ISSN Print: 2664-844X
ISSN Online: 2664-8458
NAAS Rating (2026): 4.97
IJAFS 2026; 8(8): 47-54
www.agriculturaljournals.com
Received: 14-04-2026
Accepted: 17-05-2026

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Fruit based confection

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DOI: https://www.doi.org/10.33545/2664844X.2026.v8.i8a.1757

Abstract
Confectionery products, including candies, jellies, chocolates, caramels, toffees, chewing gum, and lollipops, are widely consumed because of their attractive taste, texture, and cost-effective production. Despite their popularity, most conventional confectionery products are primarily composed of sugar, chocolate, or refined flour, providing high amounts of calories while contributing limited protein, vitamins, minerals, and others essential nutrients. Frequent consumption of these products has been linked to several health concerns, such as obesity, hyperglycaemia, dental carries, and related metabolic disorders. Growing consumer awareness regarding health and balanced nutrition increased in confectionery products that are both enjoyable and nutritionally beneficial. Fruits, which are naturally abundant in vitamins, minerals, dietary fibre, antioxidants, and bioactive compounds, provide an excellent foundation for developing healthier confectionery alternatives. This review examines the potential of fruit-based confectionery as a nutritious replacement for convectional confectionery by highlighting the incorporation of fruit pulp, juice, and other fruit-derived ingredients to improve nutritional quality, functional properties, flavour, texture, and overall sensory acceptability. It discusses various fruit-based confectionery products, including fruit leather, fruit candies, fruit jelly, fruit bars, and fruit toffee, with examples of formulations prepared from fruits such as mango, papaya, guava, pumpkin, pomegranate, strawberry, and others. These products have demonstrated enhanced nutritional composition, greater antioxidant potential, and improved consumer acceptability compared with traditional confectionery. The review further highlights the expanding market demand for natural, convenient, and health-oriented snack products, supported by advancements in packaging-based confectionery.

Keywords: fruit-based confectionery, fruit leather, fruit jelly, fruit toffee, functional foods

Introduction
It is a term that refers to a variety of culinary items that have sugar as a foremost ingredient. Generally, confections are low in micronutrients and protein content but high in calories [1]. Confectionery is one sugar-laden product that has not been properly investigated in relation to obesity. Because confectionery is pervasive in many countries, this investigation is relevant from the standpoint of public health. On the one hand, confectionery is the fifth most common source of added sugar and the ninth most common source of carbohydrate in the diets of children aged 2 to 18. In addition, chocolate confectionary is frequently heavy in fat, particularly saturated fat [2]. Chocolate consumption, on the other hand, may offer significant health benefits [3]. However, due to high sugar and food additive content, as well as the existence of undesirable compounds, excessive and widespread consumption of sugar-based confectionery is regarded to have a detrimental influence on public health. Obesity, hyperglycaemia, and tooth decay have all been linked to these products [4]. Sugar confectionery has evolved with growing sophistication over the years, and it now comes in a variety of formats with varying degrees of sweetness, flavours and aromas, textures, and mouthfeel. Confectionery has a very simple purpose: the surge of sweetness combined with pleasant flavours, aromas, and mouthfeel induces an almost immediate feeling of well-being and happiness [5]. Their low nutritional value has also been called into question, and manufacturers are under growing pressure to lower the sugar content in these products in order to meet customer expectations for healthier compositions [6]. Furthermore, studies conducted in supermarkets have discovered that unhealthy snack food products (such as chips and sugar confectionery) and sugar rich beverages are practically impossible for customers to avoid because they take up more shelf space than fruit and vegetables and are

more frequently displayed at checkout and other elevated areas [7]. Their changing lifestyles and increased health awareness have prompted scientists and the food business to alter formulas and ingredients in order to improve food nutritional value and safety [8]. As consumers are becoming more health-conscious, they are urging for low-calorie foods at an unprecedented rate [9]. Demand for nutritious and safe foods is increasing across the world, because eating a well-balanced diet is the best way to avoid or treat health issues including obesity, diabetes, malnutrition, heart disease, and other diseases that are primarily caused by dietary mistakes [4]. Minerals, vitamins, antioxidants, and dietary fiber included in fruits and vegetables provide health advantages [10]. Low consumption of fruits and vegetables is supposed to cause more than 2 million deaths worldwide each year. Individual fruit and vegetable consumption of up to 600 grams per day may lower the risk of coronary heart disease, ischemic stroke, stomach, lung, and colorectal cancer [11].

