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Asian Fermented Herbal Drinks: Traditional Practices, Health Benefits, and Microbial Cultures

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ABSTRACT

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Keywords:

Asian fermented herbal drinks Traditional practices Health benefits Microbial cultures Asian fermented herbal drinks, rooted in traditional practices, have gained attention for their potential health benefits and cultural significance. These beverages, produced through fermentation of herbs and plant extracts using specific microbial cultures, offer enhanced nutritional and medicinal properties. The fermentation process preserves herbs and transforms their chemical composition, potentially increasing health benefits. This review explores Asian fermented herbal drinks from the Philippines, Indonesia, China, India, Korea, and Southeast Asia. The health benefits, including antioxidant and antiinflammatory properties, probiotic effects on gut health, anticancer and anti-tumor potential, cardiovascular and metabolic health improvements, and immune system support, are discussed. Traditional preparation methods and cultural significance are highlighted, emphasizing fermentation techniques, herbal combinations, and historical context. The role of microorganisms in fermentation is examined, focusing on their contribution to flavor, preservation, and enhancement of functional properties. Despite potential benefits, challenges related to ingredient guality and safety require attention for industrial growth. Integrating traditional knowledge with modern scientific approaches is crucial for developing innovative, health-promoting fermented herbal drinks for local and global markets.

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1. INTRODUCTION

Fermented herbal drinks in Asia hold significant potential due to their health benefits, cultural significance, and growing consumer interest in functional beverages. The COVID-19 pandemic has heightened awareness of immune-boosting foods, and fermented products, including herbal drinks, have been recognized for their potential to enhance immunity and provide antioxidant benefits, which are crucial in disease prevention[1]. The fermentation of herbs such as Cymbopogon citratus, Zingiber officinale, and Curcuma longa has shown promising results in enhancing the phytochemical content and antioxidant activity of beverages, making them appealing to health-conscious consumers [2]. Traditional fermentation practices in Asia, such as those involving root and tuber crops, are well-established and contribute to food security and nutrition, offering a model for developing new fermented herbal drinks[3]. Moreover, the use of specific microbial strains, like *Lactobacillus*

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plantarum, in fermenting herbal mixtures can enhance the pharmacological properties of these products, as seen in the fermentation of Danggui Buxue Tang, which improved its anti-diabetic functions [4]. The ethnobotanical knowledge of fermentation starters, such as those used by the Chuanqing people in China, highlights the diversity and potential of traditional fermentation techniques to create unique flavors and health benefits in herbal drinks [5]. Despite the potential, there are challenges related to ingredient quality and safety, which require attention to ensure the industrial growth of fermented herbal beverages[6]. By providing a comprehensive overview of Asian fermented herbal drinks, this review aims to highlight their potential as innovative, health-promoting beverages. It seeks to bridge the gap between traditional wisdom and modern scientific understanding, potentially paving the way for the development of new functional foods and nutraceuticals. The paper concludes by outlining future research directions and the potential impact of these beverages on nutrition, health, and the preservation of cultural heritage.

2. METHOD

A comprehensive literature review examined Asian fermented herbal drinks, using peerreviewed articles, books, and scientific reports. The investigation searched PubMed, Web of Science, Scopus, and Google Scholar databases, using terms like "Asian fermented drinks", "herbal fermented beverages", "traditional fermented drinks", with country names and drink types. The review considered English-language publications from 2000 to 2023, focusing on original research articles, systematic reviews, and meta-analyses. Ethnobotanical studies and cultural reports were also consulted for traditional knowledge and practices. The literature was analysed to extract information on: 1. The diverse types and varieties of Asian fermented herbal drinks; 2. Traditional preparation techniques and their cultural significance; 3. Health advantages and bioactive components; 4. Microbial cultures involved in the fermentation process; 5. Challenges and future prospects. The data was synthesised to provide an overview of the current understanding of Asian fermented herbal drinks, including preparation methods, health benefits, and cultural importance. The review identified gaps in existing research and potential areas for future investigation.

