



EXPLORING NUTRITIOUS HEALTH DRINK MIXES: A COMPREHENSIVE REVIEW

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Abstract: This review explores health drink mixes, beverages designed to provide nutritional benefits and complement a balanced diet. It discusses various categories, including malt, cereal, cocoa, herb, fruit, vegetable, seed, and other ingredient-based mixes, each offering unique health advantages to cater to specific dietary needs and preferences. The introduction sets the stage by emphasizing the importance of balanced nutrition, distinguishing health drinks from alcoholic beverages, and acknowledging milk's nutrient richness while addressing taste and intolerance concerns. It also highlights the rising demand for functional foods and how health drink mixes meet this trend. The subsequent sections delve into the characteristics and benefits of each category, such as malt-based mixes for energy boosts, cereal-based mixes as a source of protein and fiber, and cocoa-based mixes for their antioxidant properties. Herb-based mixes are recognized for flavor enhancement and potential health benefits, while fruit and vegetable-based mixes offer convenience and disease risk reduction. Seed-based mixes cater to the growing interest in plant-based nutrition, providing omega-3 fatty acids and fiber. The review concludes by underscoring the increasing consumer demand for convenient and nutritious beverages and positioning health drink mixes as a diverse and appealing option to meet this demand.

IndexTerms - Health drink mixes, functional beverages, nutritional beverages, dietary needs, fiber supplements.

I. INTRODUCTION:

A health drink is a beverage designed to provide nutritional benefits, often containing vitamins, minerals, or other active ingredients that promote well-being. These drinks can support hydration and contribute to overall health when consumed as part of a balanced diet. Beverages are divided into alcoholic and non-alcoholic categories. Beverages such as wine, cider, beer, whisky, and so on are considered alcoholic beverages since they contain ethyl alcohol. Non-alcoholic beverages, such as water, milk, tea, coffee, juice, and carbonated or non-carbonated soft drinks, are defined as those that do not contain ethyl alcohol [1]. Additionally, consumers choose to consume useful and simple-to-serve goods like powdered instant beverage powder. Drinks that have been powdered are dry versions that are made and classified as quick food. Before eating, the food only needs to be slightly reconstituted [2]. Because of its low water content, instant powder is a food product with a long shelf life that dissolves quickly in water. Instant drinks are another name for agglomerated powders that dissolve or scatter in a liquid after being stirred briefly [3].

Natural milk is a nutrient-rich beverage. It is the main source of nutrition for creatures with warm blood. Water makes up 87.7% of its content, followed by 4.9% carbohydrates, 3.3% protein, 3.4% fat, and 0.7% vitamins and minerals. It contains trace amounts of all 20 important minerals [4]. Because of its remarkable health advantages, it is an essential part of the human diet. Its contents, which include calcium, phosphorus, and vitamin D, aid in the development and upkeep of strong bones. Protein aids in the growth and repair of muscle tissue. Blood pressure is maintained by potassium. Our immune systems are strengthened by vitamin B12 [5]. From children's formative years to the advanced years of old age, milk has long been regarded as a simple and convenient source of nutrition. It is also referred to as "complete food" for this reason. However, despite all these health advantages, milk is not a beverage that growing youngsters choose because many of them find it tasteless or disagree with its fragrance. Some people on diets might be concerned about its fat content [6]. Nothing is more fulfilling than transforming milk into a delightful, nutritious, and healthy beverage alternative. In this sense, drink mixes can have a big job to do. A variety of health drink mixes are already on the market [7]. The market offers a wide variety of health beverages, including those with a malt foundation, cereal-based, herb-based, cocoa-based, fruit and vegetable-based, and so on [8]. Malt-based beverage mixtures add attractiveness to milk. Cocoa-based health drinks are made with cocoa powder. Dried cocoa beans are ground to create cocoa powder. Its scent makes it one of the most popular additives in drink mixes. The powerful antioxidant properties of cocoa polyphenols, primarily flavanols, which are present in cocoa at higher concentrations (460–610 mg/kg of flavanol monomers; 4–5 g/kg of flavanol polymers) than in other plant-based diets, may cause the long-established health advantages of cocoa [9]. Iron, calcium, zinc, flavonols, antioxidants, and polyphenols are also abundant in it. These bioactive ingredients assist people with depression, colds, respiratory problems, and nutritional deficiencies [10]. Cereals are also used to make health drinks. Cereals have nutrients that probiotics may readily digest, making them potentially useful substrates [11]. Studies on the benefits of prebiotic formulations and their impact on health have concentrated on the ways that cereal components such as whole grains, barley husks, rye bran, oat milk fiber residues, and arabinoxylan fibers can enhance metabolic processes [12, 13, 14]. Indian millet, or sorghum, is a type of cereal grain. Another nutritious choice is a powder drink mix made with sorghum flour, skim milk, cocoa powder, and xanthan gum [15]. Vegetables and fruits are essential components of a human diet. Fruits, such as apple, orange, banana, strawberry, and mango, and vegetables, such as carrots, spinach, broccoli, tomato, bell pepper, etc. They shield us from numerous ailments since they are rich in antioxidants and fiber. Fruits and vegetables include phytochemicals that are very good for the heart, skin, lungs, and other organs of the body

