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STANDARDIZATION AND SENSORY EVALUATION OF VRIKSHAMLA SHARKARA (GARCINIA SYRUP)

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ABSTRACT

Vrikshamla (*Garcinia indica* Roxb.) is a traditional medicinal plant and food widely consumed in India, particularly as a refreshing summer drink. According to Ayurveda, it is one of the ten drugs in Hridya Maha Kashaya (cardiotonic drugs) and is described as Hritrogahara in Bhavprakasha Nighantu. When used as Sharkara (syrup), it is known for its nourishing, cardiotonic, diuretic, thirst-quenching, and fatigue-relieving properties. Consumer preferences for food depend on sensory factors and nutritional properties. The aim of this study is to standardize the recipe for Vrikshamla Sharkara and evaluate its sensory qualities**.** Material and Methods: In the present study, Vrikshamla Sharkara was prepared using the fruits and flowers of Vrikshamla and served in the form of Panaka. Sensory evaluation and standardization were carried out using the 9-point Hedonic scale (Lawless and Klein, 1991). As Vrikshamla (*Garcinia indica* Roxb.) occurs in different varieties across regions, this evaluation was undertaken to ensure uniform quality and to support further studies on its potential cardioprotective effect. Observation and Results- Based on the hedonic scale ratings, Sample A had the highest mean score of 43.459, outperforming Samples B, C, and D. Discussion- Sample A received the best appearance ratings and mostly positive feedback for flavour and palatability, such as "pleasant." Conclusion: On the bases of scores given to different sensory parameters, Vrikshamla Sharkara prepared by both parts used (Dry fruits and Dry Flowers) is accepted by assessors but Vrikshamla Sharkara prepared by using Vrikshamla Dry Fruits (procured from Jamnagar) was much liked by assessors as compared to Vrikshamla Sharkara prepared by using Vrikshamla Dry Flowers.

Keywords: Vrikshamla (*Garcinia indica* Roxb.), Sharkara, Sensory Evaluation.

INTRODUCTION

Vrikshamla (*Garcinia indica* Roxb.) is a traditional medicinal plant as well as food in all over India. *Garcinia indica* is indigenous to the tropical forest regions of India. It grows primarily in India's western ghats in the states of Maharashtra, Goa, Karnataka and Kerala. It is considered as an endemic species to the Western Ghats and forests in India.[1] All parts of *Garcinia indi*ca, i.e., fruits rind, seeds, etc., have been used in various culinary, industrial and pharmaceutical applications, as well as fruit drinks and food. Pharmacological properties of *Garcinia indica* including antioxidant, anti-inflammatory, antimicrobial, anticancer, and anti-obesity activities have been reported. [2] There is a scope for natural therapy for preventing cardiac ailments with the help of medicinal plants. Vrikshamla Sharkara is consumed as refreshing drink during summers.

In Ayurveda, various medicinal properties of Vrikshamla (*Garcinia indica* Roxb.) have been mentioned in different classics, Vrikshamla (*Garcinia indica* Roxb.) is one of the ten drugs included in Hridya Maha Kashaya (Cardiotonic Drugs). [3] In Bhavprakash Nighantu it is said to be Hritrogahara (removal of heart disease). Vrikshamla is Amla (sour), Kashaya (astringent), Katu (pungent) in Rasa (taste), Laghu (light) and Ruksha (dry) in Guna (qualities), pacifies Kapha Vata, and Amla Vipaka (Sour biotransformation), also Ushna Virya (hot potency). [4] When used as doses form of Sharkara (syrup) it is Prinanam (nourishment), Hridya (cardiotonic effect), and Mutrala (diuretic effect) and also Trishnahara (cure the excessive thirst) and Shramahara (cure the fatigue).[5]

As Sharkara (syrup) is a well-known functional food, satisfying the demands of the consumers is a major issue in order to succeed in promoting the consumption of functional food products. For deciding the consumer choice towards the food products, sensory parameters followed by the nutritional properties are required to be considered. Due to this reason, sensory analysis of any developed food product is an important concern prior to supply the product in the market or to the consumers.[6]Knowledge gained through individual sensation is the key parameter for the evaluations in any field. But in case of sensory evaluation, it is very problematic to model and manage the knowledge gained by sensation. It is due to the fact that involvement of uncertainty and imprecision in case of acquiring information by human senses makes it difficult for the evaluation of the sensory data.[7]

Scientists have developed different scoring scales for getting certainty in the results of sensory evaluation, 9-point hedonic scale is one of these scales, which has been used in present study to evaluate different parameters like appearance, odour, palatability etc.