Fruit may also provide characteristics to a confection that improve the sensory experience. For both flavour and texture, fruit-based components can either be highly complementary or offer opposing qualities to confections [12]. As a result, developing new methods of producing confectionery products with a high degree of finishing from fruits, as well as expanding the range of food products based on them with high organoleptic characteristics, nutritional and biological value, low cost, and high profitability, is a critical task [13]. In this perspective, the aim of this review is to include fruit confectionery instead of sugar confectionery in diet. Because children are the primary target consumer group for confectionery items, other consumer groups' preferences are shifting toward products that are filled with healthy and vital nutrients. In this regard, confectionery companies have been experimenting with natural sweeteners (e.g. stevia glycosides, fruit juices and concentrates, honey, palm sap sugar), flavours (e.g. herbal extracts and volatile oils), colours (e.g. microalgae, herbs and plant pigments, extracts and by-products), sugar replacers (e.g. dietary fibres, prebiotics), and various plant-based bioactive ingredients (e.g. polyunsaturated fatty acids, vitamins, plant polyphenols, bioactive peptides) have all been extensively investigated [14].

Different classes of confectionery

Sugar based confections

Sugar confections, as the name implies has a lot of sugar and it can be any kind of sugar. The key components of sugar confectionery comprise of sucrose, invert sugars, and glucose syrups. Sugar confections are divided into two categories: boiled sweets and fondant. Boiled sweets are sometimes referred to as hard-boiled since the sugar is in a glassy condition. According to boiled sweets “Sugar and water cooked at such a high temperature (150–166°C)” that almost no water remains and a glass like mass forms on cooling. Fondant, on the other hand, is defined as “minute sugar crystals in a saturated sugar syrup” used as the creamy filling in chocolates and biscuits and for cake decoration. Product examples include chocolate centres, fudge, marzipan, coconut paste, and chews [15]. Sugar, also known as sucrose, is the major contributing ingredient in confectionery. Sugar gives structure, mass, mouthfeel modulator, taste enhancer, and preservation characteristics to all items in addition to sweetness [16]. In its most recent guideline, the World Health Organization recommends consuming up to 50 grams of total free sugars per day, citing concerns that sugar consumption in the form of various sugar-sweetened products and beverages may lead to an unhealthy diet, weight gain, and an increased risk of noncommunicable diseases. Consumption of sugar has long been a public health concern, since it is thought to have a role in displacing or diluting nutrients in the diet, as well as contributing to the obesity pandemic in industrialized countries [17]. According to some studies, consuming AS may cause obesity and may cause other more nutrient-dense foods to be eliminated from the diet [18]. Sugar-rich foodstuffs are often deficient in dietary fibre and have a relatively high calorie density, both of which may contribute to obesity [19]. Therefore, Sugar reduction is thus a major concern in confectionery science. Sugar substitutes include sugar alcohols (sorbitol, mannitol, xylitol, maltitol, lactitol, isomalt, and others), stevia, inulin, various fruit extracts, honey, plant-based syrups, and numerous food by-products are used in place of sugar for producing sugar confectionery [20].

Chocolate based confections

Chocolate contains 28-40% lipids (cocoa butter, potentially other vegetable fats, and milk fat), 50-70% carbohydrates, and 4-8% proteins, making it a high-energy meal with a complex nutritional profile. Due to the unique characteristics of cocoa, chocolate has a long shelf life [21]. Chocolate is not only one of the key ingredients used by confectioners, but it is also a popular component found among bakers, ice cream makers, and other food producers due to its highly enjoyed taste qualities. Chocolate can be consumed as a beverage, a syrup, a flavour, a coating, or a complete confection itself [22]. Chocolate and fruit are a natural pairing. For many years, chocolate was used solely for pleasure, but research in the recent years has revealed that dark chocolate and cocoa may provide health benefits due to their high polyphenol content. Chocolate's position as a functional food has mostly been defined by its polyphenol content. However, additional nutritive elements such as carbohydrates, lipids, and dietary minerals, as well as non-nutritive constituents such as oxalates and methylxanthines, can be found in chocolate and cocoa-based drinks [23]. Aside from flavonoids, chocolate contains a variety of additional bioactive chemicals that have the potential to have either favourable or negative osteogenic effects. While chocolate is low in vitamins that are crucial for bone health, cocoa powder is used to flavor milk to encourage people to drink it since it is an excellent source of vitamins A and D, as the 2015-2020 Dietary Guidelines for Americans state [24].

