

REVIEW ARTICLE

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Bir jawa: history, gastrodiplomacy, and health benefits of a Javanese non-alcoholic beverage

Andri Frediansyah^{1,2*}

Abstract

Bir jawa is a traditional non-alcoholic beverage from Java, Indonesia, renowned for its unique combination of aromatic herbs and spices, such as ginger, cardamom, cloves, sappan wood, cinnamon, lemongrass, lime juice, and sugar (either rock or granulated). Supplementary ingredients such as pandan leaves, alang-alang (*Imperata cylindrica*), black pepper, nutmeg, and galanga enhance their intricate flavor and fragrance. Notwithstanding its designation—signifying “Javanese beer”—*bir jawa* is non-fermented and was initially developed in the Yogyakarta Palace. Nonetheless, despite its cultural significance, *bir jawa* has garnered minimal academic scrutiny relative to other Indonesian herbal beverages, resulting in a considerable void in the recorded ethnogastronomic literature. Each ingredient, abundant in bioactive substances, reinforces the beverage’s conventional function in enhancing health and well-being. Since its inception, *bir jawa* has epitomized cultural identity and functioned as a medium of gastrodiplomacy. This article comprehensively examines and synthesizes the historical, cultural, and scientific information pertaining to *bir jawa*. It examines its historical context, cultural importance, composition, preparation techniques, health advantages, and modern advancements. This review’s primary contribution is its thorough synthesis, which establishes *bir jawa* as a distinctive topic for gastrodiplomacy and a beneficial beverage deserving of further advancement and international promotion.

Keywords Secang drink, *Bir jawa*, Non-alcoholic beverage, Spices drink, Herbal drink

Introduction

Indonesia is one of the most ethnically and culturally diverse countries in the world. It has more than 17,000 islands [1]. Home to more than 1,200 ethnic groups and over 700 regional languages [2], Indonesia’s culinary heritage is deeply intertwined with local ecological knowledge, cultural traditions, and ancestral health practices.

This diversity is embodied in the national motto, *Bhinneka Tunggal Ika*—“Unity in Diversity”—a principle vividly expressed through its vibrant food culture.

Among Indonesia’s culinary hubs, Yogyakarta shines for its rich gastronomic legacy and dynamic culinary tourism. The city offers more than just flavors; it presents an immersive cultural experience where traditional foods and beverages serve as profound expressions of local identity and heritage [3]. Traditional drinks in particular hold special cultural and health significance, valued for their ceremonial roles and their plant-based, health-promoting ingredients [4, 5]. Globally, there is increasing scholarly interest in such traditional beverages—from *wedang uwuh* to kvass—positioning them within the categories of ethnic foods and functional foods due to their

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cultural significance and potential health benefits derived from bioactive compounds [6–13]. Furthermore, the use of food and drink as tools of "gastrodiplomacy" has emerged as a significant field of study, highlighting their role in soft power and cross-cultural communication [14–16].

A standout example is *bir jawa*, a non-alcoholic, spice-infused beverage rooted in Javanese tradition. Despite its name—literally "Javanese beer"—*bir jawa* contains no alcohol. It is crafted by simmering a blend of aromatic spices and botanicals, traditionally identified based on morphology, including ginger (*Zingiber officinale*), Java cardamom (*Wurfbainia compacta*), cloves (*Syzygium aromaticum*), sappan wood (*Caesalpinia sappan*), cinnamon (*Cinnamomum verum*), lemongrass (*Cymbopogon citratus*), and lime juice (*Citrus aurantiifolia*), sweetened with palm sugar. Regional variations may incorporate additional ingredients such as pandan leaves (*Pandanus amaryllifolius*), alang-alang grass (*Imperata cylindrica*), black pepper (*Piper nigrum*), nutmeg (*Myristica fragrans*), and galangal (*Kaempferia galanga*), which enhance both its sensory complexity and perceived health benefits. The resulting drink captivates with its sweet-spicy flavor, fragrant aroma, and characteristic natural foam—features that highlight its rich phytochemical profile and enduring cultural relevance.

