

Review Article

The Essence of Bengal's Ethnic Sweetmeats: An Exploratory Journey through History, Tradition, and Culture

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The enthralling sweet taste that mesmerizes the eastern part of India, or more specifically the undivided Bengal (West Bengal and Bangladesh) is unveiled. The ethnic sweetmeats that originated in Bengal varied over their primary ingredients, size, shape, and process of production due to variation in the context of geographical, cultural, and religious beliefs. In total, thirty-eight numbers of sweet products that are originated in Bengal are reconnoitered along with their nutritional composition and shelf life. Based on the key ingredients, the sweetmeats can be divided into nine classes, namely, chhana-based, pulse-based, fried, milk-skin-based, extruded rice-based, fermented, khoa-based, fruit-based, and sugar-based. Nutritional heritage comes along with health-related benefits to mankind; the racial sweetmeats produced in undivided Bengal have crucial medicinal and gastronomical importance. The sweetmeats are basically the assimilation of ancestral Bengali tradition, rituals, and convictions through the cascade of time. The classical and folk processing methods practiced from antediluvian times have had a prominent impression on the taste and nutritional compartment of the sweets produced. To the best of our knowledge, this article is the first attempt to scientifically document the integrity of the processing methods, nutritional content, and health benefits of traditional sweetmeats.

1. Introduction

Ethnic sweets have some historical antecedent which is specific to the regions of a particular country, with geographical shreds of evidence. Traditional sweets can be referred to as the sweets that can be processed by using specific ingredients and preparation methods that are served from one generation to the next for an extended time span. These are influenced by factors like the raw materials of the region with its agricultural customs, tradition, and location. The traditional sweetmeats are an integral part of the cultural heritage of that particular region and influence the socio-economic status.

Cattle were an integral part of the Vedic culture and referred to as “vara” (blessings). The cow is mentioned 700 times in the Rigveda (1500–1200 BCE). There was a vivid description in *Arthashastra* (an ancient Indian Sanskrit treatise on statecraft, economic policy, and military strategy) about commercial milking (*dohaka*) and churning (*manthaka*). *Panchagavya* (an organic product having the potential to play the role of promoting growth and providing immunity in plant system) was considered as the supreme purifying material in the Hindu rituals. The principal ingredients of *Panchagavya* were ghee (clarified butter), cow dung, cow urine, and curd as mentioned in the *Atharvaveda*

(collection of hymns and incantations that forms part of the ancient sacred literature of India known as the Vedas). During the 1st millennium B.C., the processing of sugarcane was practiced in India [1]. The cane crushing machine called “*yantra*” was widely used at that time. The refined sugar was imported from China to India, though concentrated cane juice or “*phanita*” was practiced in India from the primeval time. “*Gur*” (jaggery) processing was a heritage cottage industry in Bengal, the name “*gur*” originated from “*Gour*,” the ancient name of Bengal province, further solidifying of which resulted in the production of “*sarkara*” or amorphous sugar particles. The milk solid was termed “*kurchika*” that was served to the soldiers, whereas the sugared and spiced curd “*rasala*” was a popular home item after the 3rd century B.C. [2]. The ancient Indian dessert preparation was “*payasam (milk and rice pudding)*” in which the solid part of curd was mixed with milk, sugar, and fragrant herbs. According to the Hindu Bengali ritual, the newly married bride would boil the newly harvested rice mixed with milk and jaggery which is considered as the symbol of prosperity and well-being of their married life. According to Rigveda (the oldest of the sacred books of Hinduism), the guests were welcomed with “*Madhuparka*,” which is a honey-sweetened concoction of curd and ghee. The chewing of sugarcane was widely mentioned in Atharvaveda [3]. Milk derived “*gharta*” (ghee) is used for frying or as mixing with *soma* juice (a drink used in ancient India in the (Vedic) culture). According to *Ayurveda*, ghee is considered as a virtual panacea, and in the 18th century, an eminent physician wrote “ghee rejuvenates, is tasty, alleviates *pitta* and *vata*, removes poisons, prolongs life, promotes growth, and destroys sins and poverty” [4]. Ghee was one of the favorite foods of *Agni* (the God of fire), as described in several hymns of the *Rigveda* (an ancient Indian collection of Vedic Sanskrit hymns). Puffed rice (*muri*) sweetened with honey or sugar was offered to God, and *Yavagu*, a sweet gruel of rice mixed with spices and ghee, became a standard *Ayurvedic* remedy for digestive problems.

The sweet taste is a naturally alluring agent in our diet. It allows the flavour of sugar such as sucrose, glucose, lactose, maltose, and fructose [5]. This sweet taste appears in various fruits, vegetables, grains, seeds, nuts, spices, herbs, and milk. It is responsible for the growth and maintenance of the mucous membrane, enhances clarity and awareness in spiritual realms, and strengthens the immune system. It plays a significant role in lining the mouth, GI tract, liver, urinary tract, and reproductive system. An excess intake of it may cause tendering the digestive fire, decreases the appetite, and stimulates congestion cold and cough. The metabolic disease, diabetes, and tooth decay have been associated with sugar/sweetmeat consumption [5].

There are some research studies available in the field of Indian traditional sweetmeats though thorough research studies as well as documentation of ethnical Bengali sweetmeat are yet to be explored. As per the best of our knowledge, the nutritional information and keeping quality of those sweetmeats are still to be studied. The processing techniques for these traditional sweetmeats are mostly experience-based; thus, it is our first attempt to document

the integrity of the processing techniques using a scientific approach.

The regional agro-biodiversity can be protected by evaluating and identifying the individuality, safety, nutritional attributes, and quality features of traditional foods, thus promoting the sustainable food production and ecosystem. In these circumstances, traditional foods and sustainable recipes should be introduced to the global consumers. The compositional analysis of composite food items plays a pivotal role in describing the daily nutrient consumption by the population and its close coalition with public health. To preserve and promote ethnic recipes and ethnic food stuffs, a specific database needs to be curated. The traditional knowledge needs to be nourished through tourism, new gastronomic culture, and haute cuisine. The planned development of ethnic foods through ecologically sustainable processes will benefit the environment even more. This technique should be viewed as a viable tool for promoting regional integration and the conservation of natural resources. In this work, the preparation, socio-cultural aspects, nutritional composition, and shelf life of a vast range of ethnic Bengali sweetmeats have been unveiled. The most difficult task in a shifting business is ensuring that millennials continue to consume ethnic products [5].

2. Anthropological Aspect of Bengali Ethnic Sweetmeat

Charyapadas (11th century) is the first ever written Bengali document; *Naishadhacharita* (12th century), *Kalaviveka* (12th century), *Prakritapaingala* (13th century), *Brihad-dharma Purana*, and *Prayashcittaprakarana* contain the mentioning of the traditional Bengali sweet like molasses and naru (coconut sweetmeat). The 18th and early 19th centuries are considered to be the most important chapters in the Bengali lifestyle (*Annadamangal*). The food habits of Bengalis from the 15th to 17th centuries can be summarized from some contemporary compositions like *Mangal Kabya* (16th century). In *Padmapuran*, *Manasamangal*, and *Dharmamangal Kabya*, it is mentioned that Bengalis used to consume milk, molasses, coconut water, and sugarcane. Sri Chaitanya and his devotees were strictly vegetarian and used to consume condensed milk, yogurt, and *payesh* (milk and rice pudding) as dessert [6]. In the middle of the 18th century, *chhana* (cottage cheese) was introduced by the Portuguese into Bengali culinary culture. The Mughals too influenced Bengali customs by infusing the use of spices and fruits (especially mangoes) in Bengali dishes, especially in sweets. In this way, by the end of the 18th century, the orthodox Bengali sweets were progressively getting a conspicuous form [7].

3. Cultural Perspective

Irrespective of cast, creed, and culture, *misti* (sweet) plays a vital role in every household of Bengal. Starting from *bhog* (food offers to God/Goddess) in puja, dessert after lunch/dinner, and a side dish with *luchi* (deep-fried flat bread)/roti

(Indian flat bread)/paratha (flat unleavened bread) to almost in each and every festival, occasion, and social functions, the existence of *misti* (sweet) is a kind of inevitable thing in Bengalis' life. Sweets are an inseparable part of Bengali culture. It is a general custom to offer sweets to the guests in every Bengali household. Sweetmeats were associated with all the cultural and traditional ceremonial events listed on the Bengali calendar. Exchange of sweet is custom on several occasions like the *Nababarsha* (Bengali New Year), *Poush Parban* (harvest festival), and *Deepavali* (Diwali, the festival of lights). In other words, sweets influence the Bengali calendar. In his anthropological works, Sidney Mintz mentioned the colonial history of Britain associated with India, where the transoceanic trade of sweets was conducted through the Bay of Bengal [5]. The Gangetic Belt of India is famous for the rearing of livestock; thus, milk and dairy products are widely popular in these regions, and the sweetness is deeply associated with milk. Before the advent of *Chhana*, Bengali sweets were prepared based on sugar (*nakuldana* and *batasha*) and were not only offered to God but also consumed on a regular basis. After the widespread use of *Chhana* (coagulated milk, followed by the separation of whey water), *sandesh* (dessert) and *rasogolla* (cheese ball) became popular across Bengal. *Kheer*-based sweets were prevalent before the arrival of *Chhana* as mentioned in *Chaitanya Charitamrita* (1557 A.D) [6]. The discussion of Bengali sweets will be incomplete without mentioning the various pots and pans used in the sweet shop. There were four kinds of utensils, namely, *khola* (*pan*), *karha* (*round type frying pan*), *tal* (*pan*), and *tawa* (*frying pan or griddle*) [8].

