



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(7): 954-957
© 2022 TPI
www.thepharmajournal.com

Received: 12-04-2022
Accepted: 16-05-2022

Mohammed Ajlan

Food Technology and Nutrition,
School of Agriculture, Lovely
Professional University,
Phagwara, Punjab, India

Hafiz Farhan

Food Technology and Nutrition,
School of Agriculture, Lovely
Professional University,
Phagwara, Punjab, India

Mohammed Ashif T

Food Technology and Nutrition,
School of Agriculture, Lovely
Professional University,
Phagwara, Punjab, India

Muhammed Sajid EK

Food Technology and Nutrition,
School of Agriculture, Lovely
Professional University,
Phagwara, Punjab, India

Corresponding Author

Mohammed Ajlan

Food Technology and Nutrition,
School of Agriculture, Lovely
Professional University,
Phagwara, Punjab, India

Comprehensive review on milk based smoothies: Current status and nutritional impact

Mohammed Ajlan, Hafiz Farhan, Mohammed Ashif T and Muhammed Sajid EK

Abstract

The aim of the work was to know the review of milk-based smoothies and their consumption as an easy, nutritive, and innovative form among consumers. Smoothies are a liquid refreshing drink that is commonly used as a health-conscious supplement for maintaining a healthy lifestyle. Smoothies might comprise complete fruits and vegetables with milk or milk products or various sections of them. Because fiber and liquid are not separated, thus smoothie's nutritional and digestive characteristics are enhanced. Milk has high nutritional value compared to other foods. Milk contains vitamins, minerals, fats, protein, etc., which is good for consumption. Breakfast consumption in humans is low, which can't be avoidable. For that, industries are now making ready-to-use products that include all healthy values in one hand. By consuming, smoothies can increase the intake of more vegetables, fruits, milk, cereals, etc., in the human food cycle.

Keywords: Smoothies, milk, Innovative, breakfast, market, trends

Introduction

Now a day's consumers are rapidly expecting innovative and healthier ready-to-eat goods that are close to their natural fresh counterparts in terms of minimal processing, nutritional quality, and food safety (Hendrickx & Knorr, 2002) [8]. In response to this need, the food industry in the twenty-first century is developing new functional goods incorporating the use of unique processing methods (Keenan *et al.*, 2010) [11]. Smoothies are a great and handy way to include more nutrients into your diet on a daily basis (Rodriguez-Verastegui *et al.*, 2016) [24]. They are nonalcoholic drinks that contain milk and milk-based products such as yogurt, ice cream, milk. The consistency of smoothies is thick than slushy. They're combined without straining and frequently served with crushed ice. (Castillejo *et al.*, 2015) [4]. Smoothies were first introduced in the 1990s and are now one of the fastest-growing segments of the beverage business (Mordor Intelligence, 2017) [19]. Smoothies have traditionally been promoted as a healthy beverage option for fitness freaks (Cano-Lamadrid *et al.*, 2018) [3]. Smoothies are a great and handy way to include more fresh fruits and vegetables into your diet on a regular basis (Rodriguez-Verastegui *et al.*, 2016) [24].

Smoothies have recently gained a lot of popularity, with item growth increasing by 2.39 times from 2002 to 2007, according to food merchandisers (Lal, 2007) [14]. The two most important criteria for a fast-paced lifestyle are comfort and fitness food qualities. Dietary changes are the most common treatment for human wellness development (Williams *et al.*, 2005; Sabbe *et al.*, 2009; Verbeke *et al.* 2009) [32, 25, 29]. In an online study of Australian citizens, 79% of which are female, the smoothie consumption pattern and individual motivations were identified. In their smoothies, candidates said they consumed 98% fruit, 46% fruit juice, 66% yogurt, 52% honey, 58% milk, and 46% nutritious supplements. In contrast to rare smoothie purchasers, visit smoothie purchasers were shown to consume more center food and fewer intended items, such as nectar, frozen yogurt, and so on. Smoothies are regarded as nutritious by frequent smoothie drinkers (84%), while they are regarded as indulgent beverages by infrequent smoothie drinkers (62%) (McCartney *et al.* 2019) [17].

