International Journal of Food Science and Nutrition
www.foodsciencejournal.com
ISSN: 2455-4898
Received: 08-05-2026, Accepted: 08-06-2026, Published: 23-06-2026
Volume 11, Issue 2, 2026, Page No. 288-291

Study on consumer acceptance of carrot and beetroot-based probiotic drink

Dr. Shailza Anand, Sujal Chauhan, Suhani Jamwal, Aakarshi Sharma, Privi Dogra, Samriti Thakur, Akshita Sharma, Palak Choudhary, Shagun Minhas, Rhythm Sharma
Department of Food Science, Nutrition and Technology, Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishwavidyalaya, Himachal Pradesh, India
DOI: https://doi.org/10.66856/ijfsn.2026.11.2.11100

Abstract
Probiotics are the live bacteria offering many health benefits when eaten in the right amounts. Many bacterial groups such as *Lactobacillus, bifidobacterium* and the yeast *Saccharomyces boulardii* have beneficial role and are among the most commonly used probiotic species. Fruit juices are an excellent way to deliver probiotics because they are packed with nutrients, contain a lot of sugar which support the growth and activity of probiotic microorganisms. Juices also serve as good carrier for developing probiotic products. The compounds such as carotenoids in carrots, betaxanthins and betacyanins in beet roots have the antioxidant effect.

Fermented product kanji is a traditional Indian probiotic drink made from carrots, which is naturally acidic, has impressive nutritional quality, antioxidant properties and therapeutic benefits.

Different proportions of carrot and beetroot are used to standardize Kanji for improved sensory and nutritional quality. Variations in proportions influence color, acidity, taste, flavor, microbial growth, and overall acceptability. Higher carrot concentration may increase sweetness and carotene content, whereas higher beetroot concentration may intensify color and earthy flavor.

Keywords: Kanji, consumer acceptance, probiotics

Introduction

Kanji prepared from carrots and beetroot is a naturally fermented functional beverage developed by combining different proportions of these with water, mustard seeds, salt, and black salt. The incorporation of beetroot along with orange carrots improves the nutritional profile, colour, antioxidant activity, and sensory quality of the beverage. Fermentation by naturally occurring lactic acid bacteria enhances flavour, shelf life, and probiotic potential, making it a nutritious and refreshing traditional drink.(table :1) (Swain *et al*; 2014; Ray & Joshi 2014) [1]

Carrots (*Daucus carota*) are an important ingredient in kanji because they are rich in β-carotene, dietary fiibre, vitamins, and natural sugars. β-carotene acts as a precursor of vitamin A and contributes to antioxidant activity. The natural sugars present in carrots support microbial fermentation by providing substrates for lactic acid bacteria. Carrots also contribute sweetness, flavour, and desirable texture to the beverage. (Marco *et al*., 2017; Ray & Joshi, 2014) [1, 2]

Beetroot (*Beta vulgaris*) is added to Kanji to improve nutritional and sensory properties. Beetroot contains betalains, phenolic compounds, minerals, iron, folate, and natural antioxidants that contribute to health benefits and deep red-purple coloration. The pigments present in beetroot improve visual appeal and consumer acceptability of the Beverage. Beetroot also enhances antioxidant capacity and may contribute to better functional properties of fermented Kanji. (Swain *et al*., 2014; Sarkar, 2008) [1, 3]

The preparation process involves washing, peeling, and cutting carrots and beetroot into small pieces. The vegetable mixture is combined with water, salt, mustard powder, and black salt in sterilized containers. Fermentation is carried out under sunlight or controlled temperature conditions for 3–7 days. During fermentation, lactic acid bacteria metabolize sugars into lactic acid, causing a reduction in pH and development of characteristic sour taste and aroma. Daily stirring ensures uniform fermentation and proper microbial activity. (Flow chart: 1) (Tamang et al., 2016; Swain *et al*., 2014) [1, 4]

During fermentation, several physicochemical changes occur in Kanji prepared from carrot and beetroot blends. The pH decreases due to lactic acid production, while colour intensity increases with proportion because of betalain pigments. Fermentation also improves anti-oxidant activity and stability of bio-active compounds. (Marco *et al*., 2017; Steinkraus, 1997) [2, 6]

Kanji prepared from carrot and beetroot is rich in vitamins, minerals, carotenoids, betalins, phenolic compounds, and probiotics. The beverage possesses antioxidant, digestive, and immune-supporting properties due to the combined effect of fermentation and vegetable bioactives. Carrot contributes β-carotene, while beetroot provides betalins and iron, resulting in improved nutritional quality. The probiotic microorganisms formed during fermentation may also help maintain gut health and enhance nutrient absorption.(figure : 1) (FAO/WHO, 2002; Marco *et al*., 2017) [2, 5]