4. Sociological Perspective

There are numerous festivals in Bengalis society that take place around the year, and depending on this, a good amount of local business also takes place around the year, which plays a vital role in the support of boosting and running the micro, small, and medium scale business in local context. As any festival/ritual/occasion in Bengal is incomplete without the presence of *misti* (sweet), since ancient times in Bengali society there has been a special place of *sweet craftsmen*, which with time evolved into professional sweet maker/chef/technologist. A significant growth has taken place in terms of sweetmeat export. With respect to the economic aspects, there is a huge impact of *misti* (sweet) making business in Bengali society. The ethno-cultural tourism also plays a vital role in boosting *misti* business. Several *misti*-based local tourist spots are coming out as the promising business model which has a significant role in rural livelihood. Starting from *chhana* maker, milk producer, oil business, sugar business, flour business, and flavour business to transport business, sweet craftsman, and shop labor, a large part of Bengali society depends on this *misti* business and each year about \$200 billion in business takes place in this *misti* segment.

5. Methodology

5.1. Region of the Proposed Study. *Bengalis*, popularly known as *Bangalees* or Bengalis, are an Indo-Aryan ethnolinguistic community that originated in and is traditionally associated with the Bengal area of South Asia (Figure 1). They correspond to the *Magadhan* subfamily of the Indo-Aryan language family and belong to the eastern group [9]. The indigenous people are split between Bangladesh, which is a sovereign country, and the Indian states of West Bengal, Tripura, and Assam's Barak Valley. Bengal covers a total area of 232,752 square kilometers (West Bengal (23 districts) accounting for 88,752 square kilometers and Bangladesh (64 districts) accounting for 147,570 square kilometers). Bengal's topography is dominated by the Bangladesh Plain, which is fertile and flat.

5.2. Data Collection. A mixed methodology approach and fieldwork were used to compile a list of sweetmeats consumed, as well as portion sizes and recipes. The native investigators, in partnership with local dietitians, gathered data on foods and recipes. Market and shop assessments ($n \times 2$ marketplaces and 120 outlets surveyed in total), structured interview sessions ($n \times 3$ in total), and individual nutritional surveys ($n \times 12$) from January 2018 to December 2021; n is the number of the districts. Telephonic discussion, online meeting platforms, communication through social media, and physical interview were the used as tool for data collection. The information was gathered in Bengali and then translated into English by the authors.

5.3. Nutritional Analysis. The ethnic sweetmeats were analyzed for their carbohydrate, protein, fat, moisture, and ash content as per our previous experimental procedures [7, 10]. In total, thirty-eight ethnic sweetmeats were considered and purchased from the respective sweetmeat shops. The samples were analyzed on the same day of purchase. The samples were macerated in mortar-pestle before the initiation of the analysis. The shelf life of those samples was determined under $4 \pm 2^\circ\text{C}$ temperature and the edibility was ascertained by sensory analysis only. The sensory panel was constituted with 15 panelists (8 men and 7 women) aged between 21 and 48 years. A 9-point hedonic rating was considered to ascertain the sensory quality [10].

6. Historical Authenticity, Traditional Preparation, Geographical Significance, and Health Benefits of Ethnic Bengali Sweetmeats

6.1. Chhana-Based Sweetmeat. The most important and inevitable ingredient in almost all traditional Bengali dairy-based sweet products is *chhana* or coagulated milk casein. *Chhana* possesses similar health benefits as that of milk. *Chhana* has an edge over milk for those who have lactose intolerance, as the lactose in milk is degraded during the



FIGURE 1: The map of West Bengal and Bangladesh. Undivided Bengal was made up of the West Bengal (Indian state) and the sovereign state of Bangladesh, with a total area of more than 228,000 square km. This landscape constitutes more than 222 million people of which West Bengal possess around 81 million and Bangladesh 141 million, which helped to build the Bengali “nation.”

chhana-making process. It is considered a strong source of calcium, which helps to prevent osteoporosis in adults. It also helps in preventing stomach problems (Table 1).

6.1.1. Sitabhog. *Sitabhog* is one such example of typical food in Bardhaman (23.2324°N, 87.8615°E), India, prepared mainly by using cottage cheese and *Gobindovog* rice powder. “*Sitabhog*” has the exclusive and naturally occurring organoleptic features of taste, mouthfeel, and aroma, which have been widely recognized by judicious consumers across the globe (Figure 2(a)). Alexander of Macedonia visited India in 327 BC, and the philosophers and scientists of his group mentioned that rice was a strange plant to them, and they described it as standing in water and sown in beds, with each plant having so many years that a large producer of the grain itself was obtained. The Moroccan, Ibn Battuta visited India around 1340 AD, and he noted that the rice in Bengal was sown and harvested even three times a year, and was considered as the primary crop of the country. This delicious food was originated in Bardhaman 144 years back, but got its recognition when Lord Curzon visited there on an invitation of Maharaja Vijaychand Mahatabh.

Sitabhog is a popular dessert in West Bengal and resembles white rice served with tiny pieces of *gulab jamuns* known as “*Nikhuti*.” For its production, cottage cheese (“*Chhana*”) and

Gobindovog rice powder are used as the base material. The preparation of *Sitabhog* involves the production of vermicelli alike tiny threads of *chhana* (length of 3–3.5 cm) along with small dumplings (diameter of around 2 mm). The cottage cheese and fine quality of *Gobindovog* rice powder are rolled into a flat dough using ghee (or *Vanaspati*) in a 1 : 4 proportion. After that, the dough is rubbed through a “sev mould,” from which tiny threads of vermicelli come out, which are then deep-fried well in a pan of pure ghee until the strips are cooked properly. Thereafter, pulao leaves are soaked into freshly prepared sugar syrup to generate a nonnative flavor profile, and the fried strips are poured into the flavored sugar syrup to give them a soft texture. Then the strips are taken away from the syrup, and thus the white rice or vermicelli alike tiny threads are prepared in which the tiny balls of *gulab jamuns* are added. The dough of *gulab jamuns* consists of flour, skimmed milk powder, and ghee. These dumplings are deep-fried in ghee until it gets deep brown color. The fully fried *gulab jamuns* are dipped into the concentrated sugar syrup, and finally, it is taken away and mixed to the vermicelli alike tiny threads of fine *Sitabhog*. The protein content in *Gobindovog* rice (7.2%) has greater bioavailability than the traditional brown rice. According to Ayurveda, it is widely used to treat imbalance in our body, and it is easy to digest [11]. It also accelerates the burning of fats in the body and helps mobilize fat from the liver.

TABLE 1: Classification of Bengali ethnic sweets.

Sl no	Classes	Bengali ethnic sweets
1	Chhana-based sweetmeat	Sitabhog, Chhenabara, Sandesh, Jolbhora Sandesh, Gupo Sandesh, Kachagolla, Nolen Gurer Sandesh, Kansat, Raskodomba, Pantua, Kalojam, Ledikini, and Lalmohan, Chomchom, and Muktagacha Monda
2	Pulse-based sweetmeat	Mecha Sandesh, Moog er Jilapi, White Bonde and Darbesh, and Mihidana
3	Fried sweetmeat	Babarsa and Labanga latika
4	Milk-skin (sor)-based sweetmeat	Sarpuria and Sarbhaja
5	Extruded rice-based sweetmeat	Moa from puffed and flaked rice and Khoi and Murki
6	Fermented sweetmeat	Khiri Doi, Lal Doi, and Jhuri Pata Doi
7	Khoa-based sweetmeat	Lyangcha, Monohora, and Patkheer
8	Fruit-based sweetmeat	Coconut Naru, Chandrapuli or Coconut Chanchi, and Tusha Shinni or Tusha kheer
9	Sugar-based sweetmeats	Batasha, Kadma, and Nakuldana



(a)



(b)



(c)



(d)



(e)



(f)

FIGURE 2: Continued.



(g)



(h)



(i)



(j)



(k)



(l)

FIGURE 2: Continued.



FIGURE 2: Chhana-based Bengali ethnic sweetmeats. (a) Sitabhog: chhana and Gobindohog rice is used to produce the vermicelli like portion, and red spherical shaped nikhuti or pantua is made with chhana; (b) Chanabora: fried and soaked in sugar syrup with distinguishing texture and flavour; (c) Jolbhora sandesh; (d) Gupo sandesh; (e) Kachagolla; (f) nolen gurer sandesh; (g) Kansat; (h) Ras-kodomba; (i) Ledikini; (j) Lalmohan; (k) Kalojam (l) Pantua; (m) Chomchom; (n) Muktagacha monda; all these sweets are originated in different places of undivided Bengal. The images are collected by authors from different sweet shops acknowledged in the acknowledgment section.