[16]. Vitamin B1, vitamin C (1,1 mg/100 g), calcium, phosphorus, iron (2,6 mg/100 g), and vegetable protein can all be found in red beans (*Vigna angularis*) [17]. Malt dextrin and milk solids in an avocado powdered drink mix make it a tasty alternative to traditional health drinks [18]. A tasty choice for a beverage is flavonoids made from citrus peel combined with fructo-oligosaccharides [19].

Other types of health drinks can be made using fruits, vegetable peels, or waste parts. The quantity of food waste created annually in Europe is estimated to be 89 million metric tons, and it is expected to expand by 40 times shortly. According to a Food and Agriculture Organization (FAO) estimate, almost 40% of the food produced in India is wasted [20, 21]. Fruit and vegetable waste (FVW) is the term used to describe the indigestible portion of produce that is discarded at a certain stage, such as during handling, collection, processing, and shipping [22]. High concentrations of phytochemical elements are present in FVW, which is being investigated for its phenolic compounds, dietary fiber content, and relative extraction of bioactive components [23]. To reduce food waste, health drinks can be made from the FVW. For instance, several fruits like lemons, avocados, seeds, grapes, mangoes, and jackfruits have 15% higher quantities of phenolic compounds in their peel than in their flesh [24, 25]. FVW, particularly peels, are used in underdeveloped nations to create important goods that are sustainable and environmentally benign, including edible films, carbon dots, biochar, health drinks, and biosorbents. However, as all these interventions are still in their early phases, further research and advancements in knowledge are needed [26, 27].

Globally, consumers are becoming more conscious of the connection between diet and wellness. This has prompted scientific research to uncover foods and dietary ingredients with unique health benefits, leading to the development of functional foods [28]. Due to modern lifestyles and shifting eating habits, Non-Communicable Diseases (NCDs) such as obesity, cancer, periodontitis, diabetes, hypertension, and disorders have become more common. Nutritious meals could help prevent and treat the majority of diseases. In contemporary society, food is perceived by consumers as a tool for disease prevention and control rather than as a method of satisfying hunger [29]. A wide variety of processed food products, including functional foods, have been made possible by this shift in perspective. Bioactive substances, which include dietary fiber, carotenoids, vitamins, minerals, prebiotics, probiotics, phytochemicals, enzymes, fatty acids, and antioxidants, have a role in physiological function apart from feeding the body. These substances can be found in various plant sources [30]. An accurate picture of this field will be provided by the analysis in this review, which can help the food industry in the years to come concerning the commercial viability of drink mixes. Health drink mixes are made to increase immunity by using a variety of plant-based ingredients.

II. TYPES OF HEALTH DRINKS

Exploring a diverse range of health drink mixes, this discussion delves into seven distinct categories: malt-based, cocoa-based, cereal-based, herb-based, fruit-based, and vegetable-based concoctions. Each type boasts unique nutritional profiles, catering to various preferences and dietary needs and contributing to the ever-evolving landscape of health beverages.