Objectives of study

1. To prepare Kanji from beet-root & carrot in different proportions.
2. To study consumer-acceptance towards Kanji.
3. To evaluate sensory characteristics of Kanji using hedonic-scale**.**

Materials and Methodology

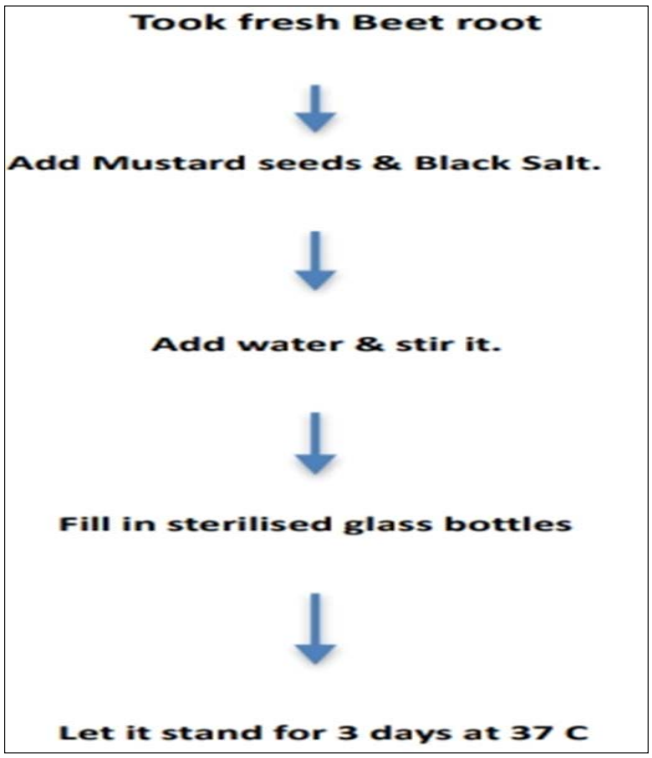
Raw materials

The raw material used for preparartion of kanji includes beetroot, carrots, mustard seeds, salt and black salt were procured from local market

Preparation of kanji

Table 1: Different Formulations of Kanji

Carrot : Beetroot	Water	Beetroot	Carrot	Salt	Black Salt	Mustard
100 : 100	1L	250g	–	6.25	6.25	12.5
0 : 100	1L	–	250g	6.25	6.25	12.5
50 : 50	1L	125g	125g	6.25	6.25	12.5
75 : 25	1L	187.5g	62.5g	6.25	6.25	12.5
25 : 75	1L	62.5g	187.5g	6.25	6.25	12.5



Flow Chart 1: Preparation of Kanji

Fig 1: Formulations of Kanji

Research Methodology

1. Research Analysis

This study follows an analytical research design to understand consumer ehavior, acceptance and preference of kanji**.**

2. Type of Research

This research relies on the numerical data collected using-

a. a hybrid questionnaire to identify the trends in consumer ehavior and demands

b. a 9-point hedonic scale to understand the consumer acceptance.

3. Data Collection

- **Primary Data:** Primary data was collected via questionnaire directly from respondents. This facilitated a direct understanding of general beverage preferences, awareness about kanji, consumption experience, preferences and acceptability (table 2-5)
- **Secondary Data:** Secondary data was obtained from credible publications, reviews, thesis and different books.

4. Research Instruments

- Questionnaire
- 9-point hedonic rating scale (figure:3)

5. Sampling Method

Selection of the respondents was carried out through a non-probability convenience sampling technique, based on ease of access and voluntary participation**.**

6. Sample Size

The research was conducted with a sample size of 100 respondents, considered sufficient to yield consumer ehavior towards kanji

7. Target Population

The target population included respondents from age group of 18 to 25 years which were primarily individuals with a student background. The study included respondents of both genders to achieve equitable representation.

8. Data Analysis

The collected data were systematically tabulated and analysed using statistical techniques such as percentage analysis in case of questionnaire and mean analysis in case of hedonic rating scale. Findings were presented in the form of table for better understanding

SAMPLE NO.	APPEARANCE	TEXTURE	TASTE	FLAVOUR	ACCEPTABILITY
Sample 1					
Sample 2					
Sample 3					
Sample 4					
Sample 5					

Fig 2: Kanji Evaluation Performa

Score/Rating	Hedonic scale
9	I like extremely
8	I like very much
7	I like moderately
6	I like slightly
5	I neither like or dislike
4	I dislike slightly
3	I dislike moderately
2	I dislike very much
1	I dislike extremely

Fig 3: Hedonic Scale

Data analysis and interpretation based on questionnaire responses

1. Which kinds of drinks do you prefer?

Table 2: Interpretation: The majority of respondents preferred cold beverages, indicating that refreshing drinks are highly popular among consumers.