6.1.2. Chhenabara. It is a famous sweet that originated in Berhampore (24.093°N and 88.2684°E) during the ruling period of Maharaja Manindrachandra Nandi (1860–1929). It is widely eaten in Bera Utsav (the traditional festival of Murshidabad, West Bengal). “*Chhana*” (cottage cheese) is the basic ingredient here. At first, chhana and flour are well mixed in 5 : 1 proportion. Around 8.5% of powdered sugar is added to it. Then the mixture is cut into small spherical balls (diameter of around 2.5 cm). Thereafter, the balls are deep-fried (2–48 hrs) at a low temperature (32°C) in *ghee* until a dark red to black color appears. After that, hot sugar syrup is prepared by mixing sugar crystals in boiling water (in 1 : 2 proportion). Then, the fried balls are added to the hot sugar syrup to soften them, and they are soaked for 24 hrs. Finally, the spherical balls (*Chhenabara*) are separated and sugar crystals are spread into the balls (Figure 2(b)). Sometimes, cardamom powder is added to the balls to enrich the flavor harmony. Cardamom helps lower the blood pressure due to its diuretic properties. It also retards the growth of tumor due to the presence of anticarcinogenic substances. The antioxidants in cardamom (protocatechuic acid and protocatechualdehyde) prevent inflammation due to their presence [12]. The essential oils (1, 8-cineole, α -terpinyl acetate, and limonene) and extracts of cardamom have bactericidal properties [12].

6.1.3. Sandesh. *Sandesh* is a delicious and traditional dessert originated from Bengal, invented at Hooghly by the co-operation of Dutch’s cook of Bandel Church (22.9342°N and 88.3714°E) (1540–80). From the Vedic period, sandesh is considered as one of the primary sweets [2]. The name “*sandesh*” is mentioned in medieval Bengali literature, including *Krittibas’s Ramayana* and the lyrics of *Chaitanya* [6]. The term *sandesh* comes from the Hindi word “*sandesh*,”

which means message. It has been a tradition in Bengali culture to send this sweet as a gift and hence the name has arrived. It is roughly a flavorful combination of milk and sugar. In the ancient days, solidified *kheer* was used, but the Portuguese introduced the use of “*chhana*” (cottage cheese) in the later days. *Sandesh* is commonly prepared by toasting *chhana* with sugar over a low flame. Later, the hot and sweetened chhana is shaped in various designs depending on the mould shapes. Sometimes, *sandesh* is filled with sugar syrup and blended with coconut and *kheer*.

6.1.4. Jolbhora Sandesh. The term “*Jolbhora*” (jol = water and bhora = filled with) indicates that water is there inside the core of this sweetmeat. It is originated from Telenipara, Hooghly (22.8963°N and 88.2461°E) in 1818. The sweet-maker named Surya Kumar Modak prepared a king-sized *Talsansh* (a common dry sweet in Bengal) but incorporated a pinch of fresh, pure rosewater inside the sweet. The water leaked out of it when the bite was made, and thus the name comes as “*Jolbhora Sandesh*” (typically of 4–5 cm length, 5–6 cm height, and 2–2.5 cm of breadth). In the winter season, jaggery juice (“*Nalen gur*”) is incorporated in place of rosewater (Figure 2(c)). Jaggery is full of antioxidants. It helps in detoxification as it clears the liver by flushing out toxins from our body [13].

6.1.5. Gupo Sandesh. It is often considered the first branded sweetmeat of undivided Bengal. It is originated from Guptipara, Hooghly (22.8963° N and 88.2461° E). “*Chhana*” (cottage cheese) is extracted from cow’s milk and cooked in a high flame (120°C). Then, the cooked *chhana* is wrapped well in cotton clothes and battered uniformly by wooden log until the bound water gets drained out. Then, the matter is

pressed with hands, and in this way, the *gupo sandesh* (diameter of around 3–4 cm) is prepared (Figure 2(d)). Generally, sugar is mixed with *chhana*, but in the winter season, jaggery is also used.

6.1.6. Kachagolla. It is a traditional sweet item all through the country, though it is said to be originated from Natore (24.4079°N and 88.9749°E), Bangladesh. The name “*Kachagolla*” suggests an unripened cheese curd having a spherical shape with a diameter ranging from 2–2.5 cm. Modhusudan Das prepared it by mixing *chhana* (cottage cheese) with hot sugar syrup around 250 years ago. The fine texture arrives upon the evaporation of the syrup. Sometimes, cardamom and cinnamon powder are added to it to enhance the flavor profile (Figure 2(e)).

6.1.7. Nolen Gurer Sandesh. It is widely enjoyed for the taste and fragrance of *gur* (jaggery). The jaggery from a date palm tree in winter is an indelible part of Bengali culture. Some early references to using *gur* are found in the writings of Panini in the 4th century BC. Specialized people climb up the tree at dusk, cut the end of the inflorescence, and hang a “*matir hari*” (an earthen pot), leaving it overnight to collect the dripping sap. The fresh sap of the wild date palm is sweet and fragrant. It is rich in vitamins, magnesium (Mg), iron (Fe), and potassium (K) [14]. The sap is put to boil until the Brix value reaches 118–120% to get good jaggery. *Chhana* is poured inside a clean and soft cotton cloth to let the water drain away. Thereafter, the lump of *chhana* is put on a flat surface, and powdered sugar is added to it. The mixture is put on a nonstick frying pan on low heat, and *nolen gur* is added to it. The mixture is stirred well, and then it is taken out to the moulds to give the proper shape of the *sandesh* (Figure 2(f)). The *nolen gur* helps in digestion and cleanse the intestinal tract. It is rich in iron, which prevents anemia. Moreover, jaggery is full of antioxidants that scavenge the toxic free radicals in our bodies. As it is mainly comprised of simple carbohydrates, it is easier to digest and a ready source of energy. Due to its high potassium content, it is helpful in water retention and the reduction of bloating [13].

6.1.8. Kansat. It is a famous sweetmeat in Malda (25.1786°N and 88.2461°E). Mahendranath Saha, a renowned sweet-maker, first introduced this item. The name *Kansat* comes from a place named *Kansat* (24.7299°N and 88.1706°E) at *Chapainawabganj* district in Bangladesh. “*Chhana*” (cottage cheese) and “*kheer*” (concentrated and solidified milk) are the primary ingredients of *Kansat*. More precisely, the content of “*chhana*” and the flame temperature of the woods, play a big role in the quality parameter of *Kansat* (Figure 2(g)).

6.1.9. Raskodomba. Named after the *Kadamba* (a ball-like blossom with small white petals that point in all directions), as per folk, it is originated in Dinajpur (25.6221°N and 88.6438°E). It is made with encasing a dry *rasgulla* (diameter 0.5–0.8 cm), coated first with hard textured *kheer*, then small poppy seeds encapsulated spherical sugar balls

(diameter 1 mm) are grafted over the periphery (Figure 2(h)). They are a rich source of thiamin, folate, and other essential mineral, including iron, calcium, phosphorus, zinc, manganese, and magnesium [15]. They also provide a relief for abdominal pain and can be used to ease a dry cough. Poppy seeds aid in boosting female fertility by removing the mucus from the fallopian tube. These are also helpful in lowering the stress level. Poppy seeds strengthen bones as they are full of calcium (1.44 g/100 g). It also prevents constipation as it is a rich source of insoluble dietary fibers (19.5 g/100 g) [15].

6.1.10. Pantua, Kalojam, Ledikini, and Lalmohan. *Pantua* (Figure 2(l)) is a special kind of sweet that originated at Ranaghat (23.1745°N and 88.5606°E). It is prepared by separating the water from “*Chhana*” and mixing it with corn starch powder. Then, the mixture is cut into pieces, and granules of cardamom are put inside each piece. Then, the pieces are fried well in ghee and put into hot sugar syrup. The sweetmeat is characterized by the cavity within a product filled with sugar syrup. Cornstarch helps increase calorie intake. Moreover, it is a gluten-free sweet, it is a good substitute for wheat flour for those suffering from gluten intolerance. It also prevents gastric dumping syndrome [16]. *Kalojam* is similar to *pantua*, but it is fried at higher temperatures than that of *pantua*, so the outer surface becomes black (Figure 2(k)).

Ledikini is a kind of fried *chhana* made cylindrical shaped (length around 5.5–6 cm and diameter around 1.5 cm) sweet originated in Kolkata (22.5726°N and 88.3639°E), a famous confectioner, and was named in honor of Lady Canning, wife of Lord Canning (1856–1962), governor-general of British ruled India (Figure 2(i)).

Lalmohan is a traditional red-colored spherical-shaped (diameter around 4.5–5 cm) sweetmeat originated from Dhaka–Mymensingh (24.7471°N and 90.4203°E) region (Figure 2(j)). Here, the key components are “*chhana*” (cottage cheese) and “*kheer*” (solidified milk). The preparation methods for both *Ledikini* and *Lalmohan* are similar to *pantua*.

6.1.11. Chomchom. It is a well-known traditional Bengali sweet. It is originated from the undivided Mymensingh district (24.7471°N and 90.4203°E) by Jasorath Haloi about 200 years ago. It is of several colour, i.e, light pink, yellow, and white. Some have a reddish shade with “*mawa*” (milk made) flakes used for seasoning. “*Chhana*” is mixed with wheat flour, pure milk, and sugar powder. Then, the whole mixture is cut into small cylindrical pieces (length around 5–6 cm and diameter around 1.5–2.4 cm). Sometimes, small cardamom pieces are incorporated into the cylindrical pieces. Then, the pieces are put into simmering sugar syrup until they are well boiled. Then, the texture of the pieces gets hardened, and small sugar crystals are sprinkled onto them (Figure 2(m)).