3. RESULTS AND DISCUSSION

3.1. Asian Fermented Herbal Drink

Asian fermented herbal drinks encompass a diverse range of beverages that are deeply rooted in traditional practices and are known for their health benefits. These drinks are typically made by fermenting various herbs and plant extracts, often using specific microbial cultures to enhance their nutritional and medicinal properties. The fermentation process not only preserves the herbs but also transforms their chemical composition, potentially increasing their health benefits. Below are some notable types of Asian fermented herbal drinks, each with unique ingredients and preparation methods.

NO	Country part		Types	Description
1.	Piliphines	fermented	Basi	This sugarcane wine is traditionally produced in the
	herbal drink			llocos region. It is characterised by its distinctive
				flavour, which is achieved through the fermentation
				of sugarcane juice with indigenous yeasts[7]
			Tuba and Lambanog	Tuba is a palm wine derived from the sap of
				coconut or nipa palm, while lambanog is a distilled
				variant of tuba, often referred to as coconut vodka.
				These beverages are prevalent in rural areas and
				are integral to social gatherings[7]
			Cola Pala	An innovative fermented herbal beverage
				produced from nutmeg fruit syrup. This drink is
				developed to enhance the economic value of local
				products in Tanggamus, Indonesia, with similar
				practices observed in the Philippines utilising local
				fruits [8]
			Herbal Soft Drinks	I hese beverages incorporate various herbs known
				for their potential health benefits, such as
				nepatoprotection and immune ennancement.
				ingredients such as Phylianthus and Glycyrrniza
~	Indepedent	for more or not or al	Curran Karahusha	glabra are utilised in these formulations[9]
Ζ.	Indonesian	rermented	Synom Kambucha	Sinom kompucha is made from young tamaring
	nerbai unink			eaves, turmenc, and sugar, termented with a
				for action down. The entired concentration of
				for seven days. The optimal concentration of

Table 1. The types of Asian fermented herbal drink

			tamarind leaves for fermentation is 0.6%, which results in a pH of 3.81 and a total phenol content of
			240.9 μg GAE/mL. The fermentation process enhances the antioxidant and antibacterial properties of the drink. It shows significant antibacterial activity against <i>E. coli</i> and S. aureus, with inhibition zones of 3.1 mm and 3.27 mm, respectively [10]
		Turmeric Kombucha	The antioxidant activity of turmeric kombucha increases with fermentation time, with free phenol levels contributing to its high antioxidant content, comparable to vitamins C and E [11]
		Kolesom	This Javanese wine, made with ginseng and other ingredients, contains 5-20% ethanol. Ensuring the halal status of such drinks is crucial in Indonesia,
3.	Chinese Herbal Fermented Drinks	<i>Chelidonium majus</i> and Other Herbs	where the majority of the population is Muslim [12] A fermented beverage using <i>Chelidonium majus</i> , <i>Sepiae Os, Lycii Fructus</i> , and other herbs is known for its gastrointestinal benefits. It is fermented with lactic acid bacteria, which aids in protecting the stompth and regulating the intentions[12]
		Health-Care Wine	This drink includes ingredients like gynostemma pentaphyllum and rhizoma dioscoreae, fermented to produce a wine that reduces blood fat and prevents arteriosclerosis. It retains natural nutrients and is rich in polysaccharides and amino
		Probiotic Herbal Composition	acids [14]. A composition using <i>radix pueraiae</i> and other herbs is fermented with probiotics to protect the liver and dispel alcohol effects. It is beneficial for regulating intestinal flora and has detoxifying properties[15]
		Jiuqu of the Chuanqing People (Traditional Fermentation Practices)	This traditional fermentation starter uses plants like Ficus tikoua and Buddleja macrostachya, with a microbial community that includes Gluconobacter japonicus and Rhizopus oryzae. It is used to make local fermented drinks with unique flavors and health henofitfel
4.	Indian Fermented Herbal Drinks	Asava and Arishta	These are traditional Ayurvedic fermented formulations made by fermenting herbal juices or decoctions with sugars. They are known for their stability, palatability, and lack of side effects, making them popular in Ayurvedic medicine[16], [17]
		Traditional Fermented Beverages	The Indian subcontinent boasts a diverse array of traditional fermented beverages, each holding cultural and regional importance. These include libations such as Haria, Chhang, and Sura, which are crafted using indigenous ingredients and time-honoured fermentation methods. These drinks are frequently consumed during customary rituals and are esteemed for their nutritional and medicinal qualities[18] [19]
		Herb-Based Fermented Drinks	Contemporary research has delved into the fermentation of herbs including <i>Cymbopogon citratus</i> , <i>Zingiber officinale</i> , <i>Moringa oleifera</i> , Mentha, and <i>Curcuma longa</i> . These beverages are distinguished by their antioxidant properties and enhanced taste profiles following fermentation[2]
5.	Korean Fermented Herbal Drink	Herbal Medicine Fermented Tea	This tea includes ingredients like betony, Atractylodes japonica, and Zingiber officinale, fermented with Bacillus licheniformis. It is known for its health benefits and is prepared by fermenting the mixture at controlled temperatures[20]
		Herbal Fermented Beverages	These beverages are made using herbs like Cymbopogon citratus, Zingiber officinale (ginger), Moringa oleifera, Mentha (mint), and Curcuma longa (turmeric). The fermentation process, typically involving Saccharomyces cerevisiae yeast, results in significant changes in the