Aim and Objectives

To compare acceptability and palatability of Vrikshamla Sharkara prepared by using four different samples with 9-point Hedonic scale.

To ensure uniform quality and to support further studies on its potential cardioprotective effect.

MATERIALS AND METHODS

Vrikshamla Sharkara (Garcinia syrup) was evaluated through sensory analysis using the 9-point Hedonic scale for standardization, and its cardioprotective potential on blood pressure and pulse will be further assessed by applying the Bruce protocol in 30 healthy participants at ITRA, Jamnagar. [8] As Vrikshamla (*Garcinia indica* Roxb.) exists in different varieties across various regions.[9] I conducted sensory evaluation and standardization of Vrikshamla Sharkara using the 9-point hedonic scale.

Procurement of materials: Vrikshamla (*Garcinia indica*) and sugar powder were procured from local market of Bhavnagar and Jamnagar. The sample was verified with reference to classical Ayurvedic texts and authenticated by experts from the Department of Dravyaguna, ITRA, Jamnagar. The formulation Vrikshamla Sharkara was prepared in the Department of Rasashastra and Bhaishajya Kalpana, ITRA, Jamnagar.

Development of ready mix: Many initial trials were conducted to test different parts of Vrikshamla plants like Vrikshamla Pushpa (dry flowers) and Vrikshamla Phala (dry fruits). Then following preparations of Vrikshamla Sharkara with dry flower or dry fruits were finalized for sensory evaluation.

Samples of Vrikshamla

Dry Vrikshamla with Sugar

Vrikshamla Dry Pushpa

Vrikshamla Sharkar

Sample A (Procured from Local market of Jamnagar)
Vrikshamla Phala- (dry fruits)-100 gm
Sita (sugar powder)- 400 gm
Water-800 ml

Sample B (Procured from Local market of Bhavnagar)
Vrikshamla Phala- (dry fruits)-100 gm
Sita (sugar candy)- 400 gm
Water-800 ml

Sample C (Procured from Local market of Bhavnagar)
Vrikshamla Phala- (dry fruits)-100 gm
Sita (sugar candy)- 400 gm
Water-800 ml

Sample D (Procured from Local market of Jamnagar)
Vrikshamla Pushpa-(dry flowers)- 100 gm
Sita (sugar candy)- 400 gm
Water -800 ml

Method of Vrikshamla Sharkara preparation for consumption

According to classical texts of Ayurveda, Vrikshamla is made in to coarse powder and soaked in water over night. Then next day it is heated on moderate temperature till the water is reduced to 1/8th. Decoction is filtered and to it sugar is added and dissolved. This liquid is again heated on moderate temperature till it attains honey like consistency. [10] For this study, dried fruits of the Vrikshamla (procured from different sources) were used in samples A, B, and C, while in sample D, dried flowers of the same plant were used. All other material and preparation method were kept same for all samples. The final drink was made from 10 ml of syrup by adding 100 ml of water.

Sensory evaluation of Vrikshamla Sharkara

When the quality of food products is assessed by means of human sensory organs, the evaluation is said to be sensory or subjective or organoleptic. Every time when food is eaten, judgment is made. Sensory evaluation consists of judging the quality of food by a panel of assessors. For this study assessment was done by using 9-point Hedonic scale (Lawless and Klein, 1991) for the different parameters.[11] Study was carried out as per ICMR National Ethical Guidelines for biomedical and health research involving human participants and consent was obtained from participants prior to the study.

A panel of assessors consisting of 08 teaching staff, and 29 Post-graduation and Ph.D. Scholars of ITRA Jamnagar were selected randomly. Acceptability and organoleptic scoring of the preparations were done on the basis of the scores given by the assessors. The recipes were prepared in college premises. The recipes were evaluated for Appearance, Color, Odour, Flavor, Consistency, Mouthfeel (palatability) and Adhesiveness.