6.1.12. Muktagacha Monda. It is one of the legendary traditional sweetmeats in undivided Bangladesh. Its shape is flat

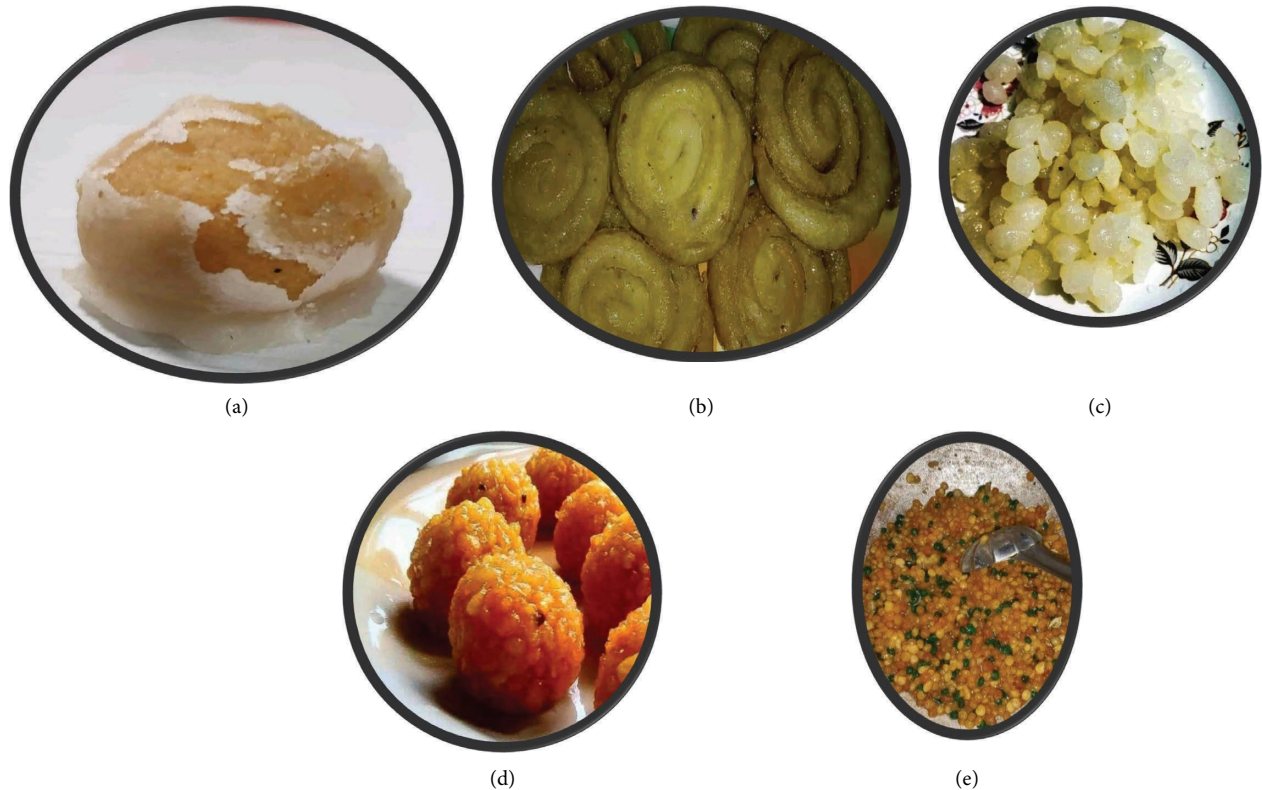


FIGURE 3: Pulse-based Bengali ethnic sweetmeats. (a) Mecha Sandesh: white to pink coloured, sugar-coated sweet, and associated with “Baba Dhormodaser Mela” from 1625–1635; (b) Moog er Jilapi: golden yellow coloured traditional sweet, mostly served during Durga puja, Vaifota, and Vijaya Dashami; (c) White Bonde: white coloured and found only in Kamarpukur, West Bengal, have a characteristics flavour and related with several myths of Sri Ramakrishna Paramahansa (1836–1886 A.D); (d) Darbesh; (e) Mihidana; golden to orange coloured granular textured product and received geographical indication certificate from Government of India in the year of 2017.

and round (diameter around 2 cm). It is widely prepared in *Muktachacha* (24.7660°N and 90.2561°E) subdistrict of Bangladesh from the primeval ages. In the winter, it is specially made using date palm molasses instead of sugar. Gopal Pal is said to be the inventor of this sweet (1804). The primary ingredients are pure milk and sugar. Milk is condensed, and adequate sugar is mixed to it. A big mould is prepared by rounding the lump by hand pressing. The mold is then flattened on a clean surface, and the mold gets hardened during cooling. The *monda* is served in butter paper wrapping (Figure 2(n)).

6.2. Pulse-Based Sweetmeat. Several pulse-based traditional Bengali sweets have several important health benefits. Pulses are a rich source of lysine and a vital amino acid in human nutrition [17]. Pluses contain a high amount of insoluble fiber and less soluble fiber. They are an excellent source of various micronutrients like calcium, magnesium, iron, phosphorus, zinc, copper, selenium, and manganese. The low glycemic index and high fibre content in pulse derived sweet product makes it good alternative for people with diabetes [17]. Pluses also reduce the risk of cardiovascular diseases by lowering the blood pressure and improving the platelet activity, lipid profiles, and inflammation [18].

6.2.1. Mecha Sandesh. It is certainly an ethnic sweetmeat found in Bankura (23.0672°N and 87.3215°E), West Bengal. According to the ancient folk, there was a shortage of milk, but the Malla kings of Bishnupur (7th century AD till the beginning of British rule) called an unknown culinary artist who prepared this delicious sweet, and it was named as “*mecha sandesh*.” At first, chana dal (split bengal gram) is powdered using the *dhenki* (hand pound planks) to produce *besan* (gram flour). Then it is fried to form cylindrical-shaped *Gathiya* (length around 2 cm), which is powdered again to give fine grainy consistency and cooked with “*kheer*” (rice pudding) and sugar to form a lump. Again, the lump is mashed with ghee and green cardamom into laddus (small ball-like structure), and then dipped in hot sugar syrup for a thin sugar coating. Sometimes fine slices of *aam ada* (*Curcuma amada*) are rolled inside the balls to generate a distinct flavor. Thus, spherical shaped mecha sandesh (diameter around 2-3 cm) is prepared (Figure 3(a)). According to Ayurveda and Unani, *aam ada* acts as an appetizer, alexiteric, antipyretic, and diuretic agent [4]. It also cures biliousness, itching, skin diseases, asthma, and bronchitis. Rice pudding is a good source of calcium and low in cholesterol. It helps in restoring the glycogen content that decreases in muscles after exercising. It has fewer calories and helps to lose weight [19].

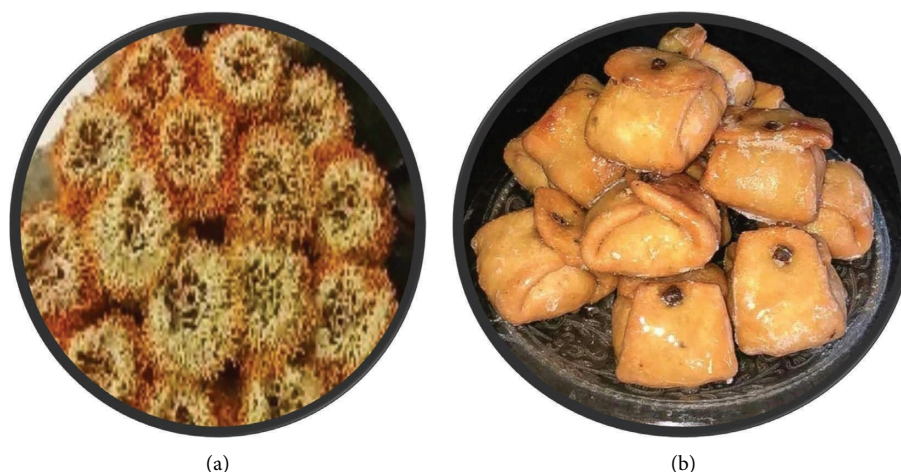


FIGURE 4: Fried Bengali ethnic sweetmeats. (a) Babarsa: crispy texture and the lower side is golden brown while the upper surface is lighter in colour; (b) Labango Latika: product with bright golden yellow lust and distinctive flavour stuffed with kheer inside and provide a unique mouth-feel with every bite.

6.2.2. Moog Er Jilapi. It is considered an intermittent traditional sweetmeat in Bengal originated in Narajol of Medinipur (22.5667°N and 87.6167°E) district. It is quite attractive too for its taste and unique shape (not similar to the traditional jilapi). Jilapi has been first mentioned in “Kitab al-Tabikh” (1226), written by Muhammad bin Hasan al-Baghdadi. The principal ingredients are green gram (moong dal), black gram, ghee, and sugar. At first, green gram is soaked well in water (about 12 hrs). Then, the water-soaked green gram gets thickened, and a paste of it is made using a grinder. Then, it is mixed well with an adequate amount of black gram paste and small pieces of cardamom. Then, this mixture (*Khami*) is placed in an earthen pot which is well covered by the wet cloth and kept in normal atmospheric condition. The next day, the fermented mixture is well fried in ghee until it gets deep yellow in colour. Then, the fried jilapi is put into hot sugar syrup to form off-white to yellow colored. Fermentation of gram flour significantly lowers the content of phytic acid, thus improve the protein digestibility. Green gram helps in the activity of cholecystokinin hormone that regulates metabolism in our body. It is rich in potassium. Potassium controls blood pressure and prevents muscle cramping [20]. Black gram helps break carbohydrates to glucose, and the folic acid present in it helps regulate brain function. It also contains dietary fiber that reduces blood cholesterol levels. It has a low glycemic index, and therefore, it reduces blood glucose and fat level (Figure 3(b)). On the contrary, black gram is rich in soluble fiber that helps the excretion of bile juice. It lowers LDL cholesterol levels [21].