Despite its cultural importance and the global relevance of these research themes, *bir jawa* remains strikingly underexplored in academic literature. Existing research is fragmented, with significant gaps—particularly concerning its historical evolution, systematic analysis of its bioactive properties and health potential, standardization of its ingredients, and a critical assessment of its viability for gastrodiplomacy. This lack of a consolidated academic framework hinders a full understanding of its value within the global contexts of functional foods and cultural heritage preservation. Therefore, this study aims to fill this gap by providing a comprehensive review that synthesizes historical, scientific, and cultural perspectives on *bir jawa*.

This article unpacks the rich cultural fabric and evolving role of *bir jawa* to address this academic gap. By exploring its unique bioactive components and potential as a functional beverage, this study bridges food science, cultural heritage preservation, public health, and gastrodiplomacy. Once exclusive to the royal court, *bir jawa* has transcended social boundaries to become a beloved drink among diverse communities. Its modernization—reflected in instant and concentrated formats—exemplifies how ethnic beverages can thrive by balancing tradition, health benefits, and market innovation. This review argues that, through such academic exploration, *bir jawa* can be positioned not only as a cultural treasure

but also as a compelling subject for further research and as a viable model demonstrating how traditional beverages can contribute to cultural exchange and sustainable economic development in a globalized world.

Method

This study employed a systematic literature review approach to investigate *bir jawa*. Given the limited number of dedicated peer-reviewed articles on this topic, a diverse range of sources was included to ensure a comprehensive analysis. Sources comprised peer-reviewed journal articles, academic books, conference proceedings, university theses, and authoritative national media publications from Indonesia.

Literature searches were conducted across multiple electronic databases to capture both international and local perspectives. International databases included Google Scholar, Scopus, ScienceDirect, and PubMed. To incorporate essential local context, the Indonesian national repository Garuda (Garba Rujukan Digital) was extensively reviewed. Search strategies employed a combination of keywords in English and Indonesian. Primary terms included: "*bir jawa*," "Javanese beer," "*bir djawi*," "secang drink," "*minuman tradisional Jawa*," and "*wedang secang*." These were combined with thematic keywords such as "history," "gastrodiplomacy," "health benefits," "bioactive compounds," and "cultural heritage," using Boolean operators to refine search results.

The review focused on several core areas: the historical evolution and sociocultural context of the beverage, production methods and ingredient composition, and health benefits based on documented bioactive properties of its constituent ingredients. Contemporary relevance and potential applications in gastrodiplomacy were also assessed. Sources that mentioned *bir jawa* only in passing, without substantive analysis, were excluded. This study is entirely based on secondary sources; no primary data collection or interviews with informants were conducted.

The history and contemporary legacy of the *Bir Jawa*

Bir jawa or *bir djawi*, which translates as "Javanese beer," is a traditional non-alcoholic spiced beverage originating from the royal court in Yogyakarta, Special Region of Yogyakarta, Indonesia (Fig. 1). Despite its name—derived from the Javanese words *bir* (beer) and *jawa* (Java)—the drink contains no alcohol. Instead, it reflects a complex interplay of indigenous culinary creativity, Islamic ethics, and colonial cultural negotiation.

Bir jawa traces its origins to the reign of Sri Sultan Hamengku Buwono VII (1877–1921) [17, 18], during Dutch colonial rule, and continued to exist under his successor, Sri Sultan Hamengku Buwono VIII (1921–1939)

