



Rice cakes of North-East region of India: A systematic review

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Documentation is the chief approach for conserving indigenous traditional knowledge. Traditional foods form an integral part of the diets of indigenous people all over the world. The indigenous techniques for rice-based foods in the North-eastern region of India have not been documented systematically. The North-eastern region is made up of eight states: Meghalaya, Assam, Tripura, Mizoram, Nagaland, Arunachal Pradesh, Sikkim and Manipur, each with its own food habits and social distinctiveness. Rice cakes are well-known in the North-east region and are mainly consumed during tea time, ceremonies, festivals, and other occasions. This study was performed through direct interview and observation, which signifies the distinct features in the preparation of rice cakes and the limitation of knowledge merely to domestic level. It also describes the techniques of rice cake production, which have few similarities among different states. This study recommends the need to upgrade, preserve, and document indigenous knowledge to promote rice cakes for better marketing and, more importantly, to attempt to conserve these products through general awareness. In addition, several health benefits of rice cake products have been discussed.

Keywords: Conservation, Health benefits, Indigenous knowledge, North-east region, Preservation, Rice cakes

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Rice (*Oryza sativa* L.) is a staple food for over 50% of the world's population. In Asia alone, rice production and consumption have been reported to account for more than 90% of global rice production¹. Rice is considered an essential component in many Asian festivals, rituals and social rites. Rice cakes have been considered a healthy food due to their ingredients, which have been found to be high in starch and low in caloric content^{2,3}. Rice has a fat content of 0.4-3%, a fibre content of 3%, a protein content of 6-7%, and a carbohydrate content of 74-80%⁴. Because of its controlled digestibility, rice starch plays an important role in maintaining human health and nutrition. Also, fermented rice cakes are easily digestible because of the degradation of starch macromolecules at the time of fermentation⁵. In India, the traditional method of rice cake preparation has been carried out for generations and is prepared to this day by the descendants⁶. In the north-eastern region of India, rice cakes maintain an important status. They are mainly consumed during festivals and are an essential part of rituals and social ceremonies. Due to less sugar

content and oil, the rice-based snacks are found to be healthy and cheap⁷. Rice and its products have become of worldwide interest because of their distinctive quality features, higher acceptability and caloric content⁸. Meghalaya, Mizoram, Manipur, Assam, Arunachal Pradesh, Tripura, Sikkim and Nagaland comprise the North-east region (NER) of India. It is located between latitudes 20° and 22° North and longitudes 89°46' and 97°5' East⁹. The people in the north-eastern region prepare a variety of rice cakes, which are specially made during harvesting festivals and various rituals⁷.

Different varieties of rice cakes have been recorded in the north-eastern region of India; they are known by various names for different tribal communities. In Meghalaya, they have *Putharo*, *Pusyep*, *Pumaloi*, *Pusla*, *Pukhleim* and *Pusaw*, prepared by the Khasi and Jaintia tribes. *Pita*, *jakkep* and *Sakin Gita* are prepared by the Garo tribes of Meghalaya. Arunachal Pradesh has *Winsii*, a steamed and boiled rice cake prepared by the Tangsa tribe. Different communities of Assam have *Entaap*, *Bhapot Diya Pitha/Tekeli Mukhot Diya Pitha* and *Sitao*. In Manipur, they have *Haokhamui* and *Sachao* in Tangkhul district. In

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Mizoram, they have *chhangban* (sticky pitha) and *chhangkan* (fried pitha) prepared by the *Lushai* community. Nagaland has *Kithou raokhao* of the Poumai Naga tribe. In Tripura, they have *Awang Bangui* and *Awang bleb*, prepared by Tripuris. *Selroti*, *Yomari*, *phapar ko roti* (buckwheat), *Feeng*/Glass noodles are prepared in Sikkim by different communities. These products are similar to Korean rice cakes (steam rice cakes), which include *Seolgiddok*¹⁰, fried rice cakes (*Yukwa*)¹¹ and fermented rice cakes (*Jeung-pyun*)¹². The preparation of rice cakes has been reported to have several health benefits and while the preparation is entirely based on traditional knowledge, the techniques of preparation can be standardized for commercial purposes. The objective of the research undertaken is to document the different varieties of traditional rice cakes found in the North-east region of India, their preparation methods and the ingredients used. Different varieties of rice cakes that have been reported are tabulated in Table 1.