6.2.3. White Bonde and Darbesh. The word “bonde” comes from the Sanskrit word “*Binduk*”. This sweetmeat is originated at Kamarpukur (22.8976°N and 87.6556°E) in the year of 1793–94. The primary ingredients are black gram powder and parboiled rice powder. These are mixed and fried well in ghee to make small granules. Then these are poured into hot

sugar syrup to make it soft in texture. After that, the “*bonde*” is isolated from the syrup and packed. Parboiled rice is rich in niacin and thiamine that helps in the easy utilization of sugar to generate energy. The high amount of anthocyanin present in parboiled rice reduces inflammation [22].

After the preparation of the yellow coloured *bonde* (Figure 3(c)), dry fruits (nuts and pumpkin seeds), and sugar syrup are added, and grated *khowa* is used for seasoning. Finally, the mixture is round-shaped by hand pressing to form *darbesh* (Figure 3(d)). Both nuts and pumpkin seeds are rich in phenolic acids, flavonoids, and carotenoids. Pumpkin seeds possess potassium, folate, riboflavin, and polyunsaturated fatty acids in decent quantities. It has proven clinical results in reducing the risk of benign prostatic hyperplasia along with a preventive role in prostate, colon, lung, and breast cancer [23].

6.2.4. Mihidana. It is the miniature of the traditional *bonde* and is derived from two words: *mihi* means fine and *dana* means grain. It is originated in Bardhaman (23.2324°N and 87.8615°E), West Bengal. Khetrnath Nag was the inventor. Here, the main components are powdered *gobindabhog* rice, Bengal gram flour, ghee, and sugar. The batter is made by mixing Bengal gram flour with *gobindabhog* rice powder, and water is added to make it smooth and mild in texture. Sometimes saffron is added to the batter that gives excellent yellow color and enriches the flavor profile. Then, the batter is passed through an iron mesh so that the small droplets of it are poured into the frying pan and fried well in ghee thoroughly. Thereafter, the fried droplets are mixed with sugar syrup, and bay leaves are added as a flavor enhancer (Figure 3(e)). Thus, *mihidana* is prepared. Saffron is a high source of antioxidants and anticarcinogenic compounds (such as crocin, crocetin, safranal, and kaempferol). Saffron is effective against depressive symptoms and premenstrual syndrome. Bay leaf is useful in the treatment of migraines. It also has some proteolytic enzymes that help in the digestion of foods [24].



FIGURE 5: Milk-skin (sor)-based Bengali ethnic sweetmeats. (a) Sarpuria; (b) Sarbhajal: both the products have a strong and delightful flavour with characteristic colour. Advaita Ācārya (1434–1539 A.D. in Bangladesh) also had a connection with these products. Both products are rich sources of calcium.

6.3. Fried Sweetmeat. In the case of fried sweet product, ghee or oil plays a vital role. Ghee or oil majorly contains fat (9.1 Cal/g), which acts as a source of energy. Ghee acts as a valuable source of fat-soluble vitamins such as vitamins A (3069 IU), E (2.8 mg/100 g), and K (8.6 μ g/100 g). It contains several anticarcinogen agents such as conjugated linoleic acid and butyric acid, which possesses anticarcinogenic activity [25].

6.3.1. Babarsa. It is a confection that originated from *Khirpai* (22.7065°N and 87.6162°E) area of the Medinipur district of West Bengal. It is also named “*Kshirpai*.” This sweet is about 250 years old (before 1750). It comes from the ancient habitation of Midnapur *Khirpai*, and the name comes from “Edward Babar” a Sahibabad. The materials used in *Babarsa* are flour, milk, and ghee. At first, ghee, ice crystals, and milk are mixed in grinder in which an adequate amount of flour and curds are added. Thereafter, the batter is dropwise added to the frying pan and fried well in pure ghee until the deep golden color appears. Then, it is soaked into the sugar syrup, and finally, it is ready. Sometimes cashew nut powder is added to the batter (Figure 4(a)). Cashew nut is enriched with copper that eliminates free radicals from the body. Cashew contains zeaxanthin that is readily absorbed by the retina which prevents harmful UV radiation [26].

6.3.2. Labango Latika. It is a rich and aromatic sweet dish in Bengal generally prepared during several traditional festivals (Makar Sankranti and Durga Puja (worship of Goddess)). This enticing dish is coated with sugar syrup and crispy on the outside but packed with “Kheer,” with a *labango* (clove) on top of it. Wheat flour is mixed with baking soda and ghee to prepare the dough. Then, the dough is divided into small round balls (radius around 2.5 cm). The balls are then covered with wet clothes and kept aside for 20 minutes. Thereafter, sugar syrup is prepared by adding sugar in water (1 : 1). To enhance the flavour profile, cardamom (flavoring agent: terpinyl acetate, 1-8-cineole, and linalool) pods, cloves extract (flavoring agent: eugenol), saffron strands, and cinnamon are added to the mixture and is boiled for about 10 minutes until it gets the consistency of 2 strings [27]. For

making the filling, grated “Kheer” (evaporated milk), chopped cashew nuts, pistachios, and little amount of raisins are mixed properly. Then, the balls are rolled, and the fillings are kept inside the core of it while placing the clove at the center. Then, ghee is put in a wok and the balls are fried in it one by one until the golden brown colour appears. After that, the fried balls are poured into the thicker sugar syrup for 5–7 minutes until both sides of the sweet are drenched in the syrup (Figure 4(b)).

All the spices present in this sweet are rich in natural antioxidants and antimicrobial agents. Clove is rich in manganese that helps in the proper functioning of brain cells and building strong bones. Eugenol is also a good natural antioxidant present in the clove. Clove oil is useful in preventing the growth of tumor cells [28]. The polyphenol compounds in cinnamon (cinnamaldehyde and eugenol) are natural antioxidants. Cinnamon also has anti-inflammatory effects. Apart from flavoring characteristics, cinnamaldehyde is used extensively in Indian traditional Ayurveda. It also lowers the blood glucose level as it is extremely sensitive to the secretion of insulin hormone [29].

6.4. Milk Skin (Sor)-Based Sweetmeat. Milk is the major basic raw material of almost all sweet products and has possessed maximum health benefits to human health. Milk is considered a complete food due to its nutritional value [1]. Several studies revealed that milk has the potential to reduce childhood obesity, which is a major concern nowadays around the globe. Milk is a good source of calcium (118 mg/100 g), which is very much important for bone and teeth health in human bodies. Except for vitamin D, almost all other nutritive components are present in milk. Several studies reported that milk has reduced the risk of type-2 diabetes and also decreases the chances of different cardiovascular diseases like stroke [1]. Milk proteins act as a good source of several essential amino acids that have a crucial role in human nutrition.

6.4.1. Sarpuria and Sarbhaja. These are two sweets from Bengal that have attained cult status. It is originated from Krishnanagar city (23.4013°N and 88.5021°E), West Bengal.

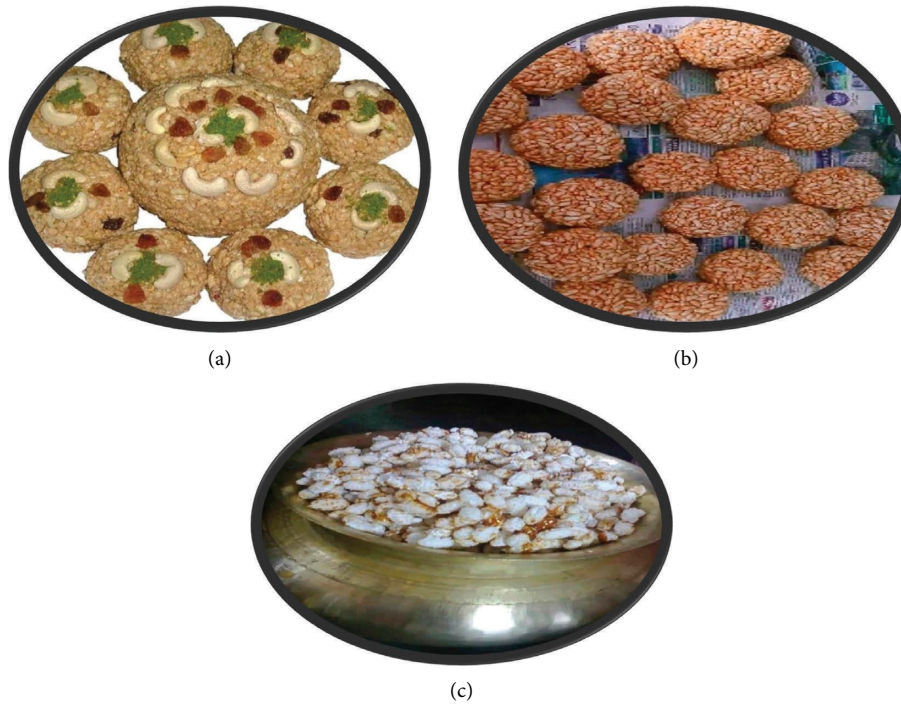


FIGURE 6: Extruded rice-based Bengali ethnic sweetmeat. (a) Joynagarer Moa: available in winter only. It has a soft texture and mouth-melting character; (b) moa from puffed and flaked rice: served during Bengali rituals like Vijaya Dashami and Lakshmi Puja; (c) Khoi and Murki: served during Janmashtami, Saraswati Puja, and Lakshmi Puja.