Option	No. of Respondents	Percentage
Fermented	25	25%
Hot	30	30%
Cold	35	35%
Dairy-based	10	10%

2. How frequently do you consume beverages in a day?

Table 3: Interpretation: Most respondents consumed beverages 3-4 times daily, showing high beverage intake habits.

Option	No.	Percentage
1–2	40	40%
3–4	45	45%
More than 4	15	15%

3. Do you like fermented beverages?

Table 4: Interpretation: More than half of the respondents liked fermented beverages, suggesting potential acceptance for Kanji.

Option	No.	Percentage
Yes	55	55%
No	20	20%
Neutral	25	25%

4. Have you heard about Kanji beverage before?

Table 5: Interpretation: Awareness regarding Kanji beverage was moderate among respondents.

Option	No.	Percentage
Yes	60	60%
No	40	40%

Sample Carrot:beetroot	Appearance	texture	taste	flavour	Overall acceptability
100:0	6.11	5.76	5.05	5.09	5.50
0:100	6.64	6.12	5.05	5.30	5.78
75:25	6.90	6.26	5.21	5.18	5.81
50:50	6.84	6.28	5.30	5.30	5.93
25:75	6.78	6.70	5.84	5.84	6.32

Fig 4: Hedonic scale sensory evaluation result

Post testing questionnaire responses (data analysis and interpretation)

1. How would you rate overall taste of Kanji?

Table 11: Interpretation: Most respondents liked the taste of the Kanji, showing good consumer acceptance.

Rating	No. Of Responses	Percentage
Strongly Agree	17	17%
Agree	50	50%
Neutral	28	28%
Strongly Disagree	5	5%

2. How attractive did you find colour/appearance of kanji?

Table 12: Interpretation: The visual appearance of the Kanji was attractive and acceptable to most panelists.

Rating	No. of Responses	Percentage
Excellent	25	25%
Good	56	56%
Fair	16	16%
Poor	3	3%

3. Did you observe any natural fermentation smell in the drink?

Table 13: Interpretation: Most respondents could identify the characteristic fermented aroma, indicating successful fermentation

Rating	No. Of Responses	Percentage
Yes	84	84%
No	16	16%

4. How acceptable was the aroma of kanji?

Table 14: Interpretation: The aroma of the Kanji was positively accepted by the majority of respondents.

Rating	No. Of Responses	Percentage
Highly Acceptable	19	19%
Acceptable	66	66%
Slightly Acceptable	15	15%

5. How would you rate the texture/mouthfeel?

Table 15: Interpretation: The mouthfeel of the Kanji was generally satisfactory, though some improvement could be made.

Rating	No. of responses	Percentage
Excellent	13	13%
Good	49	49%
Fair	30	30%
Poor	8	8%

Key findings

1. Overall acceptability (FIGURE : 4)

- 25:75 (carrot: beetroot) has highest score (6.32)indicating most preferred overall
- 100:0 (carrot: beetroot) has lowest score (5.50) indicating least preferred overall

2. Appearance

- 75:25(carrot: beetroot) had the most appealing appearance
- 100:0 (carrot: beetroot)had the lowest appearance score

3. Texture

- 25:75 (carrot: beetroot) was rated highest in texture
- 100:0 (carrot: beetroot)scored lowest in texture

4. Taste

- 25:75(carrot : beetroot) was rated best in taste
- 100:0 and 0:100 (carrot : beetroot) received lowest taste score

5. Flavour

- 25:75 (carrot: beetroot) had the best flavor
- 100:0 (carrot: beetroot) received lowest flavor score.

Conclusion

Kanji prepared from different proportions of orange carrot and beetroot is a nutritious fermented beverage with enhanced sensory and functional properties. The combination of these vegetables improves antioxidant activity, color, nutritional composition, and probiotic potential. Fermentation further enhances shelf life, digestibility, and consumer acceptability. Standardization of vegetable proportions can help develop Kanji as a commercially valuable functional beverage with health-promoting benefits.

References

1. Swain MR, Anandharaj M, Ray RC, Rani RP. Fermented fruits and vegetables of Asia: A potential source of probiotics. Biotechnology Research International, 2014.
2. Marco ML et al. Health benefits of fermented foods: microbiota and beyond. Current Opinion in Biotechnology, 2017.
3. Sarkar PK. Biotechnological innovations in traditional fermented foods. Indian Journal of Traditional Knowledge, 2008.
4. Tamang JP et al. Ethnic Fermented Foods and Alcoholic Beverages of Asia. Springer, 2016.
5. Food and Agriculture Organization / World Health Organization. Guidelines for the Evaluation of Probiotics in Food, 2002.
6. Steinkraus KH. Classification of fermented foods: worldwide review of household fermentation techniques. Food Control, 1997.
7. Patra K. standardization and optimisation of black carrot and beetroot based probiotic drink (thesis), 2024.