathophysiology

The pathophysiology of respiratory disorders is affected by various diseases. Nevertheless, the majority of respiratory disorders are characterized by inflammation and alterations in airway structure, which interfere with normal airflow.

- Asthma: Asthma is characterized by chronic inflammation of the wall of the bronchi, which lose the ability to expand as a result of the contraction of the smooth muscles, edema of the mucosa, and mucous hypersecretion. The cause of this inflammatory process frequently involves an immune response to an allergen, leading to T-helper cell activation and the release of inflammatory mediators, including histamines, cytokines, and leukotrienes [10].
- COPD: COPD is triggered by repeated exposure to irritants (cigarette smoke) that produce relentless inflammation of the lungs. In the long term, this inflammation causes alterations in lung structure, including loss of elasticity and destruction of alveoli (air sacs). This causes impairment of gas exchange, reduced airflow, and breathlessness [11].
- Bronchitis: Bronchitis is a serious condition that causes inflammation of the bronchial tubes, which produce excess mucus. In chronic bronchitis, this inflammation persists, leading to symptoms such as a chronic cough and difficulty clearing mucus from the airways [12].

CHAPTER 8

Asava and Arishta for Lifestyle Diseases

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Abstract: A variety of lifestyle disorders, such as dyslipidemia, obesity, hypertension, diabetes mellitus, *etc*., have emerged as major public health concerns worldwide in recent years. Although numerous allopathic medications have been developed to manage these conditions, several limitations, including poor absorption, drug dependence, and adverse side effects, continue to restrict their therapeutic use. In this context, Ayurveda, a time-tested traditional medicinal system, offers a promising alternative for managing such health concerns. Among its various dosage forms, *Asava* and *Arishta* are traditional fermented herbal formulations widely used in Ayurvedic medicine to treat chronic and lifestyle-related disorders. This chapter provides an overview of the therapeutic role of *Asava* and *Arishta* in managing lifestyle diseases. It begins with a summary of major lifestyle disorders and highlights the need for alternative therapies. The preparation methods and key components of these formulations are described, along with comparisons to contemporary medicines. Pharmacological and clinical evidence indicate the significant potential of *Asava* and *Arishta* formulations in managing lifestyle diseases. The therapeutic efficacy of these formulations is primarily attributed to the presence of diverse bioactive phytoconstituents, including flavonoids, saponins, glycosides, and alkaloids. Despite their established clinical relevance, critical gaps remain in understanding their phytochemical profiles and mechanisms of action, warranting further scientific exploration. Future prospects may include the strategic incorporation of suitable nanocarriers to enhance the therapeutic efficacy of *Asava* and *Arishta* formulations for lifestyle-related health conditions. Furthermore, standardization, stringent quality control measures, and robust regulatory frameworks will be essential to ensure their effective global acceptance as Ayurvedic dosage forms for the management of lifestyle diseases.

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Keywords: *Asava*, *Arishta*, fermented formulations, lifestyle diseases, hypertension, diabetes, Ayurvedic dosage forms, Ayurveda, traditional medicine, inoculum, decoction.

INTRODUCTION

Overview of lifestyle diseases and their impact on health:

The growing number of elderly individuals is an indicator of improved life expectancy. However, lifestyle diseases have increased worldwide across all age groups [1]. In recent years, lifestyle-related disorders have drawn significant global attention, contributing to nearly 70% of all deaths. These disorders represent a major subgroup of Non-Communicable Diseases (NCDs) [2]. According to global health data, approximately 74% of deaths worldwide are attributed to NCDs, emphasizing their substantial role in morbidity and mortality [3]. Lifestyle diseases are primarily associated with an individual's daily habits and behaviors [2]. Millions of people around the world suffer from chronic, lifestyle-related disorders, including obesity, stroke, diabetes, cancer, cardiovascular diseases (CVDs), chronic obstructive pulmonary disease, kidney disease, chronic liver disease, asthma, osteoporosis, dementia, depression, and metabolic syndrome [3]. In India, the prevalence of lifestyle-related conditions, such as obesity, diabetes mellitus, cancer, and CVDs, has risen markedly in recent years (1). Several lifestyle-related factors directly influence human health. For instance, most preventive measures for CVDs are based on lifestyle modification, particularly dietary interventions. A heart-healthy diet can effectively manage key cardiometabolic risk factors, including dyslipidemia, abdominal obesity, hypertension, and diabetes [4]. Furthermore, sedentary habits, aging populations, and increasing obesity rates among both adults and children have collectively accelerated the global rise in diabetes. Diabetes is associated with multiple macrovascular and microvascular complications, including Coronary Heart Disease (CHD), Heart Failure (HF), stroke, renal disease, Peripheral Artery Disease (PAD), Diabetic Retinopathy (DR), and Cardiac Autonomic Neuropathy (CAN). Poor lifestyle practices significantly contribute to the progression and severity of these complications [5]. In addition, mental health disorders have become the leading causes of disability worldwide. Despite advances in psychotropic medications and psychotherapy, the overall prevalence of depression has not declined. Consequently, the global burden of diabetes and associated disorders is expected to continue increasing [6]. Over the decades, researchers have documented exceptional therapeutic responses and survival outcomes in cancer patients, highlighting the influence of individual metabolic and lifestyle factors [7]. Common chronic metabolic disorders, such as obesity, hyperglycemia,

hypercholesterolemia, hypertension, hyperuricemia, hypertriglyceridemia, and fatty liver pose serious health threats when left unmanaged [8]. Despite the rising prevalence of lifestyle disorders, effective management is achievable by reducing or eliminating modifiable risk factors. A combination of early-stage pharmacological interventions and lifestyle-based, non-pharmacological therapies can help prevent and control these diseases, ultimately improving the quality of life [3]. Accordingly, this chapter focuses on lifestyle diseases and explores Ayurvedic alternatives, particularly *Asava* and *Arishta*, for their effective management and prevention.

Need for Alternative and Complementary Medicine in Lifestyle Diseases

Maintaining a healthy lifestyle is a primary goal for most individuals. However, many people fail to adhere to consistent healthcare routines, leading to an increased prevalence of lifestyle-related diseases. One of the most promising alternatives for managing these conditions is Complementary and Alternative Medicine (CAM), whose global adoption has increased significantly in recent years. Despite its growing popularity, CAM remains inadequately explored in terms of scientific validation and clinical integration [9]. In brief, CAM refers to therapeutic practices that are not part of conventional medicine but are often influenced by traditional systems of healing [10]. It is frequently used in conjunction with standard medical treatments to manage various health conditions. CAM therapies are particularly common among children and the elderly for treating infections, chronic pain, cancers, and disorders of the circulatory, digestive, nervous, and respiratory systems. Children and adolescents suffering from chronic pain, infections, malignancies, or disorders of the skin, gastrointestinal tract, hematological system, or nervous system are often treated using Complementary, Alternative, and Integrative Medicine (CAIM) approaches. Common CAIM modalities in pediatric care include acupuncture, herbal medicine, homeopathy, massage therapy, naturopathy, therapeutic touch, relaxation techniques, and guided visualization [11]. Women with Polycystic Ovary Syndrome (PCOS) are particularly susceptible to mineral and vitamin deficiencies, which are often associated with psychological conditions such as anxiety and depression, as well as physiological complications like diabetes, insulin resistance, and infertility. In recent years, several Traditional, Complementary, and Integrative Medicine (TCIM) approaches have been integrated into modern PCOS management. These interventions encompass nutritional therapy, psychological support, and physical therapy. Nutritional therapies may involve specialized diets, herbal formulations, nutritional supplements, probiotics, microbial therapies, and botanical medicines. Psychological treatments often include music therapy, massage, relaxation

CHAPTER 9

Insight into Fermentation Technology Involved in the Making of Ancient Formulations