Smoothies as breakfast

Breakfast is typically the first and finest meal of the day. Breakfast meals vary greatly amongst cultures but often contain a carbohydrate like cereal or rice, fruits and/or vegetables, protein, dairy, and a beverage.

Breakfast eating is linked to a variety of advantages, including improved mental health in adults and adolescents (Ashwell, 2010) [2], improved nutrition. Weight loss, satiation, total energy intake moderation throughout the day, and healthy lifestyle choices (Hunty and Ashwell, 2007) [5]. Skipping breakfast reduces fasting lipids and postprandial insulin sensitivity and might contribute to weight gain if the absorbed higher calorie intake is maintained. Breakfast is skipped by one out of every three Indians, with women outnumbering males. According to a poll, 42% of Mumbai residents skip breakfast or search for a quick snack (Huang *et al.*, 2010) [10]. Smoothies are an easy and convenient method to include additional nutrients into your regular diet. Smoothies are a terrific and convenient way to include more fresh fruits and vegetables into your diet on a consistent basis (Rodriguez-Verastegui *et al.*, 2016) [24]. They aid in the promotion of a healthy diet and lifestyle. It has a wide range of ingredients, including fruit, dairy products, pulp, yogurt, and sweets on occasion (Walkling-Ribeiro *et al.*, 2010) [28].

Milk

Milk is a nutrient-dense, complex food, and milk-derived products are one of the world's most important food sources. While the world's human population continues to expand, the need for food grows at a rapid pace. Due to increased milk consumption in emerging nations, around half of the world's total milk output is eaten in the form of fresh dairy products, with this proportion expected to rise to 52 percent over the next ten years. Developing nations eat 68% of fresh dairy products, with this figure predicted to rise to 73% in the following decade. People are taking much too many calories from solid fats, added sugars, and entire grains. Even this, many people never get enough micronutrients and fibers. Children, the elderly, and the poorest are frequently found to have the greatest deficiencies. Numerous nutrients and dietary categories have been listed as being of concern in the 2010 Dietary Guidelines. It was recommended that consumers minimize their intake of added sugars and saturated fats while increasing their intake of calcium, vitamin D, potassium, and fiber. Whole grains, fruits, vegetables, and milk were among the food groups promoted. (Drewnowski and Darmon, 2005; USDH, USDA, 2010; Wang Y, Beydoun MA, 2007) [6, 28, 31].

Milk is high in calcium, which is necessary for the formation and development of strong bones and teeth, as well as muscular activity and nerve messages. Many linked organizations assert that including enough calcium in one's regular diet helps to avoid bone fractures and osteoporosis. It's also high in potassium, which aids blood vessel dilation and lowers blood pressure. Increased potassium consumption rather than sodium intake lowers blood pressure and reduces the risk of heart disease and stroke (McCarron, 1998) [16]. Milk and dairy products contain a wide range of important nutrients for human growth and upkeep. Casein, whey proteins and immunoglobulin, conjugated linoleic acid (CLA), lactose and minor oligosaccharides such as prebiotics, calcium, phosphorous, vitamin D, and riboflavin, as well as various probiotic bacteria such as *Bifidobacterium bifidum*, are all found in milk and dairy products as essential nutrients for human health and maintenance. Milk-based foods account for over 43% of the market for functional foods (Özer and Kirmaci, 2010; Kelly *et al.*, 2009) [22, 12].

Composition of milk

Typical bovine milk contains 87% water and 13% solid, as

shown in Table 1.

Table 1: composition of bovine milk (Fox, 2003) [7]

Milk Composition	Percentage
Water	87.5
Total Solids	12.7
Fat	4.5
Protein	2.9
Lactose	4.1
Ash (minerals)	0.8

Preparation of smoothies

Industrial milk smoothies are made primarily by a high-speed mixing process that includes homogenization and heat treatment. The following are some prerequisites for a high-speed mixing process: (a) When frozen solids, hard, or fibrous raw materials are used, all equipment may be required to chop and puree the solid ingredients; (b) when powdered ingredients such as milk powders, stabilizers, and sugar are used, all equipment may be required to disperse powdered ingredients such as milk powders, stabilizers, and sugar are used, all equipment may be required to cut and puree the solid ingredients; and (c) the mixing system must disperse such powdered ingredient (An powdered ingredient (Castillejo *et al.*, 2016) [4].