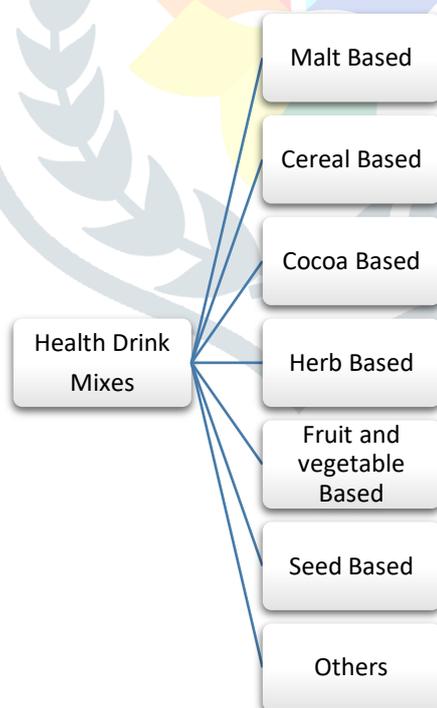


Figure 1: Types of health drink mixes

2.1. Malt-Based Health Drink mixes

Malt-based health drink powder is a nutritious blend of malted grains, vitamins, and minerals, offering a convenient way to boost energy and support overall well-being. Millets are now acknowledged as significant replacements for main crops to address global food scarcity and the growing needs of both industrialized and developing nations [31]. The antinutritional components of grains are significantly reduced during the malting process, increasing the malt's nutritional availability. Additionally, malting has been shown to boost the product's in vitro digestibility, enhance its sensory qualities, and lengthen its shelf life [32]. These days, malted wheat, malted barley, dried whey, milk solids, sugar, calcium carbonate, and salt are used in the production of malted health drink mixes in numerous different nations. The consumption of malt-based health drink mixes has been associated with several health benefits. Studies suggest that the vitamins and minerals present can contribute to enhanced immune function, addressing common nutritional deficiencies. The carbohydrate content aids in providing sustained energy, making these beverages suitable for individuals with active lifestyles or those seeking convenient nutritional supplements. Below, we have discussed the ingredients

and nutritional contents of certain malt-based health drink mixes available in the local market in Kolkata. We have collected 5 malt based drink mixes, below in the table M1, M2, M3, M4, M5 are the collected samples from the market.

Table 1: Examples of some popular malt-based health drink mixes

Sample	Main Ingredients	Nutritional composition
M1	Malted cereals, partially hydrolysed cereal solids, sugar, milk solids, cocoa powder, wheat gluten, emulsifier, liquid glucose, natural colour.	Energy: 376.5 kcal (per 100 g), protein, carbohydrates, dietary fibre, fat, saturated fat, vitamins (A, B, C, D, E, K, B1, B2, B6), calcium, magnesium, phosphorus, iron, zinc.
M2	Sugar, extract of barley and malt, cream, milk powder, buttermilk powder, cocoa powder, and vegetable oil.	Energy: 384 kcal (per 100 g), protein, carbohydrate, fat, saturated fat, sodium.
M3	Cereal extract (barley, wheat), sugar, cocoa solids, caramel colour, milk solids, and emulsifiers.	Energy: 393 kcal (per 100 g), protein: carbohydrate, fat: 1.8g, saturated fat: sodium, iodine, iron, vitamin A, C, and B12.3 kcal (per 100 g), protein: carbohydrate, fat: 1.8g, saturated fat: sodium, iodine, iron, vitamin A, C, and B12.
M4	Cereal extract (barley, wheat, millet), malted barley, sugar, wheat and flour, milk solids, natural colour, cocoa powder.	Energy: 373 kcal (per 100 g), fat, carbohydrates, vitamins (B1, B2, B6, B12, A, C and D), iodine, magnesium, iron, folic acid, calcium, protein, copper, and zinc.
M5	Skimmed milk, maltodextrin, vegetable oils, calcium carbonate, sodium L-ascorbate, flavouring (milk), ferrous sulphate, and zinc sulphate.	Energy: 419 kcal (per 100 g), protein, fat, calcium, phosphorus, vitamin D, K, magnesium, and manganese.

2.2. Cereal Based Health Drink mixes

Proteins, dietary fiber, vitamins, minerals, and carbs can all be found in cereals, making them an essential source of nourishment. Additionally, cereals have nutrients that probiotics may readily digest, making them potentially useful substrates [33]. Cereals can be used as effective lactobacilli transporters and promote the development of probiotic microbes in single- and mixed-culture fermentations if their physicochemical and organoleptic features meet probiotic requirements [34, 35, 36]. Cow's milk is a viable element for healthful drinks since it might carry bioactive components. Furthermore, it can intensify the flavor of grains, improving the diet's functionality and health [37]. The main cereal grains used in African non-alcoholic and alcoholic cereal-based drinks include maize (*Zea mays*), finger millet (*Eleusine coracana*), pearl millet (*Pennisetum glaucum*), and sorghum (*Sorghum bicolor*) [38]. Unlike traditional procedures, which add enzymes to prevent the development of starches, one cereal-based drink mix was created and licensed under application number US 011114. In this mix, oatmeal was cooked without the use of enzymes. In this study, other cereals like buckwheat, millet, milo, rye, wheat, maize, and rice might also be used in place of oatmeal [39]. Over the past decade, efforts have been made to increase solubility in cereals to prevent sedimentation. In 2014, a continuous cooker process was patented for creating soluble oat or barley flour, resulting in a more satisfactory product [40]. In 2015, a drink mix with five cereal types was published, containing minimal artificial additives and sugar and packed with nutrients [41]. The evaluation of whole grain fiber has received particular interest in the research of cereals and their health-promoting benefits after consumption because of their prebiotic properties [42]. Whole grains, including germ, endosperm, bran, hemicelluloses, fructans, and resistant starch, offer micronutrients, health benefits, and fiber, including lignans, unsaturated fatty acids, and cellulose. [43]. Another product for those who are intolerant to lactose or milk proteins, the creation of an oat-fermented beverage with high β -glucan levels and added banana to improve palatability, was investigated as a potential substitute [44]. Oat milk offers medicinal benefits due to its phytochemical content, dietary fiber, and absence of lactose and milk proteins. It also has functional properties, postponing stomach emptying [45]. Water-soluble β -glucan in oats can lower cholesterol and strengthen immunity, but its concentration is not high enough for food consumption. Two concepts were developed: soluble oat flour, which retains soluble β -glucan, and a drink mix that is easily soluble in cold fluids and soft drinks [46]. Another such concept resulted in the licensing and introduction of a product made using the enzymatic hydrolysis technique of production [47]. The cereal-based anti-fatigue nutritional powder improves body functions, sustains metabolism, and supplements energetic elements to relieve exhaustion. It contains oatmeal and cornflour powder, which contains zinc gluconate, riboflavin, and other substances, enhancing overall health. [48]. Below, we have discussed the ingredients and nutritional contents of certain cereal-based health drink mixes available in the local market in Kolkata. We have collected 2 cereal based drink mixes, below in the table C1, C2 are the collected samples from the market.