Flour based confections

Flour-based confectionery is the popular and most often eatable among confectionery, and its expansion in the market has boosted global per capita consumption. Cereal-based confectionery items are primarily consumed as a source of carbohydrates, or energy, while cereals are also a good source of minerals [25]. Flour confectionery products are abundant in protein, fat, and carbohydrate, have a high energy value, and good flavour, and are popular among people of all ages. Cookies, however, come into the category of high-energy, easily digestible foods because they are typically produced with wheat flour and oil. Cookies are consumed on a regular basis because they are such a popular foodstuff. Because of the materials used, this

addiction might have detrimental health effects [26]. Due to the utilization of low-vitamin and amino-acid-content raw materials (sugar, lipids, protein, molasses, etc.) and extra BAS destruction during technical processing, these goods have a low level of biologically active substances (BAS) in their composition. As a result, the chemical composition of such goods should be drastically altered, with the calorie value and sugar content being reduced while the BAS and physiologically useful dietary components content being enhanced [27]. In a study [28] developed flour confectionery incorporated with berries and dihydro-quercetin to enrich and increase the functional properties of resulted confectionery item. In addition to flour, the essential components used for the manufacturing of flour-based confectionery are sugar and fat. Flour based confectioneries are regarded as good products for fortification as they are low in micronutrients [29]. Biscuits and pastries filled with cream or another substance, for example, have a very distinctive character since they enhance the product [30].

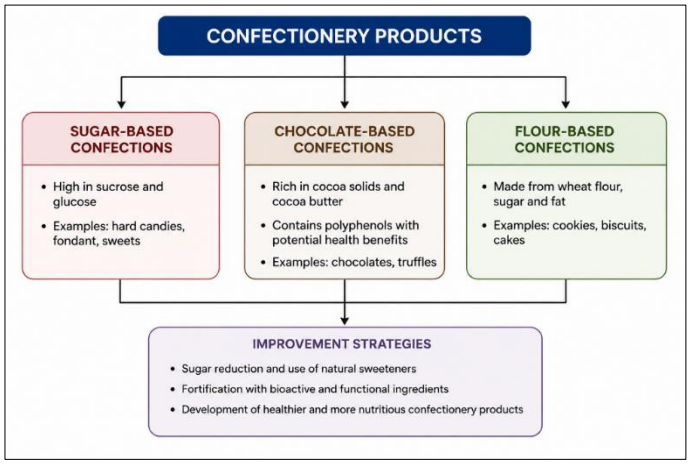

Fig 1: Classification of confectionery products, their key characteristics, nutritional concerns, and strategies for nutritional improvement.

