A Review on herbal drinks constituents, extraction techniques and food industrial applications

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Abstract

Drinks not only quench thirst but also provide health benefits. Herbs are preservatives, good food flavoring, and also act as medicinal ingredients. The addition of herbs to food for product formation provides good health benefits such as antioxidant, anti-inflammatory, antidiabetic activities. Some important herbs utilized for beverage production are cumin, garlic, fenugreek, peppermint, sage, turmeric, ginger, mint, clove, cinnamon, sage, arjuna, Aloe vera, basil, rosemary, celery, thyme. These drinks provide good taste, aroma and enhance health benefits. Herbs also have good health benefits and have application in dairy product formation by raising the medicinal ad nutritional value of products. Thus fortification of herbs by dairy products is also a new way to explore new value-added products. Moreover, herbal drinks are best to act as a substitute against soft drinks as soft drinks cause heart diseases, headaches, stomach problems. Herbal drinks are the best health remedy and more exploration in the food industries is required to introduce new herbal beverages with great nutritional and health importance.

Keywords: Herbal drinks, nutrients, industrial importance, extraction, medicinal

Introduction

The utilization of herbs as a medication is the oldest type of healthcare known to humanity and has been used in all traditions all over the past. Ancestors identified their reliance on nature for a healthy life and since that time humanity has depended on the diversity of plant resources for food, clothing, shelter, and medicine to cure myriads of ailments. Led by instinct, taste, and experience, primitive men and women treated illness by using plants, animal parts, and minerals that were not part of their usual diet (Kunle et al., 2012). Drinking natural refreshments is well known in America for a few reasons. Natural teas give freedoms to have a low-calorie drink or a sound sans caffeine option in contrast to espresso. Different teas may give a restorative impact. These natural drinks may contain separated from the bark, roots, seeds, blossoms, leaves, or products of trees and bushes (Bhise and Salunkhe, 2009). Herbal teas are combinations of a few fixings
and are all the more precisely known as tisanes. Tisanes are produced using blends of dried leaves, seeds, grasses, nuts, barks, natural products, blossoms, or other organic components that give them their taste and give the advantages of homegrown teas (Ravikumar, 2014; Craig, 2004). Traditional medicine (TM), also known as complementary and alternative medicine in developed countries, is generally utilized and is of quickly developing interest in medical services frameworks everywhere in the world (Moreira et al., 2014). About 80% of the total populace, especially in creating areas, depends on TM practices to meet their medical services needs. TM is famous and pulls in much consideration from a huge range of wellbeing framework partners, not just for its availability and reasonableness for needy individuals yet in addition due to the danger of unfriendly impacts of synthetic medications in allopathic medication (Rashid et al., 2018). Herbal beverages when consumed within a balanced diet, may improve the antioxidant status, and reduce oxidative stress in humans. In addition, numerous generally consumed homegrown drinks don't contain any recognizable caffeine levels as in espresso and tea. Wellbeing Canada sorts homegrown refreshments under normal wellbeing items (NHPs). In any case, as indicated by Health Canada moderate utilization (2–3 cups/day) of choices such as citrus peel, lemon balm, ginger, orange peel, and rosehip is recommended during pregnancy and breastfeeding (Chandrasekara and Shahidi, 2018). Herbal products can be valuable in conditioning and feeding the framework to help ease possible issues and cure inconveniences that pregnant ladies may insight. Thoughtfulness regarding sustenance can go a long path in forestalling potential complexities. Unhealthiness during pregnancy can cause clogging, hemorrhoids, weakness, and even toxemia. It's crucial to get enough Vitamins, minerals, and protein during pregnancy (Broussardet al., 2010).

Restorative plants (herbs) in their unique structure contain a large group of regular fixings alkaloids, bio-flavonoids, glycosides, minerals, Vitamins, unpredictable oils, and other common substances that help a spice's recuperating benefits as well as defend against possible harmfulness. Homegrown drugs can be extremely useful during pregnancy, labor, and post-pregnancy care however after legitimate approval of the plants (Holst et al., 2009). Herbs and plants can be processed and used in different ways and forms, and they include the whole herb, teas, syrups, essential oils, ointments, liniments, capsules, and tablets that contain a ground or powdered form of a raw herb or its dried extract (Kumadoh et al., 2017). The present review provides highlights the importance of herbal beverage in the food industry along with health benefits.