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Abstract: Ancient formulations are preparations made from natural ingredients. The release of active constituents from these components is significant. Fermentation techniques have been and continue to be used to achieve this goal in many formulations. Fermentation is a metabolic process in which microorganisms (primarily bacteria and yeasts) break down organic compounds in the absence of oxygen, resulting in complex chemical transformations. The fermentation technology in ancient formulations is a blend of empirical knowledge and its practical applications. They are confirmation of human skills in using controlled natural processes for practical purposes. These methods are simple but highly effective in the hands of skilled ancient artisans. They demonstrate a deep understanding of natural processes and a remarkable ability to adapt to available resources. Archaeological data and ancient texts provide evidence of sophisticated fermentation practices in various civilizations. Ancient civilizations employed a variety of methods to facilitate and control fermentation, even without the modern scientific understanding of microbiology. Ancient civilizations developed sophisticated techniques to harness these microbial processes through empirical observation and knowledge. These processes exemplify humans' early scientific creativity in transforming organic materials through controlled microbial involvement. The processes have evolved, and a lot of sophistication has been incorporated to achieve better results.

Keywords: Ayurvedic formulation, fermentation, asava, arishta, natural inoculation.

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INTRODUCTION

Basic Definitions of Fermentation Technology and Ancient Formulations

Ancient knowledge was primarily developed through observations and experience, and knowledge was passed down through generations. The knowledge is also updated, and techniques are refined as the new generation adds to their observations and experiences. Fermented products have played a significant role in cultural and religious ceremonies. Ancient texts from various civilizations provide significant information regarding fermentation practices. The Vedic texts from India describe the preparation of fermented beverages and medicinal formulations with better shelf life and potency. These historical records indicate that ancient people possessed an understanding of fermentation gained through experience, though they were unable to understand the underlying scientific principles of microbiology. Fermentation technology has evolved from ancient empirical practices to modern scientific methods, but the fundamental principles remain unchanged.

Fermented pharmaceutical formulations represent an important category of medicines across various traditional and modern medical systems. These preparations leverage microbial fermentation to enhance therapeutic properties, improve stability, and/or create entirely new bioactive compounds.

Ayurveda, an Indian traditional system of medicine, is now used in many countries for various ailments and disorders. The principle of Ayurveda is based on the balance between relationships within the body and mind. There are many formulations in Ayurveda like *churna* (powders), *kwatha* (decoctions), *asava* and *arishta* (fermented liquids), *taila* (oils), *ghrita* (medicated ghee), *avaleha* (herbal jams), *bhasma* (ash preparations), and *vati/gutika* (tablets/pills). The fermented formulations are recognized by different names in traditional practices of different countries, like in India asava, arishta, and chukra in **ayurvedic practice**, in **Chinese Medicine**, the herbal preparations are prepared by a process known as *paozhi*, and medicated wines or tonic wines with the name *yaojiu* are also available, while in African traditional preparation, fermented formulations are known as *muthi*.

Preparation techniques in ancient times were protected and transmitted through the *Guru-Shishya Parampara*, family traditions, or regional specialization. *Guru-Shishya Parampara* is a traditional teacher-disciple lineage, family traditions, such as those of the Vaidya family, and regional specialization, in which different areas develop distinct variations.

The ayurvedic text of India defines the use of these fermented formulations to treat a wide range of ailments. The details are elaborated in Chikitsa Sthana, the sixth section of Charak Samhita, which primarily deals with the prevention, treatment, and management of various diseases. Some of the effects associated with these formulations include hepatoprotective, antioxidant, antiepileptic, anti-inflammatory, antimicrobial, antidiarrheal, CNS depressant, cardioprotective, antidiabetic, acid-protective properties, as well as benefits for acid-peptic diseases, heart disease, and urinary tract issues. Ayurvedic medicinal preparations, such as Asava and Arishta, are characterized by their self-generated alcohol content. The alcohol is produced *in situ* through fermentation, and this process contributes to their enhanced therapeutic properties and extended shelf life. Arishta, one of the fermented preparations, is prepared from a decoction (kashaya) of herbs, in which the herbs are boiled in water to extract their medicinal constituents before fermentation begins. Asava, however, is prepared using fresh herbal juices or powders. The herbs in Asava are added directly to the fermentation vessel without prior decoction. Asava and Arishta both rely on fermentation, in which sugars or jaggery are added to facilitate alcohol production. The alcohol produced acts as a solvent, extracting and preserving the active herbal constituents. The enhanced therapeutic efficacy of these products is due to the combined effects of the herbs and their various fermentation products. The self-generated alcohol has additional benefits as it acts as a natural preservative, giving Asava and Arishta a long shelf life.