Important fruit-based confectioneries

Fruit leather

Fruit leather is a healthy snack for both children and adults. It is prepared by drying fruit puree or a combination of fruit juice concentrate and other components on a flat plane in an oven, desiccator, or sunlight [31]. As it is thoroughly dried to a soft texture and has a reduced water activity, the commodity can be preserved for a longer duration. Apples, apricots, berries, grapes, jackfruits, kiwifruits, oranges, papayas, peaches, pears, tomatoes, and a variety of other fruits are all appropriate for producing fruit leathers [32]. Fruit leathers were produced from several blueberry varieties, resulting in products with excellent antioxidant potential and total phenolic content [33]. Singh and Tiwari [34] prepared fruit leather by blending the pulp of two fruits papaya (Taiwan Red Lady) and guava (Allahabad Safeda) in different ratios and found that due to input of both fruits, the ascorbic acid and carotenoids content of blended guava and papaya fruit leather was enhanced. Madusanka *et al* [35] developed mixed fruit leather from five tropical fruits mango, banana, pineapple, papaya and passion fruit. Varying sugar levels, such as no sugar, 10%, 20%, and 30%, were used as treatments while all fruits were combined in the same proportion. The leather obtained could be used to substitute fresh fruits, with 36 grams surpassing 200 grams of fresh fruit. Addai *et al* [36] used two papaya cultivars Hongkong and Eksotika to formulate papaya leather using natural components like pectin, honey, and citric acid. The antioxidant activity and physicochemical properties were determined and the findings showed that Hongkong cultivar fruit leather has considerably higher sensory parameters, physicochemical properties, and antioxidant activity ($P<0.05$). In both papaya varieties, the process of drying the fruit leather enhanced the phenolic content and antioxidant activity as compared to fresh fruits. Basak [37] developed a mixed fruit leather and analyzed the nutritional composition and he found that resulted fruit leather has extremely low fat (0.03%) and no free fat (0.025%). It has a high fiber content (6%) and a low ash level (0.02%). Tontul and Topuz [38] conducted a study to produce a pomegranate leather (pestil) using pomegranate juice, xanthan gum (0–4%), locust bean gum (0–10%), and pre-gelatinized starch (0–10%). The leather resulted was tested for various parameters and results showed that the pomegranate leather produced had improved properties than traditional pestil. A research conducted by Ayalew and Emire [39] to formulate Annona-based fruit leathers. The formulation was produced by combining oats flour with the pulp of soursop fruits. With the addition of oat flour to the fruit leather, the protein level increased from 6.58 to 11.25 g/100 g. Fruit leathers made from natural fruit pulp are more delicious and nutritious since they include a considerable amount of dietary fibers, minerals, vitamins, and other phytochemicals [40]. They contribute value to fruit that would otherwise be undesirable for sale in the fresh food market. Fruit leather is easy to prepare, carry, and consume, and it's a great snack virtually anyplace [41].

Fruit candies

Candy is widely known among people of all ages, which is mostly made of sugar, fructose, glucose, and fruit essence, corn or maltose sugar. These added ingredient candies are high in calories but low in nutrients and functional or medicinal benefits. But nowadays, fruit candies are gaining popularity because of their high acceptance, low volume, better nutritional content, and extended shelf life [42]. Candies are mainly found in market are of two types

- Hard candy and toffees (Non crystalline): They are prepared with sucrose, glucose syrup (or corn syrup), and/or other sugars and sweeteners, as well as coloring and flavoring compounds and organic acids as minor

components. The moisture level of commercial hard candy and toffee commodities is less than 5% wt/wt [43].

- Soft candy (Crystalline): Small crystals and a creamy texture characterize their structure, which melts in the tongue or may be eaten effortlessly.

In a study fruit candy from unripe mango was prepared with three replications comprising eight treatments viz. T1: Hot water blanching + Powder sugar, T2: Steam Blanching + powder sugar, T3: Steam blanching + 40°Brix sugar syrup, T4: Without blanching + powder sugar, T5: Hot water blanching + honey, T6: Steam blanching + honey, T7: Hot water blanching + 40° Brix honey syrup and T8: Without blanching + honey. It was observed that treatment T3 and T7 yields better results in terms of 78.23°Brix TSS, 77.00 % total sugar, 35.48 % reducing sugar, 7.75 mg / 100 g of ascorbic acid and acidity 1.1%. Also, in terms of storage period, T7 had the best biochemical property preservation, followed by T3 [44]. Another study was conducted in which pumpkin was used to prepare the candies to make use of underutilized fruits having functional properties. The candies made with pumpkin extract showed much higher acceptance of sensory criteria than control candies. In comparison to control candy, candy made with pumpkin juice had a higher nutritional content. Pumpkin candies had a 5% increase in protein, fibre, and minerals such as calcium, iron, and phosphorus. Pumpkin candies have a higher antioxidant content. Both pumpkin and control candies had the same amount of fat. Carbohydrates were present in greater quantities in the control candies. As a result, when compared to control candies, the pumpkin juice-based candies have a higher nutritional content [45].