Different constituents used for herbal drinks preparation

Different constituents are utilized for the fabrication of herbal drinks, because of the bioactive compounds comprised by them namely, phenols, flavonoids, carotenoids, vitamins. Beyond this, they also provide health assistance. Pirbalouti et al., (2014) determined the green tea herbal-based extract and defined the antioxidant, phenolic, and flavonoid activities. Green teas are best to avoid diabetes, lower blood pressure, avoid the headache, lower body fat. They are enriched in flavonoids, catechins, phenolic compounds which aids health benefits. Safithri and Kurniawati, (2016) defined the diabetic effect of beverages prepared from red betel (Piper crocatum), cinnamon (Cinnamomum burmannii), and red ginger (Zingiber officinale). The functional beverage prepared was antidiabetic and abide health causes. Cinnamon extract is good in lowering blood
pressure, avoid throat issues, reduce headache, and relieves digestive discomfort. Kumar et al. (2017) explored whey-based pineapple beverages and determined their storage conditions. The developed beverage is nutritious and possesses therapeutic, prophylactic, antibacterial, and organoleptic properties. Verma (2017) mixed mint herb with orange fruit for the production of herbal-based beverage and it enhances the iron, calcium, and carotene contents. The prepared herbal juice is effective against high blood pressure, inflammatory, insomnia and cancer diseases. Similarly, Yadav et al., (2010) developed a beverage from whey-based banana with the incorporation of mentha extract. The beverage produced provides excellent nutritious properties and also therapeutic, prophylactic, antibacterial, organoleptic properties. Herbal beverages are popular among health-conscious consumers. Therefore, herbal beverages are prepared from natural sources incorporation and extracted from plants different plants such as stem, leaves, roots, fruits, flowers, and buds. Mainly the natural bioactive compounds that are reported from the herbal beverages are phenolic acids, flavonoids, carotenoids, alkaloids, terpenoids, saponins, coumarins. These bioactive constituents exhibited antioxidant, antimicrobial, antibacterial, anti-allergic, anti-inflammatory activities. Herbal beverages when consumed within a balanced diet improve antioxidant status and discard the oxidative stress in humans (Chandrasekara and Shahidi, 2018).