Historical Insights

Asavas and Arishtas are among the oldest medicinal preparations in traditional ayurvedic medicine; they have been used for thousands of years in the Indian subcontinent. Their use dates back to the Vedic period (1500-500 BCE), but systematic documentation began much later.

Archaeological Evidence

The use of fermentation in earlier times was not explicitly intended for therapeutic purposes; however, many fermented foods, with or without alcohol, that were widely consumed worldwide, were later analyzed for their therapeutic properties. Through careful observation of their effects on the human body, their application in specific ailments was identified. This conceptual framework was highly developed, as treatments were selected based on the affected organs and the intrinsic properties of the products, such as alkaline or astringent nature.

CHAPTER 10

In-Silico Approaches to Asava and Arishta for Understanding the Mechanism of Action

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Abstract: Ayurveda, in particular Asava and Arishta, has played a significant role in providing health care for humanity over centuries. The efficacy enhancement of the ayurvedic formulations attributed to the herb's bioactive compounds requires mechanistic explorations. The polyherbal complexity also requires experimental explorations to confirm their possible mechanism through scientific validation. Drug repurposing, reverse pharmacology, and polypharmacology in Ayurveda are areas for *in-silico* explorations to acquire and provide insights into the functions and mechanisms of action. *In-silico* approaches, namely network pharmacology, homology modelling, molecular docking, and molecular dynamics simulation, have been reported in scientific publications, with emphasis on the interactions between phytochemicals and therapeutic targets. The computational methods allow for cost-effective, efficient screening of multicomponent polyherbal formulations, combining the benefits of both *in vitro* and *in vivo* studies. Referring to these aspects, this chapter focuses on insights into *in silico* approaches in Ayurveda, particularly regarding Asava and Arishta formulations, and describes their global acceptance in a structured manner. This chapter includes principles of *in-silico* techniques employed in analyzing traditional medicine formulations. This chapter also describes the significance of Asava and Arishta and challenges in implementing in-silico approaches.

Keywords: Arishta, Asava, polyherbal formulations, computational methods, drug repurposing, *in-silico* approaches, molecular docking, network pharmacology.

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INTRODUCTION

Traditional alternative medicine has played a pivotal role in maintaining homeostasis, vitality, and radiance across human civilization for millennia. Natural products derived from plants, animals, and microorganisms form the foundation of these traditional healing systems [1]. The chemical diversity of natural products makes them invaluable for modern drug discovery, as they exhibit unique structural properties, target (receptor) selectivity, defence against dangers (*e.g*., virus, herbivores), drug-like properties, and established safety profiles from centuries of use [2]. Traditional medicine systems, including Ayurveda, Siddha, and those based on natural products, are used worldwide. According to the World Health Organization (WHO), approximately 80% of the Indian population relies on traditional systems of medicine.

Ayurvedic Medicines

Ayurveda continues to be a key traditional medicine system worldwide, as recognized by the WHO. Ayurveda has gained global recognition for its efficacy in managing various ailments [3, 4]. The Ayurvedic Pharmacopoeia features diverse dosage forms, including *Churna* (powders), *Vati/Gutika* (pills and tablets), *Avaleha/Lehya* (semisolid preparations), *Rasa Rasayan* (mineral-based drugs), and *Bhasma* (calcined metallic/herbal preparations).

Advantages

a. Ayurvedic formulations demonstrate remarkable therapeutic versatility, effectively addressing a broad spectrum of conditions.
b. Clinical applications extend to dermatological, reproductive, and pediatric health as well as emergency management of snake bites and common ailments [5].
c. The multi-target therapeutic action of polyherbal formulations is based on the fundamental Ayurvedic principle of tridosha balance [6].