The following points were taken into consideration

Each sample was blinded, and no assessor was informed regarding identity of samples.

The assessors were not allowed to enter the preparation area, as they could gain information which could influence their judgment.

They were not allowed to consult each other but were asked to give unbiased opinion.

The assessors were provided with a glass of water each for oral revising between the samples.

A fixed interval of one minute was maintained for mouth rinsing between each sample of Vrikshamla Sharkara (Garcinia syrup).

Scoring scales for different sensory parameters

Table 1: Appearance

1	2	3	4	5	6	7	8	9
Extremely bad	Very much bad	Moderately bad	Slightly bad	Neither bad nor good	Slightly good	Moderately good	Very good	Excellent

Table 2: Color

1	2	3	4	5	6	7	8	9
Dislike Extremely	Dislike very much	Dislike moderately	Dislike slightly	Neither like nor dislike	Like Slightly	Like Moderately	Like Very much	Like extremely

Table 3: Odour

1	2	3	4	5	6	7	8	9
Rejectable	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither like nor dislike	Like Slightly	Pleasant	Very much pleasant	Extremely pleasant

Table 4: Flavor

1	2	3	4	5	6	7	8	9
Rejectable	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither like nor dislike	Like Slightly	Pleasant	Very much pleasant	Extremely pleasant

Table 5: Consistency

1	2	3	4	5	6	7	8	9
Thin like water	Very much thin	Moderately thin	Slightly thin	Neither thick nor thin	Slightly thick	Moderately thick	Very thick	Semisolid

Table 6: Mouthfeel (Palatability)

1	2	3	4	5	6	7	8	9
Rejectable	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither like nor dislike	Like Slightly	Pleasant	Very much pleasant	Extremely pleasant

Table 7: Adhesiveness

1	2	3	4	5	6	7	8	9
Extremely sticky	Very much sticky	Moderately sticky	Slightly sticky	Neither sticky nor non-sticky	Less Sticky	Moderately less sticky	Extremely less sticky	Non-sticky

Table 8: Score of four samples for Appearance

	Extremely bad	Very much bad	Moderately bad	Slightly bad	Neither bad nor good	Slightly good	Moderately good	Very good	Excellent
Sample A	0	0	0	0	4	9	18	6	0
Sample B	0	0	1	2	5	15	11	3	0
Sample C	0	0	0	2	5	9	16	5	0
Sample D	0	0	0	3	1	16	14	3	0

Table 9: Score of four samples for Color

	Dislike Extremely	Dislike very much	Dislike moderately	Dislike slightly	Neither like nor dislike	Like Slightly	Like Moderately	Like Very much	Like extremely
Sample A	0	0	0	1	2	15	14	5	0
Sample B	0	0	1	2	6	16	8	4	0
Sample C	0	0	0	1	6	8	13	9	0
Sample D	0	0	0	4	4	15	12	2	0

Table 10: Score of four samples for Odour

	Rejectable	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither like nor dislike	Like Slightly	Pleasant	Very much pleasant	Extremely pleasant
Sample A	0	1	1	5	12	10	8	0	0
Sample B	0	0	6	10	11	6	4	0	0
Sample C	0	0	1	6	12	6	9	2	1
Sample D	0	0	2	4	11	13	5	1	1

Table 11: Score of four samples for Flavor

	Rejectable	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither like nor dislike	Like Slightly	Pleasant	Very much pleasant	Extremely pleasant
Sample A	0	1	0	0	3	9	17	6	1
Sample B	0	1	1	10	4	10	7	3	1
Sample C	0	0	2	4	4	15	6	4	2
Sample D	0	0	2	6	2	9	13	4	1

Table 12: Score of four samples for Consistency

	Thin like water	Very much thin	Moderately thin	Slightly thin	Neither thick nor thin	Slightly thick	Moderately thick	Very thick	Semisolid
Sample A	5	2	8	4	16	1	1	0	0
Sample B	1	7	7	14	7	1	0	0	0
Sample C	1	3	4	6	7	14	2	0	0
Sample D	3	2	7	6	12	5	2	0	0

Table 13: Score of four samples for Mouthfeel (palatability)