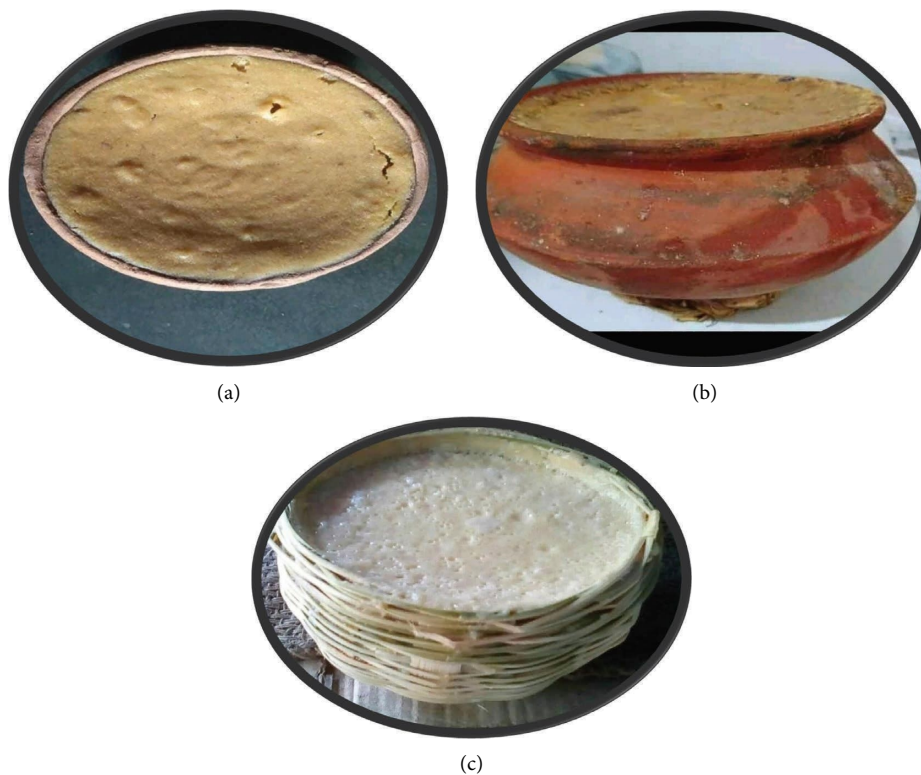


FIGURE 7: Bengali ethnic fermented sweetmeat. (a) Khir Doi; (b) Lal doi; (c) Jhuri pata doi: fermented milk-based products with characteristics off-white to reddish-pink colour, smooth mouth feeling, semisolid consistency, and moderate flavour. Depending on the human skill, the product consistency and sweetness varied. Rich source of probiotics and minerals.

Both of these are milk-based sweets with a rich heritage. *Sarpuria* (Figure 5(a)) is mentioned in the ancient book named “*Chaitanya Charitamrita*” by Sri Chaitanya Mahaprabhu. *Sarpuria* is rectangular cuboid in shape (7 cm × 4 cm × 3 cm). There are two layers of milk skin (*sor*), one at the top and another at the bottom. In between these layers, a thick layer of “chhana” is there. At first, cow’s milk is heated (78–80°C) to generate the cream out of the milk at the upper surface of it. The cream is carefully separated and stalked to make thick layers. Thereafter, these layers are deep-fried in ghee, in which almond, “kheer,” and cardamom are sprinkled. These layers are then soaked into sweetened and condensed milk. The recipe of *sarbhaja* (Figure 5(b)) is also simple. Wheat flour, powdered sugar, salt, milk cream, ghee, and a little baking powder are mixed well. This mixture is added to the milk and soaked well for 1 hr. Thereafter, these are cut in a rectangular shape and deep-fried in refined oil. Finally, the fried pieces are soaked into hot sugar syrup.

6.5. Extruded Rice-Based Sweetmeat. Rice is consumed as a staple food in Southeast Asia. It is the primary source of nutrition for most developing countries (130 Calories/100 g, carbohydrate 9%, protein 5%, vitamin B6 5%, and magnesium 3%). Rice has been used as the principal component to prepare ethnic Bengali sweetmeat, e.g., Joynagarer moa, moa from puffed and flacked rice, kхой, and murki.

6.5.1. Joynagarer Moa. With ages, the Joynagarer moa has created its place in the top ranking sweets of all time. It is an easily digestible, spherical (radius 1–1.5 cm) and possesses a unique mouthfeel and aroma that have won the patronage and recognition across the globe. It is originated from Jaynagar (22.1742°N and 88.4234°E), an area of South 24 Parganas. Here, the principal ingredients are “khai” (pooped rice) from *Kanakchur* paddy, pure ghee, sugar, date palm jaggery, cashew nut, cardamom, khoya kheer, and resin. “*Nolen gur*” (new date palm jaggery) is heated (130°C) in a big frying pan. Then, “*khai*” is poured into the molten and heated “*nolen gur*” and mixed properly. Then, the mixture is cooled down in which pure ghee, sugar, and cardamom powder are added and the whole mixture is pressed by hands to make “moa” (small spheres). On top of it, cashew nut and resins are grafted (Figure 6(a)). Resins are rich in potassium that helps in balancing the salt content in our body and regulates blood pressure. It is enriched with insoluble fiber that prevents constipation. It is a good source of Catechin, an anticarcinogenic agent [30].

6.5.2. Moa from Puffed and Flacked Rice. “*Murir Moa*” and “*Chirer Moa*” (Figure 6(b)), or crunchy puffed rice ball is a traditional Bengali sweet that is served during “*Lakshmi Puja*” (a religious Hindu festival of worshipping the Goddess of wealth). It is a giant-sized ball (radius around 2.5–3 cm) made of puffed rice and jaggery. Puffed rice is dry roasted in a cast-iron skillet for about a minute to make it crisp. Then, jaggery, water, and crushed green cardamom seeds are taken

in a pan and are boiled in a medium-low heat, and the syrup gets a sticky consistency. Thereafter, heat is turned off and puffed rice is added to the syrup. Then, ghee is applied into palms and the mixture is taken in it and the palm full of the mixture is pressed gently to give a round shape. The consistency and beneficial bacteria (*Pseudomonas aeruginosa* and *Bacillus cereus*) in puffed rice help in warding off constipation problems. Puffed rice is extremely light and has very low calories that help in reducing the number of deposited fats. Puffed rice is great for digestive systems as it is enriched with fiber. Being rich in fiber, “*chire*” promotes a slow and steady release of sugar into the bloodstream, thereby preventing any sudden spikes in blood sugar levels. “*chire*” is also quite low in calories [31].

6.5.3. Khoi and Murki. It is prepared among the Bengali culture during special prayers held at home in tribute to God and Goddess mainly on Lakshmi Puja (in October), *Saraswati Puja* (in February month), and Annaprasan (rice feeding ceremony of children). The dish is very popular in West Bengal and Bangladesh and it called “*Ukhra*” in Bengali. It is mentioned in “*Chandimangal*” (1773). “*Khoi*” is obtained by heating (indirect heating) the paddy in a pre-heated lump of sand (Figure 6(c)). *Khoi* is placed in a banana leaf to check if there is any husk there to be removed. Thereafter, jaggery and little amount of water (6:1 v/v) are heated in a bowl till it becomes sticky. Then, the *khoi* is added to the jaggery and mixed properly. Finally, it is kept in an airtight container.

6.6. Fermented Sweetmeat. Fermented sweet product such as yogurt and *dahi* is a necessary part of daily Bengali diet and these fermented products possessed probiotic activity. Fermented milk products are good sources of vitamin A, vitamins B₂, B₁, B₆, B₁₂, and pantothenic acid [4]. Fermented sweet products play a crucial role in improving digestibility (due to presence of gut friendly lactic acid bacteria), nutritional value, and lactose utilization. It helps in reducing carcinogen-promoting enzymes [4].

6.6.1. Khir Doi. It is a traditional sweet originated from Gangarampur (25.4009°N and 88.5324°E), West Bengal. The taste and texture of it make it more special and appealing. Here, the principal ingredients are cow’s milk and sugar crystals. Milk is heated (60–65°C) until “*Khir*” is obtained. Later on, the “*kheer*” is mixed with an adequate amount of powdered sugar (32 g/kg). Sugar crystal is heated (170°C) until caramelization occurs. Then, the “*kheer*” and milk are added to the caramelized sugar. The starter culture is added to the heated media. Then, the bowl is kept in a warm environment (45°C) for 8–10 hours. The final product “*Kheer Doi*” is refrigerated for 2–3 hours to get the proper texture (Figure 7(a)).