Fruit jelly

Jelly is a semi-solid food made by cooking fruit juice with sugar and adding pectin and acid to raise the total soluble solids (TSS) concentration to > 65 percent [46]. Confectionery such as chewing gum, candy, and jellies are food forms that may be supplemented with functional components such as vitamins, antioxidants, fiber, and probiotic bacteria due to their widespread market appeal [47]. In a study Lago-Vanzela *et al* [48] developed a caja-manga jelly along with its peels and from the results it is concluded that the peels had higher protein, lipids, ashes, food fiber, total carbohydrates, and pectin concentrations, as well as reduced moisture content as compared to the pulp. It is also found that completely replacement of pulp in the formulation with the peel resulted in a product with high nutritional content and no sensory issues. Curi *et al* [49] evaluated the physicochemical properties, bioactive chemicals, and antioxidant activity of several Native American physalis species (*Physalis peruviana* L., *Physalis pubescens* L., *Physalis angulata* L., *Physalis mnimos* L., and *Physalis ixocarpa Brot*). From the study it is evaluated that the *Peruviana*, *Pubences*, and *Angulata* are the most nutrient-dense species, having the highest amounts of phenolic compounds, vitamin C, and antioxidants. According to Silva *et al* [50] Bocaiuva pulp is abundant in minerals and antioxidants. So, they developed and evaluated jellies made from bocaiuva pulp (*Acrocomia aculeata* (Jacq.) Lodd ex Mart) of two morphotypes, orange and yellowish, in terms of physical and chemical characteristics. The results showed that the total phenol concentration and antioxidant capability of fresh pulp and jelly prepared with yellowish pulp were greater. Igor *et al* [51] outlines a method for creating a technology for making fruit jelly with a better carbohydrate profile. As a source of carbohydrates, they employed viburnum and orange puree, as well as fructose as a sugar replacement. The results showed that sample with the 75:25 ratio of viburnum to orange puree had an AOC of 22.33 mol TEq/g. It was twice as high as the AOC of the sample with a 25:75 ratio. Hence, the fruit jelly can be suggested as a diet item with preventive characteristics.

Table 1: Fruit-based jelly products and their functional characteristics

S. no	Fruit	Product	Characteristics	Reference
1	Sonneratia apetala	Jelly	Low in fat and free fat High in fiber	[37]
2	Apple, figs and *Moringa oleifera*	Jelly	Improved nutritional value of the product Fortified food is rich in calcium.	[52]
3	Caja-manga with its peels	Jelly	The resulted product with peels had higher protein, lipids, ashes, food fiber, total carbohydrates, and pectin content.	[48]
4	Bocaiuva • Orange • Yellow	Jelly	Total phenols and antioxidant capability of jelly prepared with yellowish pulp was greater.	[50]
5.	Orange, viburnum (as a carbohydrate source)	Jelly	Results showed that the jelly made from these had high anti-oxidant capacity.	[51]
6.	Sonneratia apetala	Jelly	This jelly produced is rich in vitamin C.	[53]
7.	Apple, Bamboo, Psyllium and wheat.	Jelly	The resulted poduct was enriched in fibre. The only sample which did not exhibit any syneresis was psyllium enriched jelly.	[54]
8.	Jucara and Passion fruit	Jelly	The customized candies had a high acceptance rating. The study shows that juçara and passion fruit jellies are good *B. coagulans* carriers.	[47]
9.	Orange, Strawberry and Black mulberry	Jelly	A new jelly was created as a healthier alternative to current ones using minimum processing with honey and fruit juices instead of sugar syrup and chemical additives.	[55]
10.	Banana (peel)	Jelly	The resulted peel jelly of banana has quite high DPPH and total phenolic content which ranges from 0.843 7 to 0.995.	[56]
11.	Strawberry and beetroot	Jelly	One combination from the research (75%strawberry + 25% beetroot) showed highest value of bioactive compounds.	[57]

Fruit bars

Fruit bars are a dehydrated and shelf-stable confectionery product. These may be a healthy alternative to conventional desserts, cookies, and cakes that are rich in fat or sugar [58]. Fruit bars can consist of a variety of pulps, fresh or dried fruit, sugar, binders, and other minor components. Furthermore, fruit bars may be an excellent quick snack that provides the necessary dietary fiber and other bioactive elements for individuals to satisfy their daily needs [59]. Kourany M S *et al* [60] developed mango and guava bars fortified with protein with enhanced sensory qualities and high nutritional content which are appropriate for direct consumption as an alternative for confectionery and snacks with no nutritional value. When it comes to protein fortification, using 1% milk protein concentration is preferable for the production of mango bars, whereas adding 2.0% whey protein to guava is more convenient. Results showed that the protein-fortified mango-and guava bars have good sensorial character and of high nutritive values because of their high levels of sugar, proteins, fibers, minerals amino-acids, and vitamin C and β-carotene. Another experiment was performed in which low calorie fruit bars from apple juice combined with locally produced fruits like grape and banana (poovan variety). The fruit extract was combined in varied quantities, such as 30:70, 40:60, 50:50, 60:40, and 70:30, as well as additives like sugar, pectin, and sodium benzoate were also added. The moisture level (12-20%) and Vitamin C content (18-24 mg/g) of the prepared fruit bars were determined. From the analysis of the prepared fruit bars the sensory and textural acceptance of bars made with an apple-grape mix was significantly high [61]. Fruit bars, on the whole, have a high nutritive value than fresh fruits since all nutrients are concentrated, and so would be a convenient meal selection to reap the advantages of fruits. Fruit bars are becoming a popular and handy food because of the rising customer desire for nutritious, natural, and convenient foods [10].