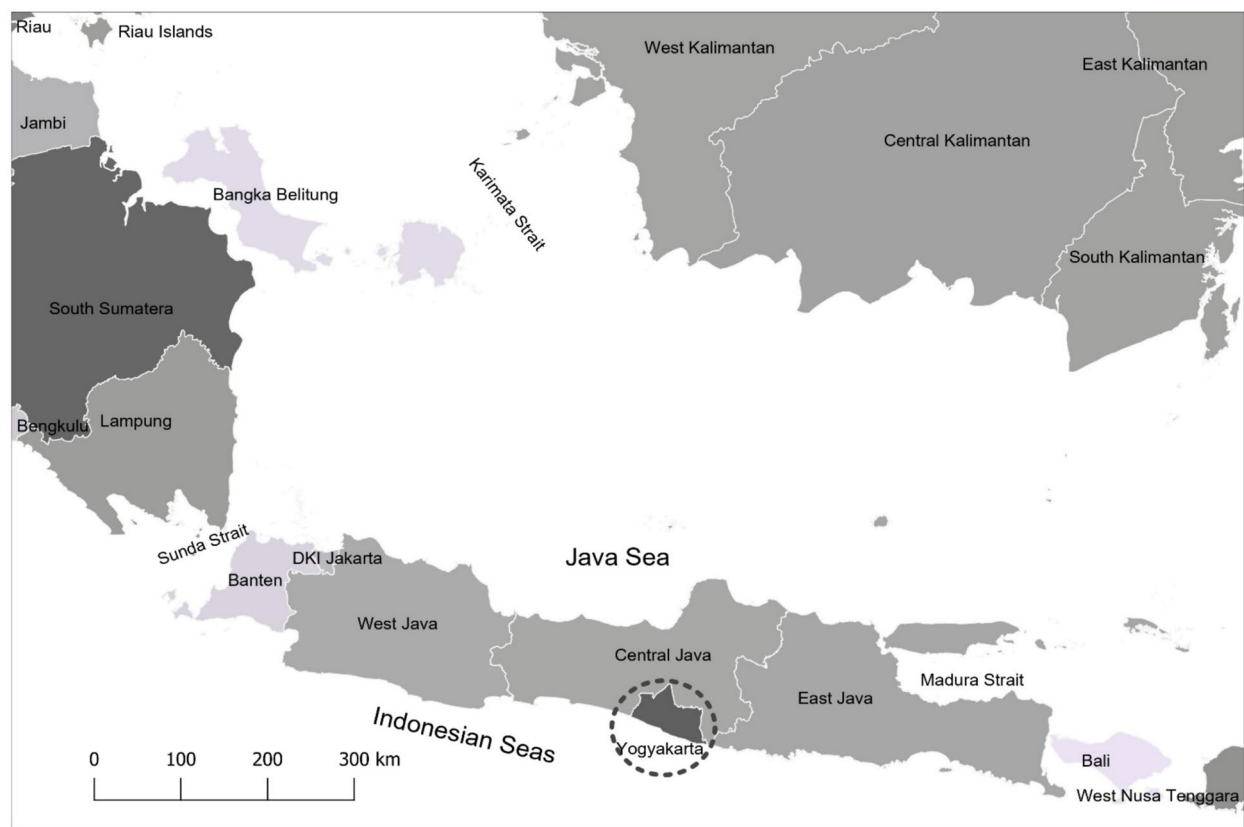


Fig. 1 Origin of *bir jawa*. Map was created in ArcGIS

[19]. Conceived as an Islamically permissible alternative to European alcoholic beer—commonly consumed by Dutch officials and European guests during state functions—the beverage fulfilled the social role of beer without contravening halal dietary laws strictly observed by the Yogyakarta Palace [20]. As both a culinary and diplomatic innovation, *bir jawa* was crafted to visually and sensorially replicate beer's deep amber color, frothy texture, and aromatic complexity, using exclusively local, non-intoxicating ingredients [17]. The drink blends traditional Javanese spices such as ginger, cardamom, cloves, sappan wood (*secang*), cinnamon, lemongrass, lime juice, and sugar (rock or granulated). Variations may include pandan leaves, alang-alang (*Imperata cylindrica*), and black pepper. These botanicals, deeply rooted in Javanese herbal traditions, contribute to its distinctive taste and perceived health benefits. The meticulous curation and preparation reveal a sophisticated mastery of flavor layering and botanical synergy emblematic of Javanese royal cuisine.