Table 2: Examples of some popular Cereal-based health drink mixes

Sample	Ingredients	Nutritional Values
C1	Whole wheat, rice, sugar, protein isolate, wheat bran, malt flavour, salt, natural flavour, and BHT for freshness.	Vitamins, minerals, calcium, iron, niacinamide, vitamin B6, vitamin B1, vitamin B2, folic acid, and vitamin D3
C2	Non-fat milk, maltodextrin, sugar, lactose, vitamins and minerals, and less than 2% of cellulose gum, beet juice (colour), natural flavour, citric acid, and salt.	Fat, cholesterol, sodium, potassium, protein, vitamins (A, C, D, E, K, B12, B6), iodine, magnesium, zinc, copper, and manganese.

2.3. Cocoa Based Health Drink mixes

Cocoa is one of the most common raw ingredients included in the formulation of many products and is liked by people of all ages. Cocoa is made from the seed of the cocoa tree (*Theobroma cacao*), and its intake is not limited to a specific time of day [49]. Research shows health benefits from cocoa's antioxidants and bioactive ingredients, particularly polyphenols. Criollo, Trinitario, and Forastero types, along with hybrid species, enhance sensory characteristics and resilience [50]. Cocoa is consumed as a beverage in suspension form. Beverages made with cocoa are highly liked by all age groups, but particularly by kids. Due to its sensory qualities and ease of preparation and consumption, drinks containing cocoa are widely accepted [51]. Cocoa-based drinks are available in various forms, including hot, cold, milk, water, ready-to-drink, and instant. They often contain sugar to make them less bitter and soluble. However, excessive sugar content has been linked to health issues like obesity and diabetes. Cocoa-based beverages may additionally contain additives such as stabilizers, vitamins, and minerals [52]. During the manufacturing of mixes for the preparation of beverages, the major goal is to improve the solubility of cocoa powder, which is normally barely soluble in water because of the hydrophobic nature of cell walls and the presence of fat [53]. From ancient times to the present day, cocoa has been used not only as a beverage but also to treat various ailments such as anemia, mental fatigue, fever, and gout. From [54]. Cocoa's nutritional components can prevent tumorigenesis, growth, and cancer cell formation, as well as breast cancer [55, 56]. It has been found to play a role in reducing mortality from cardiovascular disease [57, 58] and hypertension [59] and has an anti-inflammatory effect [60]. It helps to improve antioxidant status and provides neurological protection. It also reduces enzyme activity, improves antioxidant status [61], and provides neurological protection [62]. According to available data, no adverse effects or allergic reactions to cocoa or cocoa products have been reported. It is claimed that large amounts of cocoa or cocoa products, up to 100 g per day, can cause sweating, chills, and headaches [63]. Below, we have discussed the ingredients and nutritional contents of certain cocoa-based health drink mixes available in the local market in Kolkata. We have collected 3 cocoa based drink mixes, below in the table Co1, Co2, Co3 are the collected samples from the market.