	Rejectable	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither like nor dislike	Like Slightly	Pleasant	Very much pleasant	Extremely pleasant
Sample A	0	0	1	1	1	7	19	8	0
Sample B	0	1	3	10	6	8	5	4	0
Sample C	0	0	1	7	5	16	4	4	0
Sample D	0	0	3	4	8	6	10	6	0

Table 14: Score of four samples for Adhesiveness

	Extremely sticky	Very much sticky	Moderately sticky	Slightly sticky	Neither sticky nor non-sticky	Less Sticky	Moderately less sticky	Extremely less sticky	Non-sticky
Sample A	0	0	0	2	7	0	3	12	13
Sample B	0	0	0	3	7	4	3	8	12
Sample C	0	0	1	7	7	9	6	2	5
Sample D	0	0	0	3	7	5	6	6	10

Table 15: Average Score of four samples for different parameters

	Appearance	Color	Odour	Flavor	Consistency	Mouth-feel	Adhesiveness
Sample A	6.70	6.54	5.43	6.67	3.83	6.78	7.49
Sample B	6.14	6.05	4.78	5.59	3.59	5.30	7.14
Sample C	6.46	6.62	5.65	6.02	4.76	5.73	6.03
Sample D	6.08	6.11	5.59	6.11	4.22	5.92	6.94

OBSERVATIONS AND RESULTS

Score of four samples for Appearance

Maximum scores for appearance in sample A were in 7th column i.e. moderately good for followed by 6th i.e. slightly good, in sample B were in 6th column i.e. Slightly good for followed by 7th column i.e. Moderately good, in sample C were in 7th column i.e. moderately good followed by 6th column i.e. slightly good and for sample D in 6th column i.e. slightly good for followed by 7th column i.e., moderately good. (Table 8)

Score of four samples for Color

Maximum scores for color were in 6th column i.e. Like slightly for sample A and Sample D followed by 7th column i.e. Like moderately. In sample B were in 6th column i.e. Like slightly followed by 7th column i.e. Like moderately and in sample C were in 7th column i.e. Like moderately followed by 8th column i.e. Like very much. (Table 9)

Score of four samples for Odour

Maximum scores for Odour, for sample A were in 5th column i.e. neither like nor dislike followed by 6th column i.e. Like slightly, for sample B were in 5th column i.e. Neither like nor dislike followed by 4th column i.e. Dislike slightly, for sample C were in 5th column i.e. Neither like nor dislike followed by 7th column i.e. Pleasant and for sample D were in 6th column i.e. like slightly followed by 5th column i.e. neither like nor dislike. (Table 10)

Score of four samples for Flavor

Maximum score for Flavor, for sample A and sample D were in 7th column i.e. pleasant followed by 6th column i.e. like slightly. For sample B were in 4th and 6th column i.e. Dislike slightly and like slightly respectively followed by 7th column i.e. Pleasant. For sample C were in 6th column i.e. Like slightly followed by 7th column i.e. Pleasant. (Table 11)

Score of four samples for Consistency
Maximum score for Consistency, for sample A and sample D were in 5th column i.e. Neither thick nor thin followed by 3rd column i.e. moderately thin. For sample B were in 4th column i.e. Slightly thin followed by 5th column i.e. Neither thick nor thin and for sample C were in 6th column i.e. Slightly thin followed by 5th column i.e. Neither thick nor thin. (Table 12)

Score of four samples for Mouthfeel (palatability)
Maximum score for mouthfeel (palatability), for sample A and sample D were in 7th column i.e. pleasant or in sample A followed by 8th column i.e. very much pleasant and in sample D followed by 5th column i.e. Neither like nor dislike respectively. For sample B were in 4th column i.e. Dislike slightly followed by 6th column i.e. Like slightly and for sample C were in 6th column i.e. Like slightly followed by 4th column i.e. Dislike slightly. (Table 13)

Score of four samples for Adhesiveness
Maximum score for Adhesiveness, for sample A and sample D were in 9th column i.e. Non sticky at all, in sample A followed by 8th column i.e. extremely less sticky and in sample D followed by 5th column i.e. Neither sticky nor non-sticky respectively. For sample B were in 9th column i.e. Non sticky at all followed by 8th column i.e. Extremely less sticky and for sample C were in 6th column i.e. Less sticky followed by 4th and 5th column i.e. Slightly sticky and neither sticky nor non sticky respectively. (Table 14)

Average Score of four samples for different parameters
The average scores of different parameters selected for sensory evaluation of Vrikshamla Sharkara are given in Table 8.