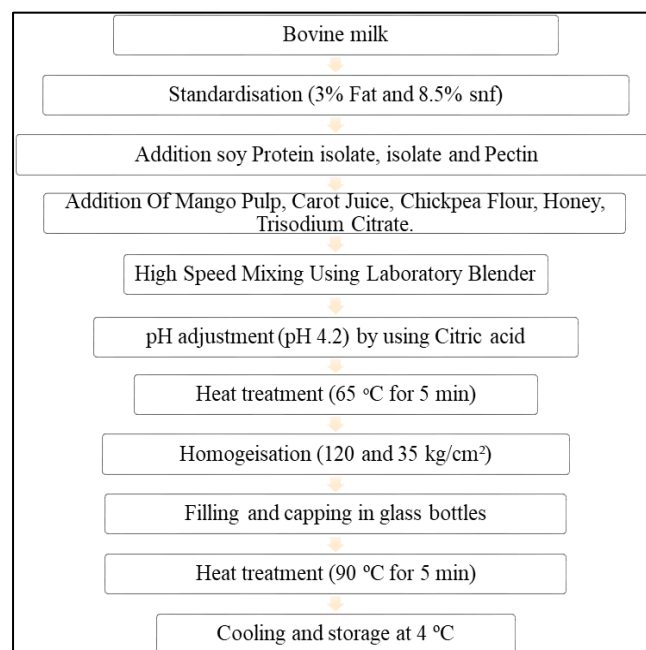


Fig 1: Mehta *et al.* 2017 [18]

Market scenario of smoothies

Many food firms struggle to bring new goods to market in a timely way. It takes time to develop new, relevant items and then moves them via R&D, testing, and marketing to retail. Consumer tastes are volatile, and it is becoming increasingly important to address them (Heneghan, 2016) [9]. Food companies operate in a very competitive, global economy, and they must continually invest in new product development. They are undergoing transformations as a result of rising operating costs. Automation solutions that might help the sector become more lean and agile are on the rise as a result of this shift (Mahalik- Michalk, 2008) [15]. It is critical for customers to raise their level of awareness in order to keep up with new trends and breakthroughs. Product components, as well as nutritional and harmful consequences of the finished

product, are all things to be aware of. It's a significant criterion since certain components may be ingested by people of all ages, while others might have deadly consequences for a person's health (Olivo, 2015) [21]. According to commercial sources, the "smoothie business" has grown significantly in several countries, including Australia, the United Kingdom, New Zealand, the United Kingdom, and the United States (Technavio 2016) [26].

McCartney *et al.* (2019) [17] conducted an online survey of Australian individuals, with roughly 79% of the respondents being female, to determine the smoothie consumption pattern and individual motivations. In their smoothies, candidates said they consumed 98% fruit, 46% fruit juice, 66% yogurt, 52% honey, 58% milk, and 46% nutritious supplements. In contrast to rare smoothie purchasers, visit smoothie purchasers were shown to consume more center food and fewer intended items, such as nectar, frozen yogurt, and so on. Smoothies are seen as healthful by frequent smoothie drinkers (84%), but they are regarded as decadent beverages by infrequent smoothie drinkers (62%).

New trends and types of smoothies

Breakfast is traditionally regarded as the most important meal of the day (O'Neil *et al.*, 2014) [20]. Various recent trends and innovations in smoothies were made in preparation. Some of them are mentioned below.

Cereal-Milk Fruit Smoothies McCartney *et al.* (2019) [17]

Cereal-based milk fruit smoothies have a high energy value the nutritional value of three of the food. The formulation consists of

- Full cream milk- 42%
- Banana-26.2%
- Blueberry- 14.5%
- Yoghurt-11.3%
- SMP- 3.0%
- Psyllium husk- 2.5%
- Water

Flour-Milk based smoothie Rani *et al.* (2016) [23]

This smoothie has the nutritional value of flour and milk. The formulation consists of

- They sprouted finger millet flour.
- Germinated sorghum flour.
- Germinated green gram flour.
- Germinated chickpea flour.
- flour went between 2-6%
- Mango mash 10%, 15%, and 20%.
- Sugar-9% 10% and 11%

The sensory evaluation said that it has the effect of apple juice and mango pulp on sensory attributes, the effect of flour levels on sensory attributes, the effect of sugar level on sensory attributes.