Table 3: Some popular Cocoa-based health drink mixes

Sample	Ingredients	Nutritional Values
Co1	Coconut milk powder, organic coconut sugar, cocoa powder, sea salt, organic chaga mushroom extract, organic maitake mushroom extract, and coconut.	Calories, total fat, saturated fat, sodium, total carbohydrate, dietary fibre, sugars, protein, vitamin A, vitamin C, calcium, and iron.
Co2	Sugar, water, invert syrup, cocoa solids, minerals, vitamins, edible common salt, permitted class, preservative, thickening agent, malt extract.	energy, protein, total carbohydrate, sugar, fat, calcium, and vitamin D.
Co3	Brown sugar, finger millet, and organic raw cacao.	Energy, carbohydrates, sugar, protein, fat, fibre, mineral content, and salt.

2.4. Herb Based Health Drink mixes

These days, it's fairly common to add herbs as the main ingredient in drink mixes. Herbs are aromatic plants that are used to enhance food products' flavors and guard the heart, blood vessels, and mind from illness. In US 0040757, ginseng, soy, and whey

protein were utilized to create a health drink with water serving as the liquid basis and organic vanilla serving as the flavoring. Owing to ginseng's therapeutic qualities, this beverage was used as an energy enhancer and stress reliever [64]. Since fat content is a big problem everywhere in the world since it increases calories, this idea does not use edible oil. The fact that the extraction was done at a neutral pH and that water was used as a solvent to preserve the greatest bioactivity of the extractives was another benefit [65]. Cinnamon is a commonly used spice as an active ingredient in many cuisines due to its scent and several health benefits. It has anti-diabetic properties as well. A 2012 license under application number US 8329232 was granted for the development of the powdered form of cinnamon water extract. This invention's benefit was that the cinnamon extract it produced had minimal levels of coumarin and cinnamaldehyde [66]. People consume fewer of these herbs and spices, despite their health benefits, because of their unpleasant flavors, which include an earthy or sour taste. One benefit of this study was the use of a non-toxic solvent for extraction throughout the entire procedure [67]. Asian spices, such as turmeric, are added to food to enhance its flavor and color. It has antibacterial, anti-tumor, and antimicrobial properties. Chinese herbs were used in US 0105361 to make a healthy beverage. This powder formulation's improved storage duration, immunity-boosting properties, and scalability for large-scale production were its main advantages [68].

2.5. Fruits & vegetable Based Health Drink mixes

Fresh fruits and vegetables are in higher demand among consumers these days. For many years, a healthy diet has been based on the principle of consuming the right number of fruits and vegetables. Key nutrients that are necessary for promoting and maintaining health are found in fruits and vegetables. India is the world's leading producer of numerous fresh food items. India's large land area and diverse climate make it easy to grow a wide range of fruits and vegetables. About 14.0 percent of the world's vegetable production is accounted for by India, which produced 162.187 MT of vegetables and 81.285 MT of fruits [69]. However, because of post-harvest losses, it has been discovered that between 30 and 40 percent of fruits and vegetables are wasted. Despite being the world's second-largest producer, India's food supply chain has high waste percentages, which contribute to the country's low consumer availability of fruits and vegetables and the need to import them. India, the second-largest producer of fruits and vegetables in the world, wastes around 25% of its produce [69]. A high intake of fruits and vegetables is linked to a lower risk of cardiovascular disease and other chronic illnesses, according to numerous epidemiological studies [70, 71, and 72]. About half (48%) of all deaths in Europe each year are caused by cardiovascular illnesses, which also account for the majority of deaths in the UK for both men and women [73]. Polyphenolic flavonoid chemicals [74, 75] are found in many fruits, vegetables, and their juices. Studies in cells and animals have demonstrated that these compounds, at physiological concentrations [76, 77, 78, 79, 80, 81], boost endothelial NO synthase activity. Furthermore, an increasing amount of research is demonstrating the advantages of a long-term fruit and vegetable diet [82, 83, and 84] and isolated flavonoids [85, 86] for improving vascular function measurements. Numerous investigations have documented the protective properties of phytochemicals found in fruits and vegetables, such as the delaying of LDL's oxidation susceptibility both in vitro and in vivo [87, 88, 89, and 90]. Vitamins, fiber, carotenoids, sulfur compounds, nitrate, organic acids, and a range of phenolic phytochemicals are just a few of the components found in plant meals that may have a major positive impact on one's health [91, 92, 93, 94]. Many fruit and vegetable juices and pure products also contain the previously mentioned beneficial components [94, 95, and 96]. Juices from fruits and vegetables have also been found to reduce the risk of cardiovascular disease [83, 87]. Below, we have discussed the ingredients and nutritional contents of certain fruit and vegetable-based health drink mixes available in the local market in Kolkata. We have collected 3 fruit and vegetable based drink mixes, below in the table F1, F2, F3 are the collected samples from the market.