Beyond its flavor, *bir jawa* emerged as a powerful symbol of intercultural diplomacy and adaptive resilience. It enabled the Yogyakarta Palace to engage in European customs—such as toasting and formal drinking—without

violating Islamic principles or local cultural values. A notable example occurred during the celebration of Queen Wilhelmina's 40th anniversary at Bangsal Manis, where Sultan Hamengku Buwono VIII hosted Dutch Governor J. Bijleveld [17]. During the same reign, the *Pisowanan Agung*—a grand royal banquet—was frequently organized to honor distinguished Dutch guests. These ceremonial gatherings featured traditional artistic performances such as *wayang wong* and classical dances, along with the serving of alcoholic beverages, including *bir jawa*, and an assortment of lavish dishes [21]. These gestures were carefully curated to convey respect and cultivate goodwill toward European visitors. Through such acts of gastrodiploacy, the Yogyakarta court sought to strengthen diplomatic ties with the Dutch colonial administration in hopes of advancing its own political and social agendas. These moments illustrate how food and drink served not merely as sustenance or spectacle, but as vital instruments of dialogue, mutual respect, and cultural negotiation between colonizer and colonized.

In addition to its role in gastrodiploacy, *bir jawa* also featured prominently in the private sphere of Sultan Hamengku Buwono VIII. It was often served during moments of personal leisure, typically accompanied by

light snacks such as bananas, cheese, dry bread, or torn bread. The beverage was served as a ceremonial luxury. It was presented in a crystal *gogok*—a traditional drinking vessel—topped with a teapot-like lid of pure gold (24-karat). The drink itself was sipped from a separate glass, also fashioned from gold, with both pieces resting upon a matching gold tray [22]. These moments of indulgence usually took place in the afternoons, after the Sultan had bathed and changed into traditional Javanese attire. He would then recline on a chaise lounge in Ngindrakila, a private palace space, accompanied by *abdi alem*—palace attendants—assigned to that particular area [22]. In this context, *bir jawa* transcended its diplomatic function and became part of a highly ritualized expression of royal comfort, status, and identity.

Initially confined for palace banquets and state occasions, *bir jawa* gradually evolved into a broader symbol of Javanese heritage. Its continued presence in ceremonial menus and selective commercialization underscores its enduring legacy [17, 18]. The beverage embodies the philosophical and religious worldview of the Yogyakarta Sultanate, where culinary practice is entwined with Islamic law, spiritual well-being, and symbolic meaning [17, 18]. By transforming the foreign custom of drinking beer into a halal, locally grounded practice, the palace affirmed a vision of harmony between tradition and modernity.

The legacy of *bir jawa* is dynamically evolving as its traditional knowledge is adapted for contemporary markets. This transition manifests in several clear ways. Local artisans and small enterprises are now bottling and selling the beverage, often emphasizing its heritage and healthful, *jamu*-inspired properties. This position strategically aligns with global trends favoring functional beverages and alcohol-free alternatives.

Such commercialization inevitably requires adaptation. Recipes are standardized for mass production, shelf-life is extended, and packaging is redesigned to be both modern and culturally resonant. This market-driven revival, however, serves a dual purpose: it generates economic opportunity for local communities while simultaneously safeguarding an intangible cultural heritage.

The journey from palace to marketplace represents a vibrant pathway for cultural preservation. *Bir jawa* now features prominently on heritage menus for culinary tourism and is celebrated within the craft beverage movement. It demonstrates effectively how traditional knowledge can function as both a cultural and economic asset. Rather than a static historical artifact, *bir jawa* stands as a living expression of Javanese identity. It exemplifies how tradition is not merely protected, but actively reinvented, bridging a diplomatic past with a commercially viable and culturally vibrant present.

The process of making *bir jawa*

Bir jawa is traditionally prepared by simmering a specific blend of dried spices in water for 10 to 15 min, a process that facilitates the release of bioactive compounds such as phenolics (Fig. 2). These compounds impart the beverage's characteristic pale straw to golden hue and contribute to its reputed health benefits.