Green coconut smoothies Teixeira *et al.* (2019) [27]

- Solid albumen of green coconut- 20%
- Acerola pulp.
- Pineapple pulp.
- coconut water- different ratios

It has Vitamin C content, healthy values such as Antioxidant capacity, Sensory acceptability.

Pumpkin leaves fortified Smoothie Aderinola (2018) [11]

- Pineapple.
- Banana.
- Apple.
- Pumpkin leaves (4.5%, 3% and 1.5%).

It has Vitamin C, Mineral content, Total flavonoids, Total Phenolic, Antioxidants.

Olive Leaf Extract fortified smoothie Kranz *et al.* (2010) [13]

- Sodium cyclamate.
- Sucrose.
- Sodium chloride.
- Citric acid.
- Strawberry-Banana smoothie.
- Olive leaf extract with oleuropein content.
- Modified starch.

Conclusion

The review paper highlights the comprehensive review of milk-based smoothies and with fruits, vegetables, cereals, etc. Today the beverage market is competing with the new trends of drinks that have more nutritional value. Smoothies nowadays are considered as good breakfast which has all nutritional content in one hand, which is easier to make, good in taste, and it has its own benefits. Various types of smoothies, their preparation, nutritional values, limitations were mentioned. As the smoothies are based on milk, it's also important to mention. The composition of milk, its healthy values were also added. Preparation of smoothies with a chart is mentioned with the market strategies, and the different types of smoothies with the trends are also mentioned. Smoothies have a good future in the present market. Furthermore, many of the constraints in smoothies can be minimized through its commercialization and research that makes in utilizing various perishable seasonal fruits into value-added nutritive products, which in turn enhances its economic demand.

Reference

1. Aderinola TA. The Impacts of Lemon Juice on The Physicochemical And Antioxidant Properties of Smoothies. *Annals Food Science and Technology*. 2018;19(4):675-83.
2. Ashwell M. An examination of the relationship between breakfast and BMI. *British Journal of Nursing*. 2010;19(17):1081.
3. Cano-Lamadrid M, Hernández F, Nowicka P, Carbonell-Barrachina AA, Wojdyło A. Formulation and storage effects on pomegranate smoothie phenolic composition, antioxidant capacity and color. *LWT*. 2018 Oct 1;96:322-8.
4. Castillejo N, Martínez-Hernández GB, Gómez PA, Artés F, Artés-Hernández F. Red fresh vegetables smoothies with extended shelf life as an innovative source of health-promoting compounds. *Journal of food science and technology*. 2016 Mar;53(3):1475-86.
5. De La Hunty A, Ashwell M. Are people who regularly eat breakfast cereals slimmer than those who don't? A systematic review of the evidence. *Nutrition Bulletin*. 2007 Jun;32(2):118-28.
6. Drewnowski A, Darmon N. Food choices and diet costs: an economic analysis. *The Journal of nutrition*. 2005 Apr 1;135(4):900-4.