Table 4: Some popular fruit and vegetable-based health drink mixes

Sample	Ingredients	Nutritional Values
F1	Beetroot, badam, cashew, cardamom, and jaggery powder.	Energy, protein, potassium, sodium, magnesium, calcium, and iron.
F2	Beetroot, carrot, tomato, grape seed extract, citrus bioflavonoids, amla, quercetin, cranberry extract, blueberry, banana, raspberry, bilberry, strawberry, grapefruit extract, acai berry, green coffee bean extract, elderberry, guava leaf, mango, black currant, resveratrol, vitamins A and C, pterostilbene, maltodextrin, citric acid, and stevia.	Energy, protein, carbohydrate, added sugar, dietary fibre, fat, vitamin A, and vitamin C.
F3	Pea protein isolate, brown rice protein isolate, inulin, ashwagandha extract, green tea extract, grape seed extract, turmeric powder, stabilizers, sweeteners, digestive enzymes (bromelain and papain), and anti-caking agents.	Energy, protein, carbohydrates, added sugars, fat, saturated fat, cholesterol, dietary fibre, green tea extract, grape seed extract, turmeric powder, sodium, calcium.

2.6. Seed-Based Health Drink Mixes

Seed-based health drinks are beverages that incorporate seeds as a primary ingredient for their nutritional benefits. Health drinks made from seeds are growing in popularity as more individuals try to include more plant-based foods in their diets. A nutrient-dense shake made of chia seeds, hempseed, goji seeds, and wheatgrass was revealed in a patent application with application number

US 0113031. In addition to improving health, the newly introduced substance was also readily absorbed. This product was created with the body's nutritional needs in mind [97]. Garden cress, or *Lepidium sativum*, is a member of the Cruciferae family and is cultivated in portions of Europe, North America, and India. Because it contains 25–39% protein, the edible whole seed is recognized to have health-promoting qualities. Because these seeds include a high percentage of carbohydrates (33%), 2.4% crude fat, 7.6% crude fiber, and 6.4% minerals with 0.723% phosphorous, it was thought that they may be used as a raw material for functional foods that share their acidic, peppery flavor and scent [98, 99, and 100]. In India, it is also referred to as land cress, common cress, and haliv [101]. The iron in the powdered seed is generally helpful in treating minor cases of anemia, particularly in youngsters. Naturally, the body needs phosphorus for its normal metabolic processes. According to certain authors, *L. sativum* seeds can also minimize premature graying of the hair, hasten the healing process after broken bones, and lessen hair loss [102]. Flaxseed and chia are other beneficial additions to a diet. Their abundance of omega-3 fatty acids may contribute to a reduction in cholesterol levels. One notable benefit of the flaxseed-supplemented health drink mix formulation is its high alpha-linoleic acid content, which has been shown to prevent blood vessel hardening [103]. A nutrient-dense drink combination using millet and dark sesame seed powder was created and patented in CN 110693012. It was stated that this product might give users a better stomach health index, which would lead to a healthy metabolism [104]. Below, we have discussed the ingredients and nutritional contents of certain seed-based health drink mixes available in the local market in Kolkata. We have collected 2 seed based drink mixes, below in the table S1, S2 are the collected samples from the market.

Table 5: Examples of some popular Seed-based health drink mixes

Sample	Ingredients	Nutritional Values
S1	Pumpkin seeds	Energy, carbohydrate, proteins, total fat, cholesterol, and sugar
S2	Sunflower seeds	Total fat, saturated fat, calories, cholesterol, sodium, potassium, protein, and carbohydrate.

2.7. Other health drink mixes

Other drink mixes encompass a diverse range of options, offering unique flavors and nutritional profiles. Additionally, specialty drink mixes may feature exotic ingredients, catering to various preferences and dietary needs. Exploring this category provides an array of choices beyond traditional beverage options. A health drink mix was prepared by using *Aloe vera* as a raw material and value-added products by using domestically developed technologies [105]. Numerous phytochemicals are lost during the baking of foods. 18 different natural component types were combined in a perfect approach to create a rapid health drink that promised to boost immunity and ward off various ailments to solve this issue. This method's advantage was that the number of phytochemicals was maintained [106]. Some health drinks are used as meal replacements. The process of losing weight is arduous and time-consuming. Many supplements are used by people to lose weight. During weight loss, it's also critical to nourish the body with vital minerals and vitamins. Numerous supplements make this claim to be helpful. However, most beverages on the market today do not provide individuals with enough nourishment. A popular method for reducing calories without sacrificing nutrition is to substitute dinner with a low-calorie beverage that has a balanced nutritional profile. The meal replacement powder mix's formulation was patented under application number US 7767245, and it was a helpful nutrient-based tool in the fight against hunger. This study's advantage was that artificial compounds were not used [107]. An improved version of a health drink was invented, using Chinese herbs and spices together with fruit and vegetable powder. In addition to aiding in weight loss, the product demonstrated great promise in eliminating pollutants and improving the quality of sleep [108]. The youth's body-building enthusiasm has been growing daily. A few dietary supplements are designed to satisfy their cravings. As a nutritional component, calcium-HMB helps to maintain or grow strong muscles. A drink mix enhanced with calcium was created. It fully fulfilled the exercise enthusiasts [109]. The synthesis of blood requires iron. It supplies the rest of the body with oxygen by way of the blood. A low iron level leads to anemia. In 2020, action was taken to close this gap. A beverage with added iron had its recipe patented in US 10602763. Which employed soluble and bioavailable iron, produced an inexpensive product, and did not change the beverage's original flavor [110]. Another meal replacement milkshake was created, and it had outstanding fat-reduction results for those trying to lose weight [111]. A nutrient-rich powder with the patent application number CN 110800995 was reported to have good quality and flavor, as well as to nourish the liver and kidneys and enrich the blood [112].