Methodology

The study was conducted from February 2019 to September 2020. It was carried out in total 11 different villages of the 8 states of North-east region of India, which include the Malaguri village, Gossaigaon, Kokrajhar district of Assam, the Garobadha village, South West Garo Hills district of Meghalaya, the Nongpohtown, Ri-Bhoi district of Meghalaya, the Dewankata village, West Garo Hills district of Meghalaya, the Nongtham village, Changlang district of Arunachal Pradesh, the Talui village, Ukhrul district of Manipur, the Purul/Hiimai village, Senapati district of Manipur, the Nandok village, East Sikkim district, Gangtok of Sikkim, the Habildar para village, West Tripura district of Tripura, the Kashiram village, Dimapur district of Nagaland and the Lunglei town of Mizoram. About 9 informants have been consulted during the studies and the Prior Informed Consent (PIC) was obtained from all informants prior to the start of the research. For rice cake preparation, rice is soaked for 8-12 h in

Table 1 — Rice cakes from India's North-eastern region

Sl. No.	Rice cake	Tribe/ Community	States	Incorporated Ingredients
1	<i>Chhangban</i>	Lushai	Mizoram	Sticky Rice flour
2	<i>Chhangkan</i>	Lushai	Mizoram	Rice flour, sugar
3	<i>Putharo</i>	Khasi & Jaintia	Meghalaya	Rice flour,
4	<i>Pusla</i>	Khasi & Jaintia	Meghalaya	Rice flour, jaggery
5	<i>Pusyep</i>	Khasi & Jaintia	Meghalaya	Rice flour
6	<i>Pumaloi</i>	Khasi & Jaintia	Meghalaya	Rice flour
7	<i>Pukhleln</i>	Khasi & Jaintia	Meghalaya	Rice flour, Jaggery, Refine oil
8	<i>Pusaw</i>	Khasi	Meghalaya	Rice flour, red tea, baking soda and sugar
9	<i>Putyandong</i>	Khasi	Meghalaya	Rice flour, sugar
10	<i>Pulum</i>	Khasi & Jaintia	Meghalaya	Rice flour
11	<i>Pita</i>	Garo	Meghalaya	Sticky Rice flour, plain rice flour, sugar/ jaggery, oil.
12	<i>Sakin gata</i>	Garo	Meghalaya	Sticky Rice flour, plain rice flour, sugar, sesame powder.
13	<i>Winsii</i>	Tangsa	Arunachal Pradesh	Rice flour
14	<i>Kithou raokhao</i>	Poumai Naga	Nagaland	Rice flour, sugar, mustard oil
15	<i>Haokhamui</i>	Tangkhul	Manipur	Sticky rice flour, frying oil, water, sugar
16	<i>Sachao</i>	Tangkhul	Manipur	Sticky rice flour, oil, sugar, sesame seeds
17	<i>Entaap</i>	Bodo	Assam	Sticky rice flour, sesame seeds
18	<i>Bhapot diyapitha/ Tekeli mukhot diya pitha</i>	Bodo& Assamese	Assam	Sticky rice, sesame seeds and sugar
19	<i>Sitao</i>	Bodo	Assam	Sticky rice, sesame seeds
20	<i>Awang bangui</i>	Tripuri	Tripura	Sticky rice flour, Bengal Joha rice flour, jaggery/sugar, salt, sesame seeds
21	<i>Awang bleb</i>	Tripuri	Tripura	Sticky rice flour, Bengal Joha rice flour, jaggery/sugar, salt, sesame seeds
22	<i>Selroti</i>	Gorkha	Sikkim	Rice flour, sugar/jaggery, garam masala, dry fruits
23	<i>Yomari</i>	Gorkha	Sikkim	Rice flour and jaggery
24	<i>Feeng</i>	Gorkha	Sikkim	Rice and moong dal starch
25	<i>Fambi</i>	Gorkha	Sikkim	Starch of Rice/Moong dal water and gelatin