Fermented Formulations

Ayurvedic formulations are prepared by extracting phytopharmaceuticals using various processes. Sandhana Kalpana is one of the unique fermented ayurvedic formulations. It includes asava, arishta, and kanji. In this preparation procedure, ethanol released during the process will be used for alcohol-based formulations. The alcohol-based products are called ‘Madya' and offer a longer shelf life, along with better absorption and efficacy. Ayurvedic literature contains around 89

fermented formulations. Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya are three classics of Ayurveda, documented in the Brihat Trayee [7].

Asava and Arishta

The Ayurvedic Formulary of India (Parts I and II), published by AYUSH, Govt. of India, describes the therapeutic importance of Asava and Arishta. Asava and Arishta refer to fermented medicinal products produced during fermentation with the aid of alcohol and are recognized in Rasashastra.

Asava: It is also known as fermented infusions, prepared by the fermentation of a mixture of herbs, water, and sugar. Asava medicines for the treatment of disorders associated with the nervous, circulatory, and excretory systems gained greater importance.

Arishta: It is also known as fermented decoctions, prepared from the herbal decoctions, dhataki (fermentation initiator), and sugar. In general, arishta products have a longer shelf life.

Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya contain the composition and therapeutic properties of Asava (45 products) and Arishta (44 products). Asava and Arishta formulations have been used for the treatment of disorders associated with almost all the human systems, including the gastrointestinal, respiratory, cardiovascular, neurological, and reproductive disorders, and urinary tract ailments. Most importantly, they are useful for immune disorders, poisonous bites, and alcoholism. Asava and Arishta formulations in a mixture with an equal volume of water are indicated after breakfast and dinner [8].

Advantages

a. Asava and Arishta offer increased therapeutic efficacy, enhanced stability, favourable safety, and superior palatability profiles [9, 10].
b. The alcohol-aqueous nature of Asava and Arishta ensures effective drug delivery and absorption.
c. Asava and Arishta are therapeutically superior compared to non-fermented Ayurvedic preparations.

Various fermented formulations with their therapeutic potential [11, 12] are summarized in Table **1**.

CHAPTER 12

A Review of Some Global Traditional Medicated Fermented Formulations Resembling Medicated Wines of the Indian System of Medicine

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Abstract: Traditional fermented medicinal formulations have been integral to diverse cultural health systems across the globe, which share similarities with Indian medicated wines, such as *Asava* and *Arishta* from *Ayurveda*. Therefore, the present book chapter explores the global landscape of such fermented products, focusing on their preparation, microbial dynamics, bioactive potential, and cultural relevance. This chapter presents in-depth case studies of traditional dairy-based fermented drinks like *Mongolian Airag, Khoormog*, and *Tibetan Chigee*, highlighting their functional microbiota, volatile profiles, and therapeutic claims. Distilled products, such as *Shimiin Arkhi* and *Arak,* and grain-based fermented beverages like *Chang, Chicha, Borde, Shamita*, and *Umqombothi,* are explored for their ceremonial, nutritional, and medicinal values. Additionally, in this chapter discusses South American beverages, such as *Aloja, Cauim,* and *Pulque,* and African products, like *Palm Wine* and *Areki*, emphasizing natural fermentation techniques using indigenous starter cultures. These formulations often rely on spontaneous or culturally inherited fermentation practices involving cereals, tubers, fruits, and herbs, offering probiotic benefits, boosted nutrient bioavailability, and potential therapeutic properties. However, variability in preparation, absence of standardization, and inconsistent safety measures pose challenges. Overall, it underscores the prerequisite to scientifically validate these fermented formulations,

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standardize microbial content, and explore their potential integration into modern therapeutic systems while respecting traditional knowledge systems.

Keywords: Medicated wines, fermented herbal formulations, *Asava*, *Arishta*, ethnopharmacology.