Extraction techniques used for herbal drinks preparation

World Health Organization predicted more than 80% of the individuals in agricultural nations rely upon conventional prescriptions for their essential wellbeing needs. India is one of the biggest makers of restorative spices and is properly called the greenhouse of the world as it is perched on a gold mine of all-around recorded and customarily well-polished information on natural medicine. Around 17,000 types of Indian verdure around 7500 types of higher plants are accounted for to have restorative worth and in different nations, it is projected about 7% and 13%. There are assessed to be around 25,000 successful plant-based details, utilized in society medication and known to country networks in India (Bharadwaj et al., 2019). In the contemporary era, everyone become health conscious and people mainly depend on herbal beverages as lifetime nutrient, because it has an enormous quantity of phytochemicals. Globally, herbal beverages consumed as a balanced diet, since it enhances the immunity level and boosts the antioxidant level. Similarly, herbal plants are extensively used in different sectors such as food, pharmaceutical, and cosmetic (Veljovic et al., 2015). The biologically active compounds present in herbal beverages are cinnamaldehyde, procyanidin, allicin, polyphenols, flavonoids, flavonols, curcumin, capsaicin, alkaloids, saponin, and terpenoids. An abundance of accessible logical proof shows that normal bioactive mixtures render various expanded organic impacts, for example, anti-inflammatory, anticancer, antitumor, anti-allergic, anti-ulcer, anti-bacterial, anti-fungal, and anti-pyretic (Aadil et al., 2019). Extraction measures for these compounds rely upon a few factors, for example, the method that is utilized, the raw material, and the organic solvent. Traditional procedures for the most part require a lot of organic solvents, high energy use, and are tedious, which has created interest in innovations that are alluded to as spotless or green advancements (Herrera et al., 2018). Traditionally, people used homemade herbal drinks from different
herbs such as thyme, cinnamon, basil, bay leaves, cumin to treat problems like cough, cancer, infection, viral, and allergies. Oh et al., 2013 studied that water-soluble polyphenols are the major bioactive compound present in herbal beverages, which enhances dental health. Moreover, reported the antioxidant and antimicrobial activity of numerous herbal beverages (rooibos, green tea, black tea, rosemary, lemongrass, mulberry leaf, bamboo leaf, lotus leaf, peppermint, persimmon leaf, and mate tea). Kogiannou et al., 2013 investigated the anti-oxidant, anticancer properties of herbal beverages prepared from 12 different herbs such as rosemary, Cretan dittany, St. John’s wort, sage, marjoram, thyme Cretan marjoram, pink savory, oregano, mountain tea, pennyroyal, and chamomile. Herbal combinations considerably reduced concentrations of IL-8 in both HT29 and PC3 cell lines. IL-8 is a chemokine that promotes cancer development, by inhibiting cancer cell proliferation. In addition, chamomile and St John’s wort were found to inhibit the NF-KB p65 subunit, resulting in tumor regression in HT29. Martono and Muninggar, 2020 reported the flavonoid and antioxidant activity in herb beverages using RSM (response surface methodology). Flavonoid and antioxidant activity in herb beverages at optimal infusion conditions were 117.79 mg QE/gm and 83.06 % respectively. Furthermore, steamori herb considerably reduces the level of blood sugar and cholesterol, so that it could decrease the risk of COVID-19 infection. Steamori herb also contains a good amount of flavonoids and antioxidants that have a health effect on the human body. Fedullo et al., 2021 studied that herb beverages possess a large number of bioactive compounds, which have been proposed as hormetins, improving antioxidant defenses by a hormetic mechanism mediated by the activation of the nuclear factor erythroid-derived 2 (Nrf2) antioxidant response element (ARE) pathway. Skapska et al., 2020 developed fruit-herbal beverages, which have pro-health functions. Each beverage contained substantial amounts of polyphenols, including anthocyanins; rosehip-acerola and sea buckthorn beverages were also sources of vitamin C and carotenoids. Al-Mahdi et al., 2020 investigated the polyphenol compound in green and black herbal tea, which were connected with favorable effects in the prevention of cardiovascular ailments, predominantly of atherosclerosis and coronary heart disease. Burris et al., 2012 research that yerba mate is a popular tea beverage produced and consumed in the South American countries of Argentina, Brazil, Chile, Paraguay, and Uruguay, and is processed from the leaves and stems of Ilex paraguariensis., a perennial shrub from the Aquifoliaceae family. Furthermore, extracts and isolated compounds from yerba mate to benefit human health have provided several pharmacological applications: antioxidant, antimicrobial, anti-inflammatory, antiobesity, and anticancer. Ordaz et al., 2018 inspected the bioactive compounds such as phenolic, rosmarinic acid, caffeic acid, and apigenin by the HPLC-MS extraction method. Therefore, lemon balm could be used as medicine in the past for the treatment of several diseases such as gastrointestinal and hepatic. The extraction techniques for herbal drinks and their health benefits are described in Table 1.
Table 1. The extraction techniques for herbal drinks and their health benefits are described above:

<table>
<thead>
<tr>
<th>Herbal beverage</th>
<th>Scientific name</th>
<th>Family</th>
<th>Bioactive compound</th>
<th>Extraction techniques</th>
<th>Health remarks</th>
<th>References</th>
</tr>
</thead>
</table>
| Chamomile       | Matricaria chamomilla L.| Asteraceae   | • Coumarin  
• Phenylpropanoids  
• Flavones  
• Flavonols  
• Flavanone     | Solvent extraction | • Analgesic activity  
• Anti-allergic activity  
• Anti-cancer activity  
• Anti-ulcer  
• Anti-inflammatory  
• Inhibit poliovirus replication  
• Prevent osteoporosis  
• Treat infant botulism  
• Wound healing property | Singh et al., 2011; Afshari and Rahimmalek, 2018 |
|                 |                         |              | • Terpenoids  
• Phenols  
• Flavonoids | Soxhlet extraction | • Anti-hemorrhagic  
• Anti-inflammatory  
• Anti-bacterial |                                                 |
<table>
<thead>
<tr>
<th>Cinnamon</th>
<th>Cinnamomum verum</th>
<th>Lauraceae</th>
<th>Phenolic content</th>
<th>Flavonoids</th>
<th>β- carotene</th>
<th>Solvent extraction</th>
<th>Anti-allergic</th>
<th>Anti-pyretic</th>
<th>Anti-ulcerogenic</th>
<th>Anti-oxidant</th>
<th>Anti-cancer</th>
<th>Islam et al., 2020; Yang et al., 2012</th>
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<tbody>
<tr>
<td>Phenol</td>
<td></td>
<td></td>
<td>Picric acid</td>
<td>Salicylic acid</td>
<td>Cresol</td>
<td>Pyrogallol</td>
<td>Super critical fluid extraction</td>
<td>Anti-diabetic</td>
<td>Anti-bacterial</td>
<td>Anti-oxidant</td>
<td>Anti-fungal</td>
<td>Anti-tumor</td>
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<td>Flavonoid</td>
<td></td>
<td></td>
<td>Isoflavone</td>
<td>Coumarin</td>
<td>Flavanonol</td>
<td>Solvent extraction</td>
<td>Anti-obesity</td>
<td>Anti-hypertension</td>
<td>Anti-occipitve</td>
<td>Anti-fungal</td>
<td>Anti-mutagenicity</td>
<td>Olorunnisola et al., 2014; Hartatie et al., 2019; Boeira et al., 2018</td>
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<tr>
<td>Lemongrass</td>
<td>Cymbopogon citratus</td>
<td>Poaceae</td>
<td>Phenolic acid</td>
<td>Flavonoids</td>
<td>Tannins</td>
<td>Solvent extraction</td>
<td>Anti-obesity</td>
<td>Anti-hypertension</td>
<td>Anti-occipitve</td>
<td>Anti-fungal</td>
<td>Anti-mutagenicity</td>
<td>Olorunnisola et al., 2014; Hartatie et al., 2019; Boeira et al., 2018</td>
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<tr>
<td>Compounds</td>
<td>Extraction Method</td>
<td>Benefits</td>
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<tr>
<td>6-Methyl-5-hepten-2-one, beta-Myrcene, Linalool, Citronella, Longipinnenepoxide, Z-citral, Trans-geraniol, E-Citral, Geranyl acetate, Patchouli alcohol</td>
<td>Steam-water distillation</td>
<td>Boost immune system, Anti-obesity, Maintain cholesterol level, Anti-infection</td>
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<tr>
<td>Phenol, Flavonoid</td>
<td>Soxhlet extraction, Ultra-sound assisted extraction</td>
<td>Anti-cancer, Anti-bacterial, Promotes body detoxification, Antifungal, Anti-stress</td>
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<tr>
<td><strong>Dandelion</strong></td>
<td><strong>Taraxacum officinale</strong></td>
<td><strong>Asteraceae</strong></td>
<td><strong>Solvent extraction</strong></td>
<td><strong>Gas chromatography</strong></td>
<td><strong>Sesquiterpene lactones</strong></td>
<td><strong>Phytosterol</strong></td>
<td><strong>Terpenes</strong></td>
<td><strong>Coumarin</strong></td>
<td><strong>Saponins</strong></td>
<td><strong>Chalcones</strong></td>
<td><strong>Flavones</strong></td>
<td><strong>Anti-inflammatory</strong></td>
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<tr>
<td><strong>Flavonoid glycosides</strong></td>
<td><strong>Polyphenol</strong></td>
<td><strong>Phytosterol</strong></td>
<td><strong>Triterpenes</strong></td>
<td><strong>Apigenin</strong></td>
<td><strong>Sesquiterpene lactones</strong></td>
<td><strong>Phytosterol</strong></td>
<td><strong>Terpenes</strong></td>
<td><strong>Coumarin</strong></td>
<td><strong>Saponins</strong></td>
<td><strong>Chalcones</strong></td>
<td><strong>Flavones</strong></td>
<td><strong>Anti-inflammatory</strong></td>
</tr>
</tbody>
</table>