A typical 300 ml serving includes 5 cm of roasted, crushed ginger, 2 Java cardamom pods, 3 cloves, 5 cm of *secang* (sappan) wood bark, 5 cm of cinnamon stick, half a teaspoon of lime juice, 1 stalk of lemongrass, and sugar (either rock or granulated) to taste. Additional aromatics, such as pandan leaf, *alang-alang*, and black pepper, may be incorporated to enhance the drink's complexity.

Preparation begins by bringing water to a vigorous boil, followed by the addition of all spices except lime juice and sugar. As the *secang* wood infuses, the water changes to a reddish color. Subsequently, lime juice and sugar are added, resulting in a color transformation to a pale lager beer hue, ranging from pale straw to golden. The infusion is then strained and shaken to produce a foam reminiscent of beer and poured into a glass, resulting in a beverage with an appearance similar to real beer, which can persist for up to five hours. Traditionally, this beverage is served chilled, either with or without ice, and is valued for its refreshing qualities.

In contemporary commerce, *bir jawa* is widely available in sachets containing pre-measured dried spice blends, enabling consumers to conveniently prepare the drink by steeping the contents in hot water. This format preserves the traditional flavor profile while catering to modern lifestyle preferences.

Ongoing innovations in formulation and processing are critical for ensuring consistent product quality, enhancing sensory characteristics, and expanding consumer acceptance. These developments support the preservation of *bir jawa*'s cultural heritage while facilitating its adaptation to current consumption trends.

Potential health benefits of *bir jawa*

Bir jawa is a traditional Indonesian beverage that masterfully blends flavor and function. Its unique character comes from a complex mix of spices and herbs, each contributing bioactive compounds with significant health-promoting potential. As a rich source of phenolic compounds and antioxidants, *bir jawa* fits within the growing global interest in functional beverages for wellness and the potential prevention of degenerative diseases [23, 24]. The functional properties of *bir jawa* are rooted in its specific ingredients, which include both core and adjunct components. The core ingredients are:

Ginger is a central component. Its pungent character and broad biological activities come from non-volatile



Fig. 2 Preparation steps for traditional *birjawa*. Images documented by the author

compounds, primarily gingerols, shogaols, and zingerone. 6-Gingerol, the predominant polyphenol, is associated with anti-inflammatory, antioxidant, antibacterial, and anticancer effects [25, 26]. 6-Shogaol also contributes potent properties, including potential benefits for blood pressure regulation [25]. Similarly, 6-shogaol contributes potent expectorant and tissue-protective properties, with potential benefits for blood pressure regulation [25]. In

traditional medicine, ginger's warming nature is believed to stimulate circulation and alleviate stagnation [27]. Ginger extract has also been shown to enhance immune function [28].

Lemongrass provides a characteristic aroma from its essential oils, which are predominantly citral [29]. Beyond its oils, lemongrass contains flavonoids like luteolin, which has anti-inflammatory and anticancer

activities [30–32], and apigenin, recognized for its antioxidant properties [33]. The plant also contains tannins, sterols, and terpenoids, which contribute to its broad spectrum of bioactivities, including antimicrobial effects [34].

Cinnamon adds a warm, sweet aroma and a reddish-brown color. Its bark contains about 2% essential oil, with cinnamaldehyde as the main bioactive compound [35]. Cinnamaldehyde inhibits histone deacetylase enzymes, which are implicated in inflammation, cancer, and neurodegenerative diseases [36]. Cinnamon also demonstrates antimicrobial, antifungal, antioxidant, antihypertensive, and immunomodulatory activities [37, 38].

Java cardamom, related to ginger, is an aromatic spice that gives *bir jawa* a distinctive flavor. It exhibits antioxidant properties, and its essential oil is primarily composed of cineole [39–41]. These compounds underpin the seed's diverse biological activities, including antifungal, antimicrobial, and anti-inflammatory effects, as well as potential protection against acute renal failure [41]. Java cardamom also shows antibacterial activity against pathogens like *Staphylococcus aureus* and promising anticancer activity against breast cancer cells in vitro [42].