water, sun or air dried and then ground in a traditional mortar and pestle into fine flour. It is subsequently filled with different ingredients inside. Rice cakes are mainly prepared from fermented rice and other cereals and consumed by people from all communities because of its taste, flavour and nutritional values. Rice cakes are unknown to the nutritionists and entrepreneurs due to lack of scientific exploration¹³. General procedure of rice cake preparation in North-East Region of India has been presented in (Fig. 1).

Results

Traditional rice cakes

Chhangban

The Lushai community in Mizoram is known for making *Chhangban* rice cakes. The *I-daw* rice used in the recipe was discovered to have a high amylopectin level, a starch level of 83.48% and a moisture level of 10.22%. The rice is cleaned and washed properly and then soaked in clean water for 12 h. The rice is pounded into a fine powder the next day and sieved for a soft and smoother rice cake texture. The powdered rice is mixed with 60% of water and kneaded properly. Afterwards, the sticky balls are wrapped in banana leaves or leaves of *Phrynium capitatum*, locally known as *hnahtial*, and tied with a string. This wrapped rice ball is placed in a large pot

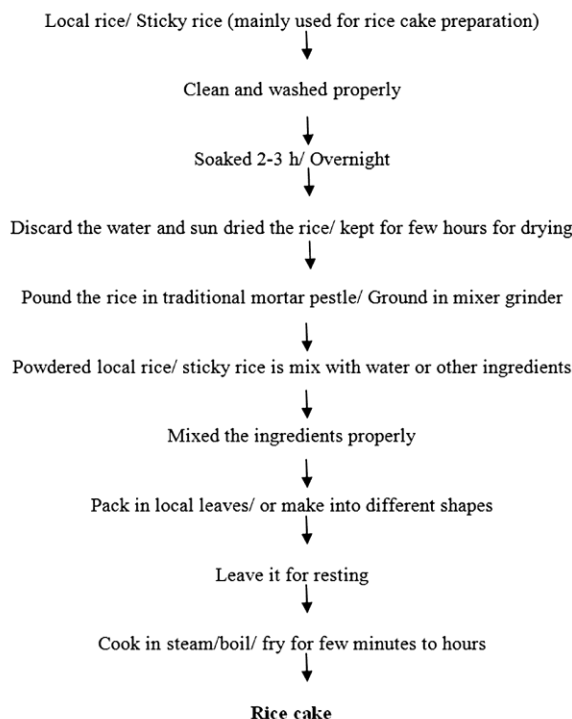


Fig. 1 — A general procedure for making rice cakes in India's North-eastern region

of water and boiled for 20-30 min until it is cooked. Later on, it is cooled down to room temperature, sliced into pieces and served as lunch¹⁴. The practise of this rice cake making is usually done during Christmas and New Year festivals (Fig. 2). *I-daw* rice was found to have a typical starch profile, with crude protein at 2.83%.¹⁵

Chhangkan

Chhangkan is a local fried rice cake of Mizoram prepared by the *Lushai* community. The method of preparation is similar to that of the Chhangban rice cake. The local rice is cleaned and soaked in water for an hour. The rice is kept for drying outside in the sun for 6 h and pounded in a wooden mortar pestle till it becomes a fine powder. The rice flour is mixed with 5% of sugar and 60% of water and kneaded properly. The dough is made into a small round flat shape and shallow fried in oil on both sides for 5 min till it is cooked. It is served as a snack with tea¹⁴.