6.6.2. Lal Doi. It is considered to be an iconic sweetened set yogurt dessert of Bengal. It is also one of the most famous varieties of *Dahi* in the Bengali culture. According to



FIGURE 8: Bengali ethnic fruit-based sweetmeat. (a) Coconut naru: reddish-brown (jaggery made) or white (sugar made) slightly sticky ball with unique flavour and texture; (b) Chandrapuli or Coconut chanch: half-moon shaped product with greenish hue and coarse mouth-feel; (c) Tusha Shinni or Tusha kheer: sweet, spicy, and soft Halwa type product with copper-brown colour.

“Chaitanya Charitamrita,” Sri Chaitanya Mahaprabhu was fond of this sweet. On Gaura Purnima, the birth of Sri Chaitanya Mahaprabhu (18 February 1486), the Vaishnava devotees fast the entire day until moonrise and then enjoy a fabulous feast where the “Lal Doi” is an uneditable part of their meal. This particular product is treated as a sacred product and associated closely with traditional rituals such as weddings, various puja (worship), *Ashirbad* (blessings), *Upanayana*, and *Annaprasan* (first rice eating ceremony). It is originated first in Nabadwip (23.4037°N and 88.3659°E). It is also termed “*chakku yogurt*” as the stickiness of it can be determined by inserting a knife (*chakku*) inside the sweet. Whole milk and jaggery in 4:3 v/v ratio are the basic ingredients. Milk is heated at 70°C until the volume gets reduced to one-third. Jaggery is added to it for characteristics sweetness with continuous stirring. An earthen pot is used for the setting of curd. Prolonged incubation can make the *Dahi* sour and inedible (Figure 7(b)).

6.6.3. Jhuri Pata Doi. It is a special kind of sweetened *dahi* that originated and is found only in Murshidabad (24.1759°N and 88.2802°E). Murshid Quli Khan (1717–27), the Diwan of Bengal, under Aurangzeb, was fond of this sweet. Usually, *dahi* is settled in earthen pots, but in this case, “*jhuri*” (bamboo basket) is used. Inside this, “*jhuri*” dried and condensed milk or “*kheer*” is kept while the wholes of the pot

are covered with the coating of comparatively less sweet coating of “*kheer*.” The curd is thicker and yellowish in color. It tastes less sweet than the conventional “*kheer*” (Figure 7(c)).

All these three, “*doi*” is being rich in calcium (83 mg/100 g) and phosphorus (38 mg/100 g), prevents arthritis, and strengthens teeth and bones. These foods lead to less secretion of the cortisol hormone (the imbalance of the level of cortisol causes more fat accumulation in the body) and help in losing weight. Being a probiotic food (rich in *Lactobacillus* and *Leuconostoc* sp.), it boosts our immunity and helps in the proper functioning of the digestive system [32].

6.7. Khoa-Based Sweetmeat. *Khoa*, *kheer*, or *mawa* is an important ingredient in ethnic Bengali sweetmeat products, and it is prepared by continuous heating of milk. It acts as an important source of vitamin A (9.7 mg/100 g), C (1.1 mg/100 g), E (0.73 mg/100 g), K (40 µg/100 g), and calcium (683.3 mg/100 g). Due to high fat (24 g/100 g) and solid not fat (8.6%) (SNF) content of *kheer*, it acts as a potential source of energy [33].

6.7.1. Lyangcha. It is a traditional sweetmeat originated in Saktigarh (23.2044°N and 87.9716°E) of Burdwan district, West Bengal. It is used as “*bhog*” (offering) to Goddess Kali and is the most common item in the dessert list of Tarapith

TABLE 2: Nutritional composition of the Bengali ethnic sweetmeats.

Ethnic sweetmeat	Protein (%)	Fat (%)	Carbohydrate (%)	Moisture (%)	Ash (%)	Shelf life
Sitabhog	6.6	14.15	36.9	25.25	0.33	15 days in refrigerated condition
Chhenabara	7.23	22.91	51.63	17.39	0.84	20 days in refrigerated condition
Kachagolla	15.91	22.46	44.48	14.37	2.78	10 days in refrigerated condition
Jolbhora Sandesh	19.7	17.7	47.7	13.9	1.6	15 days in refrigerated condition
Gupo Sandesh	21.8	18.6	41.8	16.36	1.44	7 days in refrigerated condition
Nolen Gurur Sandesh	12.7	25.7	35.8	28.8	1.98	15 days in refrigerated condition
Kansat	13.9	12.4	35.4	23.2	1.29	7 days in refrigerated condition
Raskodomba	18.73	17.9	47.5	14.23	1.64	7 days in refrigerated condition
Ledikini	9.8	11.8	43.25	30.5	4.65	10 days in refrigerated condition
Lalmohan	8.1	9.3	46.7	30.6	5.3	6-7 days in refrigerated condition
Kaloram	12.9	24.6	34.7	25.9	1.44	8-9 days in refrigerated condition
Pantua	8.6	9.7	45.9	35.57	0.53	4-5 days in refrigerated condition
Chomchom	13.6	5.19	51.84	34.15	2.41	6-7 days in refrigerated condition
Mukttagacha Monda	12.9	22.8	36.1	24.1	1.81	5-7 days in refrigerated condition
Mecha Sandesh	29.45	12.36	38.95	16.89	2.35	13 days in refrigerated condition
Moog er Jilapi	15.01	12.59	69.8	2.29	0.31	7 days in refrigerated condition
White Bonde	8.12	6.14	61.29	24.08	0.37	15 days in refrigerated condition
Darbesh	7.98	6.51	67.21	18.07	0.23	15 days in refrigerated condition
Mihidana	7.33* 7.53#	6.75* 5.73#	66.33* 68.32#	19.3* 18.12#	0.29* 0.3#	6 days in refrigerated condition
Babarsa	8.79	42.95	18.21	29.43	0.62	8 days in refrigerated condition
Labango Latika	6.14	15.43	41.22	37.02	0.19	7 days in refrigerated condition
Sarpuria	5.3	10.4	24.3	55.7	4.3	9-11 days in refrigerated condition
Sarbhaja	4.9	10.7	24.1	57.2	3.1	9-11 days in refrigerated condition
Joynarar Moa	3.76	5.24	50.75	34.78	5.47	20-25 days in refrigerated condition
Moa from puffed and flacked rice	3.08	22.88	63.42	9.35	1.27	1-2 month in air tight container
Khoi and Murki	3.37	23.41	62.38	9.05	1.79	1-2 month in air tight container
Khair Doi	4.5	11.5	32.79	50.35	0.86	15 days** in cups and 6 days** in pouch
Lal Doi	4.9	6.8	43.2	44.04	1.06	15 days** in cups and 6 days** in pouch
Jhuri Pata Doi	5.3	5.9	34.81	53.27	0.72	15 days** in cups and 6 days** in pouch
Lyangcha	18.1	22.5	29.8	27.1	2.5	12-14 days in refrigerated condition
Monohora	17.6	21.7	31	26.8	2.9	6-7 days in refrigerated condition
Patkheer	19.7	21.9	27.1	28.6	2.7	10-15 days in refrigerated condition
Coconut Naru	3.5	21.5	37.5	33.75	3.75	Up to one month in refrigerated condition
Chandrapuli or Coconut chanch	13.87	14.92	53.9	14.9	2.41	25-30 days in refrigerated condition
Tusha Shinni	11.7	8.9	31.3	45.24	2.86	2-3 days in refrigerated condition

TABLE 2: Continued.

Ethnic sweetmeat	Protein (%)	Fat (%)	Carbohydrate (%)	Moisture (%)	Ash (%)	Shelf life
Batasha	3.92	9.57	80.43	4.2	1.88	6–8 months in air tight container
Kadma	2.96	10.89	78.35	6.02	1.78	6–8 months in air tight container
Nakuldana	3.56	8.51	81.84	4.56	1.43	6–8 months in air tight container

* with ghee, # without ghee, and ** in refrigerated condition. The primary nutritional information of the 38 ethnic sweetmeats has been invented from Bengal. The results are expressed as mean \pm standard deviation. The nutritional and shelf lives of each product are expressed as information obtained from the stakeholders from sweetmeat industries, GI, nutritional labelling over the products, and experiments conducted by authors.

(24.1140°N and 87.7991°E) temple (1225 A.D.) *Lyangcha* is a cylindrical shaped (length 3 cm to 1 m and diameter 0.5 cm to 50 cm), dark red to black colored sweetmeat, made of “*Khoya*” and flour. The dough is deep-fried followed by dipping into cardamom flavored hot sugar syrup for 2–5 hr. Ghee is often added to the dough in a regular interval.

6.7.2. Monohora. It is originated in Janai Rajbari (22.7146°N and 88.2437°E) around 250 years ago, and characterized by the external sugar-coated spherical-shaped (radius around 2.53 cm) traditional *sandesh* along with *khoa*. From ancient times, sugar is added to food ingredients as preservatives as it acts like a humectant that maintains water content in foods. The growth of spoilage microorganisms slows down as the sugar syrup acts as hypertonic media with respect to the internal environment of the microorganisms. So, plasmolysis occurs and there will be a loss of water from the bacterial cell [34]. It is the first approach to the preservation of sweets before the introduction of the refrigeration system.