Clove provides a spicy, slightly sweet flavor, largely due to its essential oil dominated by eugenol (70–80%) [43]. Its phenolic compound is recognized for its potent antibacterial [44], antioxidant [45, 46], and anti-inflammatory properties [47]. Recent research highlights eugenol's activity against antibiotic-resistant *Helicobacter pylori* and its ability to suppress biofilms formed by *Porphyromonas gingivalis*, a key pathogen in periodontal disease [48, 49].

Secang wood is culturally significant in Java, where it is brewed as an herbal drink for overall health. Its primary bioactive compound, brazilin (which oxidizes to brazilein), gives the wood its characteristic red color [50, 51]. Brazilin exhibits antioxidant, antibacterial, and anti-inflammatory effects, along with hypoglycemic, hepatoprotective, and anti-acne properties [52, 53].

Lime plays a unique role in transforming the beverage's red hue to a yellowish shade, enhancing its resemblance to beer. Lime contains bioactive compounds like limonin, and its essential oil is rich in limonene [54, 55]. These components contribute to lime's notable antibacterial, antioxidant, and anti-inflammatory properties [56].

Additional ingredients are often incorporated by small- and medium-sized enterprises (SMEs) to create variations of *bir jawa*, including:

Pandan leaf is prized for its fragrant aroma, primarily from the compound 2-acetyl-1-pyrroline, and its natural green color [57]. Its extracts contain alkaloids, flavonoids, and polyphenols [58], which contribute to its broad-spectrum antimicrobial and antioxidant activities [59, 60].

Black pepper is valued for both flavor and its pharmacological activities. It exhibits antimicrobial effects by inhibiting biofilm formation and demonstrates strong antioxidant potential [61]. Piperine is the principal bioactive compound, contributing to these effects along with anti-inflammatory and analgesic properties [62, 63].

Alang-alang or cogongrass has a naturally sweet flavor. It is traditionally valued for its analgesic, antioxidant, and anti-inflammatory properties [64]. Its key bioactive constituents—saponins, flavonoids, and phenols—contribute to antibacterial, antitumor, and hepatoprotective activities [65, 66].

Nutmeg seed contains 5–15% volatile oil and a diverse range of phytochemicals like lignans and phenylpropanoids [67, 68]. Key compounds such as myristicin contribute to nutmeg's reported antioxidant, analgesic, anti-inflammatory, and antibacterial properties [69].

Galanga or sand ginger is traditionally valued for its pungent, warming qualities, used to stimulate digestion and relieve pain [70]. It is rich in terpenoids and flavonoids and has confirmed anti-inflammatory, antioxidant, and antitumor potential [71–73].

While the synergistic combination of herbs and spices in *bir jawa* suggests a potential for various health benefits, most notably its traditionally recognized warming effect—it is important to distinguish between this potential and established scientific evidence. The bioactivities discussed herein are extrapolated from studies on its constituent ingredients. Crucially, unlike other traditional beverages such as *wedang uwuh* [74, 75], *bir jawa* itself has not been subjected to direct scientific validation through in vitro, in vivo, or clinical studies. Therefore, claims regarding its efficacy remain primarily grounded in traditional use, anecdotal reports, and the known pharmacological properties of its components, highlighting a significant gap for future research.

Development, opportunity, and future challenge of *Bir jawa*

Bir jawa has undergone significant product development to improve its convenience and accessibility for modern consumers. Today, it is available in various easy-to-use formats, including instant powder and ready-made concoctions (Fig. 3) that can be quickly prepared by adding hot water. This evolution mirrors the global trajectory of other traditional beverages, such as the standardization of kombucha into shelf-stable, commercially scaled RTD formats [6, 7, 76], demonstrating a shared pathway for aligning ethnic drinks with modern consumer demand for convenience.