Mahboubi and Mahboubi, 2020; Diaz et al., 2018
| **Eucalyptus** | Eucalyptus globulus | Myrtaceae | • Quinones  
• Saponins  
• Tannins  
• Flavonoids  
• Steroids  
• Alkaloids | Soxhlet extraction | • Antioxidant  
• Antiseptic  
• Anti-inflammatory  
• Anti-tumor  
• Anti-helmintics  
• Insecticidal activity | Kaur et al., 2019; Parham et al., 2020 |
|---|---|---|---|---|---|---|
|  |  |  | • Flavonols  
• Hydroxybenzoic acid  
• Hydrolyzable tannins | Ethanol extraction | • Anti-pyretic  
• Anti-inflammatory  
• Anti-cancer  
• Antioxidant  
• Anti-fungal  
• Antiviral |  |
| **Thyme** | Thymus vulgaris L. | Lamiaceae | • Thymol  
• P-cymene  
• Caffeic acid  
• Quercetin  
• Rosmarinic acid  
• Apigenin-7-O-glucoside  
• Carvacrol  
• β-myrecene | Solvent Extraction, Hydro-distillation, Super critical fluid extraction | • Anti-oxidant  
• Anti-fungal  
• Anti-cancer  
• Antibacterial  
• Anti-inflammatory | Lee et al., 2005; Dauqun and Abdullah, 2017 |
| Zeaxanthin | NA | Anti-septic |
| Lutein     |     | Antispasmodic |
| Pigenin    |     | Antimicrobial |
| Thymonin   |     | Antifungal    |
| Naringnin  |     | Anti-viral    |
|            |     | Antitussive   |
Food industrial applications

The growing interest in herbal drinks to avoid daily stress and diseases that occurred due to the busy schedule & lifestyle of today’s scenario. Herbal drinks are the best remedy to avoid diseases such as hypertension, cough, headache, cancer, diabetes. The incorporation of herbals for the preparation of different food products is the spotlight of the food industry. Food industries utilized different herbal extracts for the fabrication of new, innovative food beverages that provides antioxidant, antimicrobial, and abide different causes. The several drinks utilized in industries are Green tea which has antioxidant activities (Chandrasekara and Shahidi, 2018). The main polyphenols present in tea are phenols, flavonoids and provide anti-inflammatory, anti-carcinogenic activities. It also provides benefits such as lowering blood pressure, enhance metabolism, reduce liver diseases, skin diseases, heart problems, weight loss. Some other herbs used are hibiscus, peppermint, chamomile, rooibos. Etc. Herbal beverages when intake with a balanced diet enhance antioxidant activity, reduce oxidative stresses. Herbal beverages are best as they do not have caffeine content and have health benefits (Barreira et al., 2013). Herbs are utilized for treating different diseases and have good utilization in pharmaceuticals, ayurvedic, nutritional, and functional foods. Also, the formulation of herbs with different extracts and products provides innovative value-added, functional products. Antioxidant enriched herbs are safe for consumption and the antioxidant properties of herbs are due to the presence of flavonoids, vitamins, carotenoids, terpenoids. Some antioxidant-enriched herbs are basil, cinnamon, ginger, mint, oregano, rosemary, saffron, sage, thyme, clove, etc. As herbal beverages are prepared from natural ingredients of plant parts such as stem, leaves, roots, fruits, flowers, and buds. The bioactive constituents provided by drinks are phenolic acids, flavonoids, alkaloids, coumarins, saponins, terpenoids (Rodino and Butu, 2019). These bioactive constituents provide effects such as antibacterial, antioxidant, anti-inflammatory activities. The effective point of these herbs and spices as they impart aroma and taste to food. Some dairy foods are also produced by the incorporation of herbs and spices to provide functional dairy products with medicinal and nutritional values (Pyrzynska and Sentkowska, 2019). They also improve the attractiveness and appearance of fortified foods and thus enhance the sale of those herbs among consumers. Mainly these herbs are utilized for the production of dairy products in industries to combat microorganisms and enhance the quality of products. In dairy products herbs in form of powder, fresh, extract and essential oils have been used. By different methods of preparation in industries including pasteurizing, carbonation, distillation, fermentation, infusion, juicing, and mixing (Skąpska et al., 2020). So, in this way herbs are efficient for utilization in industries for the production of new products as they provide good flavorings, health attributes. The combination of herbs with dairy products is a blessing as provides efficiency, safety, quality. More, research is required to enhance the existing methods to develop new outlines for the production of new herbal beverages in industries.
Conclusion

The aforementioned points concluded that herbal beverages achieve importance worldwide, like people aware of healthy food consumption. In the modern era, different types of herbal products with a bundle of nutrients and have bioactive compounds are available in the market, which provides so many health benefits. Overall, this review complied to give the information regarding herbal drinks such as preparation procedures, presence of bioactive substances, and industrial applications.

References