From the observations on different sensory parameters, it was observed that 48.64%, 43.24% assessors found moderately good appearance in sample A and sample C respectively, 40.54% and 43.24% assessors found slightly good appearance in sample B and sample D respectively.

Scores given to basis on color, according to 40.54%,43.24%, and 40.54% assessors color was slightly likable for sample A, sample B and sample D respectively. And 35.14% accessors found Moderately likable in sample C.

According to 32.43%, 29.73%, and 32.43% assessors the Odour of sample A, sample B and sample C was neither likable nor dislikable respectively. And Odour of sample D was slightly likable by 35.13% assessors.

In case of flavor for sample A 45.94% and in sample D 35.13% assessors assess pleasant flavor. And 27.02%, 40.54% assessors found Slightly likable for sample B and sample C respectively.

Neither thick nor thin Consistency was observed in sample A assessed by 43.24% and in sample D by 32.43% assessors, 37.84% assessors slightly thin consistency observed in sample B and in sample C observed slightly thick consistency by 37.84% assessors.

In case of mouth-feel parameter sample A was pleasant according to 51.35% assessors and sample D was pleasant according to 27.02% assessors. In sample B and sample C Slightly dislikable and slightly likable according to 27.02% and 43.24% assessors respectively.

On the Observation of Adhesiveness, 35.13% ,32.43% and 27.02% assessors found non sticky at all for sample A, sample B and D respectively. And according to 24.32% assessors found less sticky in sample C. (Table 15)

RESULTS AND DISCUSSION

Table 16: Mean value of average scores

Samples	Mean value of Average score
Sample A	43.459
Sample B	38.594
Sample C	41.270
Sample D	41.054

Based on the observations of all the samples using a hedonic scale, Sample A had the highest mean average score of 43.459 compared to Samples B, C, and D. Therefore, it will be used for the clinical trial on Vrikshamla.

Sensory evaluation was conducted with 37 randomly selected assessors using a 9-point Hedonic scale to assess acceptability and organoleptic qualities. Sample A received the most favourable appearance ratings, with the majority of assessors rating it as "Moderately Good" (18) or "Slightly Good" (9), and 6 rated it as "Very Good." Overall, Sample A had acceptable appearance. In comparison, Sample B received the least favourable ratings, while Samples C and D performed moderately well, with C slightly outperforming D. Appearance is one of sensory attributes that influence consumer satisfaction. This helps to understand consumer preference and acceptability levels which is important for quality control.

Sample A received mostly positive flavour ratings, with 17 assessors rated it as "Pleasant" and 9 as "Like Slightly." One assessor rated it as "Extremely Pleasant." No "Rejectable" or "Dislike" ratings were given, indicating a overall favourable response. Its flavour was particularly well-received in the "Pleasant" and "Very Much Pleasant" categories. which suggests that its flavour was widely appreciated among assessors. Flavour is mainly composed of taste and odour but is also influenced by other properties such as texture, appearance etc. Flavour is one of the sensory phenomena experienced based on the taste, odour/smell, appearance, texture, temperature of a food that can trigger the senses.

Sample A received mostly positive palatability ratings, with 19 assessors rating it as "Pleasant" and 8 as "Very Much Pleasant." It also received 7 "Like Slightly" ratings, with no "Rejectable" or "Dislike Very Much" ratings. This indicates that Sample A had the best overall palatability and was the most favoured in this group. Palatability is a key factor in hedonic scaling because it's the extent to which a food is agreeable to the palate or taste.

CONCLUSION

In present study Vrikshamla Sharkara prepared by Vrikshamla Phala and Vrikshamla Pushpa are accepted by assessors. On the basis of individual scores of different parameters sample-A (which was Procured from Local market of Jamnagar) was more liked by assessors as compared to sample-B, sample C and sample D. and i.e. Vrikshamla Sharkara prepared using Vrikshamla Phala (dry fruits) is more suitable as compared to Vrikshamla Sharkara prepared using Vrikshamla Pushpa (dry flowers).

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