Putharo

The Khasi and Jaintia tribes make this and it is one of the most popular rice cakes in Meghalaya. It is cooked on a "*saraw*," a native earthenware plate with a cover and base and is made with "*khaw mynri*," a local rice variety. With the use of a mortar and pestle, the rice is ground to a fine powder and sieved through a traditional bamboo sieve to produce a fine powdered rice flour. After that, 80-90°C hot boiling water (40%) is poured over the powdered rice flour and gently stirred for a soft texture, followed by cold water (20%) and thoroughly combined until a paste forms. A serving spoonful of the paste is poured into a hot "*saraw*" (80-85°C) and cooked for 2 min, topped with a *saraw* lid. *Putharo* is a popular rice snack among the Khasi and Jaintia people of Meghalaya and it is served at weddings and other special events¹⁶.

Pusla

Pusla is a traditional snack of the Khasi and Jaintia tribes of Meghalaya. It is prepared by using *Mynri* rice, a local variety of rice. The rice is soaked in water



Fig. 2 — Chhangban

for 6-8 h overnight and the water is discarded the next day. Then it is ground to a fine powder with the help of a mortar and pestle. The powdered rice is mixed with previously melted jaggery (6%), water (60%) and a pinch of baking soda till it forms a dough. The dough is divided into small balls and packed tightly in *Phrynium pubinerve* leaves, locally known as “slamet,” until the dough acquires a flat rectangular shape with a thickness of around 2 cm¹⁷. The little packets are then transferred into a pot of boiling water. It is either boiled or steamed on top of a pot for 10 to 20 min at 85-90°C. This snack is commonly available in the local markets and is important during many occasions and marriage festivals¹⁶.

Pusyep

This is a steamed rice cake from Meghalaya, prepared by the Khasi and Jaintia tribes. Here the same preparation method is followed as for *Pusla* and *Putharo*. After the process of soaking, grinding, and sieving is completed, water is sprinkled on the powdered rice to make the powdered rice moist. It is then kept for at least 6 h for fermentation. Next, the rice powder is sieved through a traditional bamboo sieve to avoid any clumps. A small amount of moistened rice (10-15 g) is put into a kettle lid to get the desired shape. It is covered with muslin cloth and kept on top of the traditional steaming pot. This rice cake is steamed for about 5 to 10 min till the steam penetrates the moistened powdered rice. *Pusyep* is a daily tea snack and is also consumed during different ceremonies and marriage festivals¹⁶.

Pumaloi

Pumaloi is a smaller version of *Pusyep*. It is smaller in size, whereas *Pusyep* is bigger. The method of preparation is the same as for *Pusyep*. The rice flour (5 g) is put in a small round steel bowl measuring 5 cm in diameter and 2 cm in thickness for steaming on top of a steaming pot. It is steamed for about 2-5 min till the steam penetrates the moistened powdered rice. *Pumaloi* is a tea snack and is consumed during different ceremonies¹⁶ (Fig. 3).



Fig. 3 — *Pumaloi*

Pusaw

This is a traditional rice cake of the Khasi tribe of Meghalaya, mainly prepared in the West Khasi Hills district. The main ingredients of this rice cake are rice flour (500 g), red tea (2 mL), baking soda (1 g), and sugar (2 g). The rice is clean and soaked for 6-8 h overnight. The next morning, the water is drained and the rice is kept for drying for about 2-3 h. The rice is pounded in a wooden mortar and pestle till it becomes fine flour. The rice flour is sieved to avoid any impurities. It is then mixed with red tea to achieve the desired brownish red colour. Sugar is added for taste, and a pinch of baking soda. The batter is mixed properly for a smooth texture. The pot is greased inside with refined oil. The batter is poured inside and covered with a lid. The rice cake is baked for about 20-30 min on a traditional gas fire over low heat (40-50°C), and a piece of burnt charcoal is kept on top of the lid. The rice cake is ready when it no longer sticks to the wall of the pot. *Pusaw* is one of the favourite delicacies of the Khasi people and is usually prepared during marriage ceremonies¹⁶.