Fruit toffee

Fruit toffee is a dried pulp with the right balance of sugar and acid. The product must have a TSS of 75%, moisture content of 20% and a fruit content of 25%. It has been claimed that pulpy fruits such as mango, guava, papaya, fig, jackfruit, and others may be used to prepare toffee; such fruit toffees are inherently highly nutritious since they include the majority of the elements of the fruit from which they are made [62]. Chavan *et al* [63] scrutinized a technology for preparation of mixed toffee from strawberry and guava (sardar) pulp and examined the compositional chemical changes and sensory properties of toffee during storage. In terms of organoleptic characteristics and nutritional quality, toffee made with 70:30 w/w (guava: strawberry) ratios surpassed other combinations. Guava pulp has a strong flavor and is abundant in vitamin C (100–260 mg/100 g), and also minerals like phosphorus and calcium. Strawberry is known to clean or clear the blood of toxic toxins, gout, and lethargic liver, dissolve tartar on teeth, high blood pressure, strengthen and repair the gums, as well as prevent mouth and lip cancer. In another investigation by Kumar *et al* [64] mixed fruit toffee was prepared from mango and papaya pulp at different proportion. Essential minerals, vitamins, and other nutritious elements are abundant in mango pulp. It is high in vitamin A (4800 IU/100g), vitamin C, vitamin B complex, iron, phosphorus, and other essential nutrients. Toffee is a sugary confection that is popular among children. The use of mango pulp and papaya pulp in toffee production provides essential nutrients such as vitamin A, ascorbic acid, fiber, and minerals. Papaya does not bring in a lot of money since its order isn't very appealing, which restricts its commercial exploitation on both a consumer and processing level. However, mango has a sweet fragrance and a refreshing acidic flavor. As a result, combining papaya and mango pulp might be a cost-effective way to get the most out of them. As a result, there is a lot of potential for making mango and papaya pulp using simple technology and using it to make mixed fruit toffee.

Fruit confectionery better than other confectionery

As the rising interest in functional foods, scientists and food producers are looking for new sources of bioactive substances and also carriers of those substances. One of the possibilities to increase the content of natural antioxidants in the diet is to enrich food products with concentrated fractions of plant polyphenolic compounds [65]. According to Rumora *et al* [66], functional confectionery is defined as "a confectionery item that has standard confectionery ingredients removed or replaced with an ingredient that fulfills a specific physiological function or claims to offer potential health benefits. Manjula and Suneetha [45] indicated that sugar boiled confectioneries have a large potential for growth as they are penetrated in estimated 15% of households only. Cappa *et al* [67] studied the physico-chemical properties of soft candies enriched with grape skins that are released as by-products during the winemaking process. According to the results, adding grape skin powder to a product does not reduce its acceptability; on the other side, it boosts the anthocyanin, flavanol, and procyanidin content of the final product.

Fruit candies are becoming more and more popular because of high acceptability, minimum volume, higher nutritional value and longer shelf life. They have additional advantage of being least thirst provoking and ready to eat snacks [42]. Fruit confectionery products are benefiting from extending the snack product line to include healthy snacking for consumers with health and diet concerns. Some new products thus claims to be organic or natural choice and they are emerging with labels such as eco-fruit, organics, natural, fat free, etc. Some fruit-containing dairy products and sports and energy drinks are aimed at consumers with health concerns. A range of low or no fat, no added sugar, vitamin and mineral fortified, etc. products with assorted fruit varieties are now available. Some new products in the wine category also distinguish themselves as drinks produced from fruits grown under specific climatic conditions while others claim to be produced from natural fruits [68]. In the Global food market, confectionary industry plays essential role. Usually confections are low in nutrients and high in calorie. Low sugar confections are gaining popularity because of its low calorific value, its nutritional health benefits [69].