6.7.3. Patkheer. It is a traditional sweet originated in Bikrampur (23.4981°N and 90.4127°E), Bangladesh. Cow’s milk (3 kg of milk is required to produce 1 kg *Patkheer*) is the primary ingredient. It is a common menu of Bikrampur during *Jamai Sasthi* (traditional Bengali ritual). Sugar is mixed with cow’s milk and is heated around 1 hr, and the milk is stirred continuously by a wooden ladle followed by placing the condensed milk in an earthen pot and kept in an open atmosphere for cooling for 2–3 hours. Finally, it is wrapped into a banana leaf. Epigallocatechin gallate (EGCG) is present in the banana leaves, which is absorbed by the patkheer and imparted upon consumption of the food, EGCG ensures digestive and cellular health along with antibacterial activities. E-2-hexenal, hexanal, 3-hydroxy-2-butanone, and 2-pentanol are the principal flavoring components in banana leaf which may be infused to patkheer and give its characteristics flavour [35].

6.8. Fruit-Based Sweetmeat. Fruits are excellent sources of vitamins, minerals, and bioactive components. Since ages, West Bengal and Bangladesh are well known for their fruit cultivation. Different kinds of fruit and nuts have been used in preparation of various sweetmeats, e.g., coconut naru, chandrapuli or coconut chanch, and tusha shinni or tusha kheer.

6.8.1. Coconut Naru. It is perhaps the most common and easily prepared sweets in every Bengali household during various pujas (Laxmi puja and Janmashtami celebration). Bijay Gupta’s *Padmapuran* or *Manasamangal* (1484 A.D.) have a mention of this particular sweet. It is made of two primary ingredients: grated coconut and jaggery and/or sugar. There are two types of *Narkel naru* (Figure 8(a)) made in every Bengali family: *white naru* (sugar made) and reddish to *black naru* (jaggery made). Grated coconut, kheer, sugar, or jaggery are mixed with previously heated ghee and mixed

well with continuous stirring until the jaggery gets melted completely into the grated coconut and turned to sticky brown hue. Thereafter, the mixture is taken off the flame and shaped into several ball-like structures (diameter around 1–2 cm). Here, the role of *khowa* is to make the whole cluster sticky enough to give it the proper shape. Sometimes, cardamom powder is also added to the mixture. Coconut meat is enriched with manganese (2.8 mg/100 g) that plays a significant role in the metabolism of carbohydrates, cholesterol, and proteins [36]. The water is rich in selenium (0.97 µg/100 g). The maximum proportion of solid fats is from coconuts or derived from lauric acid, which helps increase the level of HDL. Coconut flour obtained from the dried and grounded coconut meat is a good replacement of traditional wheat flour (especially for those having gluten intolerance) [37].

6.8.2. Chandrapuli or Coconut Chanch. It is a lemon yellow coloured, half-moon shaped traditional Bengali sweet made of grated coconut. It is generally prepared during the Bijaya Dashami days (10th day of the Hindu calendar month of *Ashvin* or *Kartik*). This sweetmeat was mentioned in *Padmapuran* (genre of texts in Hinduism published between the 4th and 15th centuries CE). Grated coconut and grated “*khowa*” (evaporated milk) are taken in a frying pan, and cardamom powder is also added to it. The mixture is well stirred (2–5 minutes) to avoid sticking of *khowa* at the bottom of the pan. Thereafter, sugar is added to it, and the mixture is kept low on the flame until the sugar gets melted entirely, followed by adding powdered camphor. Thereafter, the mixture is placed on a plate to cool, and then it is pressed into the mould to give it the shape of a half-moon (Figure 8(b)). Camphor (a terpenoid) acts as a counter-irritant on the skin [38] and used to reduce muscle pain, inflammation, and helps in treating throat congestion. It has antimicrobial, antitussive, antinociceptive, antimutagenic, anticarcinogenic, and proven remedial action against orthostatic hypotension [39].

6.8.3. Tusha Shinni or Tusha Kheer. It is a traditional sweet dessert originated in Sylhet (24.8949°N and 91.8687°E) of Bangladesh, specially made during Ramadan. It is characterized by its creamy texture and aromatic flavour (cardamom, nuts, and rose water). *Kheer* is an Indian rice pudding made of three basic ingredients: rice (*Basmati* or *Gobindobhog*), milk, and sugar. Sometimes, jaggery is also used instead of sugar. Rice is added to previously heated full-fat milk, and the mixture is stirred well in a low flame (60–70°C) until the rice becomes soft and slightly squidgy. An adequate amount of sugar is added, and cooking is continued until the kheer gets thickened. Then, it is garnished by adding almonds and cardamom powder (Figure 8(c)). Almonds help increase the level of vitamin E in RBC [40] and lower the cholesterol level [41] and blood pressure by producing antioxidants in the bloodstream [42]. It is enriched with several nutrients such as protein (21.4%), fibers (12.5%), fat (50%), vitamin E (37%), manganese (32%), and magnesium



FIGURE 9: Sugar-based Bengali ethnic sweetmeats. (a) Batasha; (b) Kadma; (c) Nakuldana: used mainly in daily basis in every Bengali household for offering purposes in regular Puja. Strong sweet taste is associated with all these products have a relatively higher shelf life if stored at air tight container.

(20%). Almonds contain flavonoids that have antiaging properties. It also contains L-carnitine and riboflavin that assists the growth of brain cell [43].

6.9. Sugar-Based Sweetmeats. Sugar (387 cal/100 g) acts as a major source of calories in human nutrition. It has several functions to impart in a particular food product such as imparting flavour and taste. It also acts as a class II preservative and helps to increase the shelf life [34] (Table 2).

6.9.1. Batasha. It can be considered the most popular aerated, pan-Indian, and crystallized sweet candies made from sugar or jaggery. It is consumed across all socio-economic classes in several ritual purposes. It is shaped like a round coin but convex in the upper surface. It is an inevitable part of Laxmi Puja, Kali Puja, and *Saraswati Puja*, indicating the harvest and hopes of prosperity. *White batasa* (sugar made) is required in the worship of Lord Siva, while the red one (jaggery made) is essential for the worship of Lord Narayana. It is also used in Bengali Muslim marriages as documented in the memories of Samran Huda [44]. “*Horir lut er batasha*” is a traditional observance among the Hindus. Sugar is boiled in water until it reaches a harder consistency, and sodium bicarbonate is added to aerate the syrup, followed by placing

it on the wax paper in a little coin shape (diameter around 1-2 cm) (Figure 9(a)).

6.9.2. Kadma. *Kadma* is a traditional Bengali sweet that was originated in the 18th century in Mankar (23.4288°N and 87.5544°E), Burdwan. In the older days, the ornaments were packed inside the container and were gifted in the marriage ceremony to surprise the couple. It is a special sweet made from boiling sugar and mixing water derived from cottage cheese into it. In the religious festival such as Bijaya Dashami, Laxmi Puja, and Dussehra, *Kadma* is a must as an offering to the God (Figure 9(b)).

6.9.3. Nakuldana. It is the white colored spherical (diameter around 0.01 cm) ethnic Bengali sweet, served in every Bengali pujas (worship of God and Goddess). In *Tarakanath temple* of *Tarakeswar* (1729 A.D.) all the pilgrims are usually given *Nakuldana*. The hot sugar syrup is poured into a large container (that moves in a circular motion) which gives the small ball-like shape after a certain revolution (Figure 9(c)).

Without addressing the numerous pots and pans used in the sweet processing, the explanation of Bengali sweets will fall short. There were different types of utensils used in ethnic Bengali sweetmeat processing described in Figures 10(a)–10(f).



(a)



(b)



(c)



(d)

FIGURE 10: Continued.



FIGURE 10: Traditional utensils for ethnic Bengali sweetmeat processing earthen. (a) Oven, (b) “Khunti,” (c) “Jhagri,” and (d) “Kadai” are the stainless steel made utensils, (e) Barkosh is made with wood and is used for kneading of chhana and flour. (f) The cone shaped pot is used for jilepi processing. The bamboo baskets are used as a storage arrangement.

7. Conclusion

The anthropological journey of Bengali sweetmeat is influenced by geographical, cultural, and nutritional heritage. The availability of ingredients, foreign colonists have also influenced the taste buds of this region of India. The sweetmeat products originated at different parts of undivided Bengal and conquered the rest of India or may have a place in the global gastronomical map are addressed. Some of the products already change and/or go through a transformational diversification, and some of the sweetmeats are on the verge of obsolescing due to the unavailability of adequate knowledge of their nutritional, raw material, and processing methods. *Naishadhacharita* (12th Century), *Chandimangal* (16th century), and *Chaitanya Charitamrita* portray the sweetmeat culture of ancient Bengal, whereas from the late 18th century, the colonists influenced the traditional cultural sweetmeat heritage of Bengal most with the production of “chhana,” and a new stream in the Bengali ethnic sweetmeat tradition being formulated. The medicinal values of the ethnic Bengali sweet, as well as their nutritional skeleton, depict the potential of this product, which not only vanquish the taste goblet but also has a beneficial role in human health, which has to be explored further.

8. Future Perspective

Future generations will benefit from this comprehensive nutritional knowledge of numerous types of sweetmeats. Many wonderful sweetmeats that are close to expiring should be rescued. Additionally, one researcher can use this article to increase their nutritional worth of traditional sweets by adding various bioactive components.

Data Availability

The data used to support the findings of this study are included within the article. Images are personally contributed by the authors upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest on the research, authorship, and publication of this article.

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