Putyndong

Putyndong is a rice cake of the Khasi tribe of Meghalaya, and it is a specialty of the Bhoi people in Ri-Bhoi district. This rice cake is prepared in a cylindrical bamboo pipe that is roughly 30 cm long, with an 8-10 cm diameter, and burnt in the flame, giving it a distinct pleasant aroma that is loved by all the locals. The rice flour mainly used is *mynri* rice (80%) and sticky black rice (20%). Firstly, the rice is pounded in a wooden mortar pestle and sieved through a traditional bamboo sieve. Next, cold water is sprinkled on the rice cake to make it moist and mix properly. The moist rice flour is then sieved again to prevent any lumps. After that, it is taken and filled inside a freshly cleaned bamboo pipe and sealed with fresh, clean leaves of 2-3 pieces of *slalakhar* (local name). The sealed bamboo pipes are then kept over the fire and turned frequently, allowing them to be burnt from all sides for 5-10 min. When the rice cake no longer adheres to the bamboo pipe's wall and water begins to drip from the bamboo pipe's mouth, the rice cake is ready. The rice cake is taken out of the bamboo pipes only before serving. *Putyndong* is a type of tea snack that is loved by all the locals and can be consumed daily¹⁶.

Pukhleñ

Popular amongst the Khasi and Jaintia tribes of Meghalaya, this rice cake is prepared using *Mynri* rice

flour (500 g), jaggery (15 g) and a pinch of baking soda. The rice flour is mixed with melted jaggery, and a pinch of baking soda is added to the mixture. The mixture is mixed properly with 85-90% of water until it forms a batter. A serving spoonful of the batter is taken and dropped in a wok with heated refined oil at 75°C. It is deep-fried on both sides for 5 min each over low heat (50°C) until it reaches a crispy brown texture. This rice cake can be consumed daily with tea and also during festivals¹⁵.

Pulum

Pulum is a rice cake mainly prepared in the state of Meghalaya. It is the specialty of the Khasi people in the West Khasi Hills district of Meghalaya. *Pulum* is mainly prepared by boiling the cake in hot water. Rice flour is taken and mixed with water (70%) till it forms a dough. No spices or sugar are added to this rice cake. The dough is divided into smaller pieces and, with the help of hands, it is tapped into round, flat-shaped structures. The flat cake is then transferred into previously boiled hot water and cooked for about 10 min. After 10 min, it is immediately transferred into cold water to stop the cooking process. It is then taken out and ready to serve. *Pulum* is popular in the West Khasi Hills district of Meghalaya and is mainly prepared during wedding ceremonies and other festivals.

Pita

This is a local rice cake prepared by the Garo tribe of Meghalaya. In this procedure, the same amount of sticky rice flour (50%) and plain rice flour (50%) is used. Sticky rice in the local Garo language is known as “*Minil merong*” and plain rice is known as “*Miari merong*”. To the mixed rice flour, sugar or jaggery (6%), and water (65%) are added and mixed properly. The mixture is then baked for about 5 min until the sugar or jaggery has melted with the rice flour. The mixture is then allowed to cool before being formed into small roti-size pitas by hand. The small rotis are fried in a pan for 6 min until golden brown. This rice cake is commonly served as a tea snack at festivals.

Sakingata

Sakin gata (sticky white rice cake) is a popular sweet rice cake among the Garo people of Meghalaya. This is prepared by mixing sticky rice “*Minil merong*” and ordinary rice “*Miari merong*” in a ratio of 3:1. The rice is soaked for six hours. The next day, the water was discarded and the rice was allowed to dry for about 3 h in sunlight. It is then pounded using

a mortar and pestle. The next step is to fry the sesame seeds for 2 min until they make a crackling sound and release an aroma. The sesame seeds are taken and ground until a finely coarse form is achieved. Sugar (5%) and ground sesame seeds (50%) are added to the powdered rice and mixed together. The mixture is then transferred into an earthen pot having a few holes at the bottom. The pot is layered with banana leaves or fibre loofah. The layered banana leaf/loofah is slit in a few places to ensure proper steaming. The powdered sticky rice mixture is layered on the banana leaf or loofah, followed by little black sesame powder. This process is done until there are five layers of the components. After layering is completed, this earthen pot is kept on top of a hot, steamy vessel and allowed to steam for about 30-40 min. The earthen pot is covered with a lid and tightly packed with cloth so that no steam will escape. *Sakin gata* is mainly prepared during the “*Wangala*” festival and other ceremonies.