III. FUNCTIONAL INGREDIENTS

Health drinks often contain a range of functional ingredients designed to provide specific health benefits. These may include essential vitamins and minerals like vitamin C, vitamin D, calcium, and iron, which support overall health and well-being. Probiotics, or live beneficial bacteria, are commonly included to promote gut health and digestion. Antioxidants, such as those found in ingredients like berries or green tea extract, help protect cells from damage caused by free radicals, potentially reducing the risk of chronic diseases. Proteins are often added to support muscle repair and growth, as well as to promote satiety, while fiber aids in digestive health and weight management by promoting feelings of fullness. Health drinks may also contain herbs, botanicals, or adaptogens like ginseng or turmeric, believed to offer various health benefits such as antioxidant properties or stress reduction. Omega-3 fatty acids, found in ingredients like fish oil or flaxseed, are known for their heart health benefits. Additionally, prebiotics may be included to nourish probiotics and maintain a healthy balance of gut bacteria. Plant-based ingredients like spirulina or wheatgrass, rich in nutrients, are also commonly found in health drinks for their potential health benefits. Individuals need to consider the efficacy and safety of these ingredients and consult healthcare professionals before incorporating them into their diet, especially if they have specific health concerns or medical conditions.

IV.EFFECT ON HEALTH CONDITION

The healthiness of health drinks depends on their ingredients, nutritional content, and the overall context of an individual's diet and health needs. Not all health drinks are created equal, and some may be more beneficial than others. Powdered health drinks are incredibly convenient, allowing users to easily mix the powder with water, milk, or other beverages. Many of the health drink mixes claim to be suitable for on-the-go consumption, whether at the gym, office, or while traveling. The lightweight and compact nature of powdered supplements also makes them easy to carry and store. Health drink mixtures are becoming a witness to their advancement as people become more conscious of their health. Numerous actions have been taken to raise the nutritional content of drink mixtures. Herbs, spices, fruits, vegetables, and cereals high in nutrients were used to make a lot of drink combinations. High-phenolic-compound materials, like berries, cherries, buckwheat, and oat bran, are being extensively studied to create functional fast meals that lower blood pressure, reduce inflammation, and lower hypercholesterolemia. The demonstrated health advantages and functions of fermented or probiotic-enriched goods include weight loss, suppression of chronic inflammation, and decreased cardiovascular risk [113, 114].

Health drink mixes, often marketed as convenient and nutritious alternatives, do have certain disadvantages that consumers should be aware of. Many health drink mixes contain high levels of added sugars to enhance flavor, which can contribute to various health issues such as obesity, diabetes, and tooth decay. Some health drink mixes may contain artificial additives, colors, and preservatives to improve taste, appearance, and shelf life. These additives may have adverse effects on health, triggering allergic reactions or sensitivities in some individuals. Certain additives or ingredients in health drink mixes may cause digestive discomfort for some individuals [115]. Excessive-sugar health drinks have been linked to cardiovascular illness, dental cavities, excessive blood pressure, and type 2 diabetes in infants. Protein is present in powdered mixes but has been dehydrated. Protein powders can support fitness and health objectives and are typically made from milk, soy, or plants. However, the majority of these supplements include potentially hazardous stimulants.