Wellness-oriented fruit products on the rise or market oppurtunities in the health and wellness sector

Significant changes have been noted in the area of fruit juice and juice drinks in particular. The majority of new fruit juice products pitch themselves as healthy and functional beverages supplemented with additional nutrients such as vitamins and minerals, or they claim to be calorie-free, low

fat, natural, with no added sugar or preservatives. Sparkling juice drinks are also becoming more popular, making the category more competitive with non-alcoholic beverages such as water and soft drinks. This line extension's product developments concentrate on flavor and diversity. Low sugar, low calorie, no preservatives, and other healthful attributes are also found in the canned and frozen fruit categories. Some items advertise themselves as organic or all-natural. Fruit spreads are also becoming more popular as healthy and useful foods, with attributes such as low calorie, no added sugar, no additives or preservatives, made entirely of fruit, vitamin/mineral fortified, organic, and so on. Extending the snack product range to include healthy snacking for consumers with health and diet concerns has benefited fruit confectionery items. As a result, several new items claim to be organic or natural, and labels like eco-fruit, organics, natural, fat free, and so on are appearing. Some fruit-flavored dairy products, as well as sports and energy beverages, are marketed at those who are concerned about their health. A variety of low-fat, no-sugar, vitamin-and-mineral-fortified, and other products containing various fruit kinds are now available. Some new wines claim to be made from fruits cultivated in certain climates, while others claim to be made from natural fruits.

Fruits are highly regarded as convinient products

Minimally processed fruits are transforming the fresh fruit market, which was formerly thought to be seasonal, unbranded, and bulk, by making the product more convenient and indistinguishable. The development of new goods in the fruit juice and juice drink market has also been aided by packaging innovation. Many juice drinks have been introduced as ready-to-drink goods that are easy to transport. Surprisingly, several modern packaging designs are emphasizing languages and product explanations as well. In order to gain market share, manufacturers are developing not just novel tastes, but also novel packaging. New dried fruit items are shrinking in size and are packaged in easy-to-open, easy-to-eat, and stay-fresh plastic tubs, pouches, or platters, giving consumers a handy method to travel and enjoy them. As dried fruit producers develop reusable bags for the home, workplace, and automobile, plastic zip packets are becoming increasingly popular.

Conclusion

Traditional confectionery products are widely appreciated for their appealing taste, texture, and convenience; however, they generally provide limited nutritional benefits and are often associated with health issues such as obesity, hyperglycaemia, and dental caries when consumed in excess. Increasing consumer awareness of nutrition and healthy lifestyles has created a growing demand for confectionery products that offer both sensory satisfaction and improved nutritional quality. Fruit-based confectionery fulfils this requirement by incorporating fruit pulp, juice, and other fruit-derived ingredients into products such as fruit leather, fruit candies, fruit jelly, fruit bars, and fruit toffee. These products not only preserve desirable sensory characteristics but also enhance the intake of vitamins, minerals, dietary fibre, antioxidants, and other bioactive compounds. The studies reviewed indicate that fruits including mango, papaya, guava, pumpkin, pomegranate, and strawberry can be effectively utilised in confectionery formulations to improve nutritional and functional attributes while maintaining high consumer acceptability. Furthermore, fruit-based confectionery provides the advantages of convenience, portability, and extended shelf life, making it well suited to contemporary consumer preferences. The utilisation of surplus and underutilised fruits in these products also contributes to reducing post-harvest losses and promoting sustainable food systems. Overall, fruit-based confectionery represents a promising alternative to conventional confectionery by combining sensory appeal with enhanced nutritional value, thereby supporting healthier dietary choices and addressing public health concerns associated with excessive sugar consumption. Continued advancements in formulation strategies, processing technologies, and product development are expected to further strengthen the commercial potential of fruit-based confectionery, benefiting consumers, food manufacturers, and the food industry as a whole.

Acknowledgments

The facilities provided by the Department of Food Science and Technology at Punjab Agricultural University are greatly appreciated by the authors.

Conflict of interest- Authors declare no conflict of Interest.

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