Winsii

This rice cake is mainly prepared by the Tangsa tribe of Arunachal Pradesh. It is a steamed or boiled rice cake. The local rice name “*Raico*” is used for this purpose. Firstly, the rice is taken and soaked in water for about 2-3 h or more before preparation. Then it is dried for 2 h and ground to a fine powder. The powdered rice is taken and mixed with water (80%) till it forms a paste. The paste is spread as a thin sheet on the *Nyiipshup jaq* leaf (local name). The carefully packed leaf is kept on top of a perforated steel utensil and steamed for half an hour. This cake is served hot with tea, vegetables, or soup. It is mainly prepared during New Year festivals (Fig. 4).

Kithou Raokhao

This rice cake is mainly prepared by the tribe of Poumai Naga of Nagaland. The local name “*Kithou raokhao*” means sticky rice bread or pancake, and “*Kithou*” means sticky rice or glutinous rice. The sticky rice is soaked in water for 2-3 h. Then the water is drained and the rice is set aside. The



Fig. 4 — Winsii

sticky rice is taken for grinding till it reaches a powdery form. Water (70%) and sugar (5-6%) are added to the rice powder and mixed. The batter is then poured into a round utensil and fried on low heat (45-50°C) with mustard oil for 10-15 min, or until both sides are brown. This rice cake is mainly prepared during marriage ceremonies and other festivals (Fig. 5).

Haokhamui

Haokhamui is a rice cake prepared by the Tangkhul tribe of Manipur. It is prepared by using sticky rice locally called “*Manui*”, frying oil (3-4%), water (60%), and sugar (5-6%). The previously soaked rice (6 h) is ground into a fine powder with the help of a mixer grinder. For this powdered rice, water is poured accordingly and kneaded to make dough. Sugar is used to enhance the flavour. The dough is divided into small pieces and formed into a flat roti (15-20 cm in diameter). This roti is fried in a small amount of oil at a low temperature (40-50°C) for 30 min to 1 h. This rice cake is typically served at Christmas and New Year's celebrations.

Sachao

Sachao is mainly prepared by the Tangkhul tribe of Manipur. It is made using sticky rice flour, oil (10-15%), sugar (3-4%), and ground black sesame seeds (15%). The preparation method of *Sachao* is similar to that of *Haokhamui* rice cake. After the sticky rice is soaked (6 h), grounded (fine powder), and made into dough (60% water), it is then mixed with ground sesame seeds and sugar (optional). The dough is made into a small rectangular shape and deep fried for 10-15 min. *Sachao* is mainly prepared after the harvest and during the festive seasons (Fig. 6).

Entaap

The rice cake, *Entaap*, is made by the Bodo tribe of Assam and a few tribes of Meghalaya as well. The main ingredients for this rice cake are black sticky rice (locally known as “*Maibra gwswm*”) and sesame seeds (15-20%). Some do use shredded coconut as

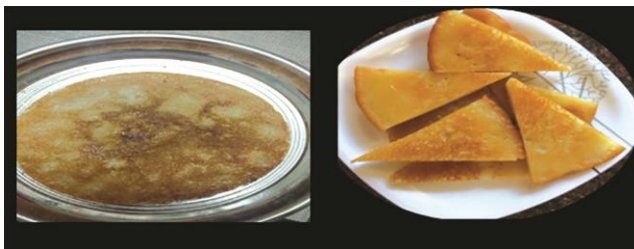


Fig. 5 — *Kithou raokhao*

well (15-20%). First, the black sticky rice is soaked in water for 2-3 h. Then it is pounded in a wooden mortar and pestle to a fine powder. The powdered rice is sprinkled with water (5-10%) and dried (cooked in an earthen vessel). The ground sesame seeds, sugar, and shredded coconut are spread on top of the rice cake. It is then pressed into a folded shape and cooked for 2-3 min.