6.	Southeast Asian Herbal Fermented Beverages	Herbs like Cymbopogon citratus and Zingiber officinale	beverage's physicochemical properties, such as pH, soluble solids, and antioxidant activity[2] These herbs are fermented using <i>Saccharomyces</i> <i>cerevisiae</i> yeast, resulting in beverages with enhanced antioxidant activity and improved flavor. The fermentation process significantly alters the phytochemical content, making these drinks appealing for health-conscious consumers[2]

While these fermented herbal drinks are celebrated for their health benefits, it is important to consider the cultural and traditional contexts in which they are consumed. The fermentation process not only enhances the nutritional profile of these beverages but also preserves traditional knowledge and practices. However, the scientific validation of health claims and the standardization of preparation methods remain areas for further research and development.

3.2 Health Benefits of Asian Fermented Herbal Drinks

Asian fermented herbal drinks represent a promising area of research and development, with significant potential for improving human health and well-being. These beverages combine the health-promoting properties of herbs with the beneficial effects of fermentation, resulting in drinks that are both nutritious and therapeutic



Figure 1. The Health benefits of Asian Fermented Herbal Drink

3.2.1 Antioxidant and Anti-Inflammatory Properties

Fermented herbal drinks are abundant in antioxidants, which perform a critical function in mitigating oxidative stress and inflammation within the body. For instance, Kombucha, a fermented tea beverage, contains antioxidants that contribute to cellular protection[21]. Similarly, fermented soybean products have demonstrated anti-inflammatory properties, which may potentially reduce the risk of chronic diseases [23]

3.2.2 Probiotic Properties and Gut Health

Numerous Asian fermented herbal drinks contain probiotics, which are advantageous for gut health. Probiotics in these beverages can enhance the immune system, improve digestion, and synthesise vitamins. For example, Lactobacillus acidophilus, a common probiotic found in fermented drinks, has been demonstrated to promote digestive wellness and enhance immunity [24]. Furthermore, the fermentation process in herbal drinks can generate bioactive compounds that support gut microbiota balance[25], [26]

3.2.3 Anti-Cancer and Anti-Tumour Effects

Several studies suggest that fermented herbal drinks may possess anti-cancer properties. For example, Jaeumganghwa-Tang, a traditional Korean herbal formula, has been shown to induce apoptosis in cancer cells when fermented with Lactobacillus acidophilus[27]. Similarly, Kombucha tea has been reported to have anti-tumour effects, although further research is necessary to confirm its efficacy in humans [21]

3.2.4 Cardiovascular and Metabolic Health

Fermented herbal drinks may also contribute to cardiovascular health by reducing cholesterol levels and blood pressure. For instance, certain fermented soybean products have

been shown to lower cholesterol and improve lipid metabolism[22]. Additionally, some herbal fermented beverages, such as those containing Rhodiola rosea, have been reported to reduce body weight and improve metabolic health [14]

3.2.5 Immune System Support

The bioactive compounds in fermented herbal drinks can enhance immune function. For example, Kombucha tea has been shown to improve antioxidant activity, which plays a role in immune system support [21]. Similarly, fermented herbal wines, such as those made from *Polygonum multiflorum*, have been reported to strengthen organic immunity[14].