However, key challenges remain in standardization. Traditionally, *bir jawa* was freshly brewed without standardized measurements. While the addition



Fig. 3 Commercial variants of *bir jawa*. **A** Freshly prepared *bir jawa* from Bale Raos restaurant in Yogyakarta, containing *Piper retrofractum* (*cabai jawa*). **B** Instant powdered mix (Prakasita Sekar Mataram brand) with galangal, nutmeg, black pepper, and pandan leaves. **C** Instant powdered mix (Ny. Suryati brand) containing *alang-alang* root. **D** Ready-to-mix concoction. Images documented by author

of sweeteners like rock sugar has enhanced palatability, critical brewing parameters—such as temperature, particle size, and duration—have not been scientifically optimized. Existing studies on similar herbal drinks suggest these factors significantly influence the final beverage's antioxidant and phenolic content [64–66]. Furthermore, establishing quality control protocols, akin to those used in the Ayurvedic and Jamu industries to ensure batch-to-batch consistency and safety [77–80], is a necessary step for broader commercialization.

The market opportunity for *bir jawa* is substantial, anchored in two key trends. First, it aligns with the rising global interest in functional beverages, offering warm, aromatic characteristics and a profile of natural bioactive compounds. Second, as a non-alcoholic beverage that visually mimics beer, it taps into the growing market of consumers seeking sophisticated alcohol-free alternatives. This dual appeal positions it uniquely, similar to how kombucha capitalized on health and probiotic trends to move from a niche product to a global phenomenon [7, 76].

Adapting *bir jawa* to fast-paced lifestyles presents distinct challenges. While dried spice sachets and RTD formats enhance convenience, they have limitations: Sachets require brewing effort, and RTD products often depend on energy-intensive cold-chain storage. Innovative solutions, such as self-heating packaging [81, 82], could bridge this gap by offering both convenience and the authentic experience of a hot beverage.

Sugar content is another critical challenge. Conventional sweeteners are unsuitable for consumers managing diabetes or low-glycemic diets. While sugar substitutes like stevia, erythritol, and allulose present promising alternatives [78–80], their integration into *bir jawa* is unexplored. As seen with other functional beverage reformulations, these substitutes can alter the sensory profile, potentially impacting consumer acceptance [83–85]. Therefore, research into their functional compatibility and palatability is essential.

Finally, ensuring product safety is paramount given the complex blend of herbs. Comprehensive toxicological, microbial, and chemical assessments are essential, especially for vulnerable populations [86]. Successful commercialization will also depend on targeted market research to develop effective packaging, branding, and consumer education strategies—learning from the success of brands that have effectively communicated the traditional heritage and modern benefits of beverages like kombucha and wedang uwuh [7, 8].

Conclusion

Bir Jawa is a traditional, non-alcoholic Indonesian beverage with a rich cultural heritage, originating from the royal court of Yogyakarta. While it mimics the appearance of lager beer, its significance lies in its distinctive sensory profile and its potential as a functional beverage. While analysis confirms that bioactive compounds in its ingredients—including gingerols, eugenol, and

brazilin—provide mechanistic plausibility for traditional health claims, this work crucially identifies the absence of direct scientific validation for *bir jawa* as a composite beverage. The primary contribution of this review therefore lies in mapping this research gap and proposing a targeted investigative agenda prioritizing: (1) phytochemical and bioactivity validation through in vitro studies of the complete beverage formulation; (2) safety and efficacy assessment via in vivo and clinical trials; and (3) product optimization through standardization of preparation parameters and alternative sweetener integration. By systematically bridging traditional knowledge with rigorous scientific validation, *bir jawa* transition from cultural heritage artifact to an evidence-based functional beverage, simultaneously preserving Javanese culinary identity while meeting contemporary global demands for health-promoting ethnic beverages.

Abbreviations

HB Hamengku Buwono
RTD Ready-to-drink

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Author contributions

A.F. did conceptualization, methodology, data curation, analysis, and writing.

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Data availability

Not applicable.

Declarations

Ethics approval and consent to participate

No data were collected directly from human participants or community knowledge holders. Therefore, this study did not require ethical approval or informed consent.

Consent for publication

Author agrees to this publication.

Competing interests

Author declares there is no competing interest.

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