Bhapot diya pitha/Tekeli mukhot diya pitha

Bhapot diya pitha/Tekeli mukhot diya pitha is a traditional Assamese and Bodo rice cake. The ingredients include *bora saul* (sticky rice), sesame seeds (10%), and sugar (6%). Between layers of rice powder, sesame seeds and sugar are sandwiched. The rice is soaked for 4-5 h before being finely ground with a wooden mortar and pestle. It is then placed on a kettle lid (to achieve the desired form) and covered with muslin cloth. It is then placed on top of a deep elongated spherical small mouth aluminium pot filled with boiling water (60-70°C) for 3-5 min, or until the steam penetrates the top of the rice cake¹⁷.

Sitao

This is another rice cake delicacy of the Bodo tribe of Assam. *Sitao* is mainly prepared using *bora saul* flour, sesame seeds (10-15%), sugar (6-10%), and salt (1-2%). The freshly pounded sesame seeds, sugar, and salt are mixed together with the sticky rice flour. Next, water (60-65%) is poured over and kneaded till it forms a dough. The dough is shaped into a smaller flat circular cake and deep fried (60-65°C) for 5 min on each side until it attains a brown colour¹⁸ (Fig. 7).

Awang bangui

The rice cake, *Awang bangui*, is traditionally made in the state of Tripura, mainly by the Tripuri. Two varieties of rice are used for the making of this rice cake. *Auwan/Guria Maira* (local sticky rice) at 75% and Bengal Joha rice at 25% are taken and mixed together. The rice is soaked for 3-4 h. Following that,



Fig. 6 — *Sachao*

the water is drained and the rice is allowed to dry for 2-3 h. The rice is then taken and pounded using wooden mortar and pestle till a fine powder is attained. With the powdered rice, the jaggery/sugar (5-6%) and salt (1-2%) were mixed along with (70%) warm water (50°C). For flavour, sesame seeds (8-10%) are added. The mixture (200-250 g) is then packed in a banana leaf, making a cone shape and tied using a grass straw. The package is transferred into a pot of boiling water (80-90°C) and boiled for 20-30 min till the rice cake is cooked. (Fig. 8)

Awang bleb

Awang bleb is another variety of rice cake from the state of Tripura. This rice cake is similar to the *Sachao* of Manipur and the *Sitao* of Assam. It is one of the most popular types of rice cake consumed during gatherings and many festivals. It is made of *Auwan/Gurian Maira* (375 g), Bengal Joha (125 g), jaggery/sugar (10 g), salt (2 g) and sesame seeds (2 g). The preparation method is similar to that of *Awang bangui*. After mixing the two varieties of rice, melted jaggery, sugar, salt, and sesame seeds were added. The dough is made into a small flat circular disc and deepfried (80-90°C) for 5 min on each side till a golden brown colour is achieved.