INTRODUCTION

Overview of Traditional Fermented Medicinal Formulations

In recent times, the side effects linked with modern medicine have driven attention to alternative treatments. Consequently, traditional systems like *Ayurveda* gaining increased recognition both in India and globally [1]. In brief, traditional medicine has long been used for managing numerous health situations [2]. It plays a substantial role not only in curing diseases but also in preventing them. As a result, it contributes substantially to achieving and maintaining good health [3]. Tracing back to 900 BC, *Ayurveda* is one of the world's oldest documented medicinal systems. It serves as a highly effective substitute for modern therapies. This makes India a major contributor to the global traditional medicine system [4]. It has been described that *Ayurveda* is a science deeply rooted in antiquity. It has served humankind for over 5000 years and encompasses aspects of healing, longevity, and disease prevention [5]. One of the distinctive approaches of *Ayurveda* is its use of fermentation in drug preparation, a method not frequently employed in other medical systems [6]. Historically, fermentation has been used extensively not only in drug preparation but also in food production. In many cultures, fermented foods and beverages constitute approximately 5-40% of the diet [7]. It is believed that fermentation techniques were discovered and widely practiced throughout Indian civilization, dating back to the Vedic period [8]. According to Chinese literature, fermentation is one of the oldest processing methods developed alongside human civilization [9]. In India, Ayurvedic fermented formulations have found widespread acceptance due to their numerous benefits, including the low cost, favorable taste, absence of preservatives, and effective therapeutic results. A critical step in these formulations is the self-generation of alcohol during fermentation, which plays a key role in extracting plant-based therapeutic constituents into the liquid medium [10]. In conclusion, traditional fermented medicinal formulations have played a vital part in sustaining health and treating diseases for centuries. With growing awareness of the limitations of modern medicine, systems like *Ayurveda* are being embraced globally. The exceptional benefits offered by fermentation, particularly the self-generated alcohol's role in enhancing therapeutic efficacy, underscore the enduring relevance of these formulations in both traditional and modern healthcare settings.

Concept of medicated wines in *Ayurveda* (*Asava-Arishta*)

Medicated wines, such as *Asava* and *Arishta,* hold a prominent position in Ayurvedic pharmaceutics owing to their rapid therapeutic action and excellent preservation properties. In this case, during natural fermentation, sugars are transformed into alcohol and carbon dioxide, with the produced alcohol serving a dual function. In brief, it facilitates the extraction of active phytoconstituents and acts as a self-preserving agent that defends the formulation from microbial contamination. Thereby, it guarantees long-term stability. The fermentation method used to formulate these medicated wines offers several benefits for herbal drug development. It augments bioavailability by breaking down unwanted sugars and reducing gastrointestinal side effects, such as gas and bloating. Unlike conventional extraction methods, fermentation enables the extraction of a broader range of active compounds due to dynamic alcohol concentration gradients. Moreover, yeast used in fermentation can naturally sequester and eradicate heavy metals and pesticide residues, functioning as a detoxifying agent. This process can also diminish the toxicity of certain plant constituents. Fermentation aids in the breakdown of plant cell walls, which enhances the release of bioactive compounds. These are then effectively transferred into the solvent medium through microbial enzymatic activity and active transport mechanisms [11]. To summarize, *Asava* and *Arishta* represent a sophisticated approach to herbal drug delivery in *Ayurveda*. The natural fermentation process of medicated wines not only enhances the extraction and preservation of active ingredients but also supports detoxification and reduces side effects. Their design echoes an advanced understanding of pharmacological principles, highlighting the scientific depth embedded in traditional Ayurvedic practices.

Significance of fermentation in herbal medicine

According to Ayurvedic principles, fermentation significantly augments the therapeutic efficacy of herbal drugs. It modifies the phytochemical content of herbs, both quantitatively and qualitatively, consequently improving their medicinal potential. The fermentation process ruptures plant cells, facilitating the release of active constituents for biotransformation. This cellular decomposition leads to the leaching of phytochemicals, increasing their concentration and converting them into safer, more effective metabolites. These transformed metabolites often function as novel therapeutic agents for treating numerous ailments [12]. Furthermore, fermented formulations, such as medicated wines, have been shown to enhance shelf life, palatability, bioavailability, and overall therapeutic efficacy. They are capable of removing heavy metals from herbal raw

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