V.FORMULATION AND PROCESSING OF HEALTH DRINK MIXES

The process of creating a health drink mix's recipe or composition is referred to as formulation and processing. The choice of ingredients is the primary step in this process. The substances that are used must contribute essential nutrients such as vitamins, minerals, proteins, and fibers. To make sure that the health drink mix fulfills its intended health advantages, nutrient density is essential. It should also help the finished product have the appropriate mouthfeel and texture. The next step is the processing technique. The production of health drink mixes involves various processing techniques aimed at creating a stable and nutritionally effective product. Spray drying is the most common method where liquid ingredients are sprayed as fine droplets into a hot air chamber, rapidly evaporating moisture and leaving behind a powdered form. It preserves the essential nutrients [116]. Emulsification is a process that involves blending ingredients with different properties (e.g., water and oil) to create a stable and homogenous mixture. Hydrophobic components (such as flavor oils, clouding agents, oil-soluble vitamins, and nutraceuticals) can be incorporated into a variety of different colloidal delivery systems suitable for application within beverage products, with the most common being microemulsions, nanoemulsions, and emulsions [117]. A popular technique in the creation of health drink mixtures is homogenization. To produce a stable and well-mixed emulsion, homogenization is the process of dissolving fat globules in a liquid into smaller, more homogeneous particles. When making healthy drinks mixed with ingredients like fats, oils, or other emulsifiable compounds, this step is especially crucial. To extend the shelf life and change the flavor of the product, various food additives, preservatives, food colorants, and antioxidants are added. Iron oxide is added to food that has been fortified, and potassium sorbate, sodium benzoate, and other chemicals are used to prevent microorganisms. The additives also help to maintain consistency, improve nutritional value, and improve taste or color [118].

VI.PACKAGING AND STORAGE

Any functional food must be packaged properly to ensure that its quality is maintained and that its shelf life is extended. Packaging's primary function is to shield the food product from outside influences, including chemical, biological, and physical impurities. It also keeps the product from deteriorating due to environmental elements including light, oxygen, moisture, etc. Food items with active packaging are better able to hold onto their nutritional value [119]. To prevent moisture and air from affecting the quality of the product, it's recommended to store health drink mixes in airtight containers made of glass or plastic. This helps maintain the freshness and prevent the absorption of moisture from the surrounding environment. Plastic packets are also used for storing the product. Paper has insufficient strength, low heat sealability, and poor barrier qualities for storing this kind of product. Exposure to direct sunlight can lead to the degradation of certain vitamins and other ingredients in health drink mixes. Therefore, it's advisable to store them in a place away from direct sunlight. Health drink mixes are generally best stored in a cool, dry place. Exposure to heat and humidity can lead to clumping and degradation of the product. Some health drink mixes may contain ingredients that benefit from refrigeration. If the product label recommends refrigeration after opening, it's essential to follow those instructions.

VII.MARKET TRENDS OF HEALTH DRINK MIXES

The health drink mix industry is undergoing a significant transformation characterized by diverse product offerings, including protein shakes, meal replacements, and functional beverages, to meet evolving consumer preferences. Tailored products for specific demographics, like athletes or seniors, are gaining momentum, along with continuous innovation in formulations and packaging. Growing global awareness is driving market expansion, while collaborations with the fitness or beauty sectors are fostering synergistic products. E-commerce is emerging as a primary sales channel, prompting companies to prioritize their online presence. Regulatory compliance and transparent communication with consumers are integral to product positioning. These trends reflect a dynamic landscape where consumer-driven demands for innovation, personalization, and health consciousness are shaping industry strategies and offerings. This information pertains to the market size and projected growth of the flavored powder drink industry.

The flavored powder drink market, valued at USD 73.40 billion in 2021, is projected to witness steady growth, reaching USD 100.04 billion by 2030, with a compound annual growth rate (CAGR) of 3.5% during the forecast period from 2023 to 2030

[120]. Similarly, the global powder drinks market, valued at USD 72.46 billion in 2021, is expected to expand at a CAGR of 3.0% from 2022 to 2030. In 2021, the fruit-based segment dominated the industry with an 80% share. Looking ahead, the coffee-based segment is anticipated to experience the second-fastest growth, with a CAGR of 2.5% from 2022 to 2030. Notably, the online channel is poised to emerge as the fastest-growing distribution channel, with a projected CAGR of 4.2% from 2022 to 2030, reflecting shifting consumer preferences towards digital platforms for purchasing powdered beverages [121].

VIII. CONCLUSION

To sum up, this study article offers a thorough investigation of health drink mixes, clarifying their many classifications and nutritional advantages. The study examines various beverage combinations that can be used to complement a balanced diet, and they do so with ease. These combinations include cereal, fruit and vegetable, herb, malt, chocolate, and seed bases. Health drink mixes appear as potential solutions for boosting overall well-being because they answer the growing demand for functional foods and accommodate a variety of dietary demands and tastes. The insights provided in this research highlight the importance of health drink mixes as valuable additions to the beverage market, positioned to satisfy the changing needs of health-conscious people worldwide as consumers prioritize convenience and nutrition more and more.

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