Fig. 7 — *Sitao*



Fig. 8 — *Awang Bangui*

Selroti

The Gorkha people of Sikkim and neighbouring states such as Himachal Pradesh, Darjeeling, Nepal, and Bhutan are the main producers of *Selroti*. It is made using 1 kg of old basmati rice, 100 g of wheat flour, 8% powdered sugar, and spices (25 g). Using enough milk (200 mL) and water, combine the rice flour, powdered sugar or jaggery, pulverized dry fruits (25 g), and spices (400 mL). The ingredients are thoroughly combined to produce a thick, abundant liquid. At room temperature, the mixture is allowed to ferment for 3-4 h. Then it is deep fried for 10-15 min in oil (1 L) in concentric circular patterns till golden brown. During the fermentation of *selroti* batter, lactic acid-producing bacteria such as *L. curvatus*, *L. mesenteroides*, *S. cerevisiae*, *S. kluyveri*, *P. burtonii*, *P. pentosaceus*, *E. faecium*, *Z. rouxii*, and *D. hansenii* were discovered^{19,20}. *Selroti* is a popular snack containing 91.3% carbohydrate, 5.7% protein, 2.7% fat, 23.8 mg/100 g Ca, 8.9 mg/100 g Na, and 29.7 mg/100 g Phosphorous, and a food value of 410.3 kcal/100 g²¹. It is eaten with almost every meal on a daily basis. It can be served with potato curry, pickle, and meat during the Dashehra and Diwali festivals^{19,22}.

Yomari

Yomari is a common type of rice cake prepared by the Gorkha community of Sikkim and holds an important status for the people of the Newar sub-community. It is prepared using old basmati rice flour and jaggery or chhena as the stuffing (40-50%). The rice flour is kneaded well using 70% of warm water (40-50°C). After kneading, the dough is kept for 3-4 h. Dough balls are formed into oval structures with tapered ends to resemble boats. Jaggery or caramelized chhena are stuffed inside the dough. After that, it is sealed and steamed (70-80 °C) for 15-20 min to soften it up. *Yomari* is mainly consumed during wedding ceremonies and other festivals (Fig. 9).

Feeng (glass noodles)

In Sikkim, the Gorkhas and other groups make a variety of rice products using old basmati rice. Rice starch is mostly used in its production. This starch is first soaked with water, then pressed through a machine that extrudes it into noodles, which are then cooked for 20-30 min in warm water (38°C). They are then rinsed with cold water and hung to thoroughly absorb the starch, then rinsed and sun-dried for two days until brittle and glass-like. Noodles can be



Fig. 9 — Yomari

combined with veggies, churpi, or meat to make a dish.

Fambi

Fambi is a by-product of *feeng*. The starch obtained from rice is used for the preparation of *Fambi*. The liquid water is collected and an edible gelatin (30%) is added and stirred well. It is further kept at 6-8°C in the refrigerator for at least 3 h or overnight to give it a semi-solid composition. They are then cut into cubes and prepared along with various spices as a curry.

Discussion

The people of India's North-eastern region have had extensive indigenous knowledge in preparing rice-based foods since ancient times, and the preparation of rice cakes is solely dependent on the availability of resources in the community. *In vitro* studies in animal models²³ have revealed some of the potential health benefits of rice phospholipids, including the ability to control cardiovascular disease and lower cholesterol²⁴, treat hepatic ailments²⁵, prevent metastasis and tumour growth^{26,27}, improve body immunology²⁸, and aid in the control of inflammatory responses such as arthritis²⁹. Nevertheless, more studies are still needed *in vivo* to claim these health benefits³⁰. It can be mentioned that maintaining proper sanitary conditions while preparation and value addition of the rice cakes using various natural anti-staling agents can help in increasing the shelf-life of the product and reduce food spoilage³¹. Further studies on the nutritive values of the traditional foods may be more beneficial to know the impact of these rice cakes on health.

Conclusions

This study has documented twenty-five varieties of rice cakes from the North-eastern region of India. It reveals that a few rice cake varieties are common in

different states of the North-eastern region, while others are indigenous to a particular state. Both men and women contribute equally to the procedures. The preparation method and unhygienic condition of rice cakes create low incomes for the local people. Therefore, there is a need to upgrade and preserve the indigenous knowledge to promote these products through markets¹⁷. Hence, with the proper involvement of modern scientific techniques, these rice cakes can be improved and enhanced in their marketable capacities³².

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Conflict of Interest

None of the authors has any competing or conflicting interests to declare.

Author's Contributions

BB formulated the research design, carried out the analysis, wrote the original draught and carried out the study. BKM and SH contributed as supervisors, formulated the research design, and reviewed and edited the paper. All authors contributed to writing the article and approved it before submission.

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