7. Fox 3rd PF. Advanced Dairy Chemistry, Fox, PF, McSweeney, PLH, Eds.
8. Hendrickx ME, Knorr D, editors. Ultra-high-pressure treatment of foods. Springer Science & Business Media; 2012 Dec 6.
9. Heneghan C. major challenges facing the food and beverage industry in 2016.
10. Huang Z, Lu Y, Majithia R, Shah J, Meissner K, Matthews KS, Bondos SE, Lou J. Size dictates mechanical properties for protein fibers self-assembled by the drosophila hox transcription factor ultrabithorax. *Bio macromolecules*. 2010 Dec 13;11(12):3644-51.
11. Keenan M, Dillenburger K, Doherty A, Byrne T, Gallagher S. The experiences of parents during diagnosis and forward planning for children with autism spectrum disorder. *Journal of Applied Research in Intellectual Disabilities*. 2010 Jul;23(4):390-7.
12. Kelly P, Woonton BW, Smithers GW. Improving the sensory quality, shelf-life and functionality of milk. In *Functional and speciality beverage technology*. Woodhead Publishing. 2009 Jan, 170-231.
13. Kranz P, Braun N, Schulze N, Kunz B. Sensory quality of functional beverages: Bitterness perception and bitter masking of olive leaf extract fortified fruit smoothies. *Journal of food science*. 2010 Aug;75(6):S308-11.
14. Lal GG. Getting specific with functional beverages. *Food Technology*. 2007;61(12):24-31.
15. Mahalik NP, Michalk R. Retrofitting fieldbus technology in food industry. In *2008 World Automation Congress IEEE*. 2008 Sep 28, 1-5.
16. McCarron DA. Diet and blood pressure--the paradigm shift. *Science*. 1998 Aug 14;281(5379):933-4.
17. McCartney D, Langston K, Desbrow B, Khalesi S, Irwin C. The influence of a fruit smoothie or cereal and milk breakfast on subsequent dietary intake: a pilot study. *International Journal of food sciences and nutrition*. 2019 Jul 4;70(5):612-22.
18. Mehta D, Kumar MH, Sabikhi L. Development of high protein, high fiber smoothie as a grab-and-go breakfast option using response surface methodology. *Journal of food science and technology*. 2017 Nov;54(12):3859-66.
19. Mordor Intelligence. 2017. Global smoothies market-major trends, growth and opportunities. (2017-2022).
20. O'Neil CE, Byrd-Bredbenner C, Hayes D, Jana L, Klinger SE, Stephenson-Martin S. The role of breakfast in health: definition and criteria for a quality breakfast. *J Acad Nutr Diet*. 2014; 114: S8-26.
21. Olivo L. Taking the active nutrition market to new heights. *Nutraceuticals World*. 2015;18(8):52-64.
22. Özer BH, Kirmaci HA. Functional milks and dairy beverages. *International Journal of Dairy Technology*. 2010 Feb;63(1):1-5.
23. Rani R, Kumar MH, Sabikhi L. Process optimisation for a ready-to-serve breakfast smoothie from a composite milk-sorghum base. *International Journal of Dairy Technology*. 2016 Aug;69(3):372-9.
24. Rodríguez-Verástegui LL, Martínez-Hernández GB, Castillejo N, Gómez PA, Artés F, Artés-Hernández F. Bioactive compounds, and enzymatic activity of red vegetable smoothies during storage. *Food and Bioprocess Technology*. 2016 Jan;9(1):137-46.
25. Sabbe S, Verbeke W, Damme PV. Analyzing the market environment for acai (*Euterpe oleracea* Mart.) juices in Europe. *Fruits*. 2009;64(5):273-284.
26. Technavio. 2016. Global Smoothies Market 2016-2020. Technavio.630. The Neilson Company. From breakfast to 'breakfaster: Liquid breakfast buyers double631 over the past five years. New York, USA. 2014.
27. Teixeira NS, Torrezan R, Freitas-Sá DD, Pontes SM, Ribeiro LD, Cabral LM. Development of a fruit smoothie with solid albumen of green coconut. *Ciência Rural*. 2019 Jan 17, 49.
28. U.S. Department of Health and Human Services, U.S. Department of Agriculture: Dietary Guidelines for Americans. Washington, DC: USDHH, USDA, 2010.
29. Verbeke W, Scholderer J, Lähteenmäki L. Consumer appeal of nutrition and health claims in three existing product concepts. *Appetite*. 2009 Jun 1;52(3):684-92.
30. Walkling-Ribeiro M, Noci F, Cronin DA, Lyng JG, Morgan DJ. Shelf life and sensory attributes of a fruit smoothie-type beverage processed with moderate heat and pulsed electric fields. *LWT-Food Science and Technology*. 2010 Sep 1;43(7):1067-73.
31. Wang Y, Beydoun MA: The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and meta-regression analysis. *Epidemiol Rev*. 2007;29:6-28,.
32. Williams E, Stewart-Knox B, Rowland I. A qualitative analysis of consumer perceptions of mood, food and mood-enhancing functional foods. *Journal of nutraceuticals, functional & medical foods*. 2005 Feb 9;4(3-4):61-83.