3.3 Traditional Preparation and Cultural Significance

3.3.1 Traditional Fermentation Techniques

Asian fermented herbal beverages frequently employ traditional fermentation methods that have been transmitted through generations. The preparation of Kombucha tea, for instance, involves the utilization of a symbiotic colony of bacteria and yeast (SCOBY) to ferment sweetened black tea (Bajpai & Pandey, 2022). Similarly, traditional Korean fermented teas, such as those derived from Betony and Atractylodes japonica, utilize Bacillus licheniformis for fermentation [20]

3.3.2 Use of Herbal Combinations

Numerous Asian fermented herbal beverages are composed of a combination of herbs, each selected for its specific health benefits. For example, a fermented wine produced from Polygonum multiflorum, Rhodiola rosea, and other herbs has been reported to possess multiple health benefits, including nourishing the liver and kidneys, and improving visual acuity[14]. Similarly, traditional Japanese fermented products, such as miso and natto, are produced from mixed cultures of microorganisms and have demonstrated beneficial effects on metabolism and the immune system [28].

3.3.3 Cultural and Historical Context

Fermented herbal beverages possess deep cultural and historical roots in Asia. For instance, Kombucha tea has been consumed for centuries in China and has recently gained popularity globally for its purported health benefits[21]. Similarly, traditional Korean herbal teas, such as those derived from Taraxacum mongolicum, have been utilized for their medicinal properties for generations [20]

3.4 Microorganisms in Fermented Herbal Drinks

Microbial culture in fermented herbal beverages entails the utilisation of specific microorganisms to enhance the organoleptic properties, nutritional value, and potential health benefits of the beverage. These beverages are typically produced through the fermentation of plant extracts or herbal components with selected microbial strains, which may include yeasts, bacteria, and fungi. The fermentation process not only contributes to the distinctive flavour and aroma of the beverage but also augments its functional properties through the production of bioactive compounds.

No	Microorganism	Genus	Species
1.	Bacteria	Lactobacillus	Lactobacillus homohiochii Lactobacillus fructivorans[29]
		Acetobacter	Acetobacter pasteurianus[30]
		Pediococcus	Pediococcus pentosaceus[31]
2.	Yeast	Saccharomyces	Saccharomyces cerevisiae[2]
		-	Schizosaccharomyces pombe[30]
		Candida	Candida zeylanoides
			Candida lactis [29]
3.	Fungi	Rhizopus	Rhizopus oryzae[5]

Yeasts and Bacteria are commonly used microorganisms in the fermentation of herbal drinks. These microorganisms are responsible for the production of alcohol and acetic acid, which are crucial for the development of flavor and preservation of the drink [29], [30]. Another ones is Fungi, fungal are also involved in some fermentation processes, contributing to the breakdown of complex compounds and enhancing the nutritional profile of the drink[31], [32]

4. CONCLUSION

Asian fermented herbal beverages offer distinct health advantages and cultural importance. The fermentation process enhances the nutritional and medicinal properties of herbs and plant extracts, thereby increasing their antioxidant, anti-inflammatory, probiotic, and anti-carcinogenic potential. Notable examples include Basi, Tuba, Sinom Kombucha, Kolesom, Asava, and Arishta. Traditional fermentation techniques and herbal combinations are integral aspects of these beverages, with microorganisms such as yeasts, bacteria, and fungi playing pivotal roles in the fermentation process. The potential and advantages of this fermented herbal beverage warrant its widespread recommendation. This fermented herbal concoction preserves cultural traditions and offers potential health benefits for consumers. The integration of traditional knowledge and modern scientific approaches further contributes to the understanding and appreciation of these culturally significant and health-promoting beverages.

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