

DEVELOPMENT AND QUALITY EVALUATION OF 'SINGHARA (INDIAN WATER CHESTNUT) VADI': RESEARCH ARTICLE

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Received on: 04/02/2021

Revised on: 24/02/2021

Accepted on: 14/03/2021

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ABSTRACT

The study was undertaken to develop and standardise an innovative, wholesome and functional traditional Indian sweet which was prepared with *Singhara (Trapa bispinosa Roxb)* with an intention to develop an innovative and nutritive food product that can be used as an acidity pacifier. *Vadi* was standardized as per the reference found in the Ancient Ayurvedic literature (*Kshemkutuhala*) with slight changes as per practical application. Various trials were conducted and *Vadi* was prepared from the most acceptable trial (T2: Water chestnut flour 45%, Sugar 32%, Cow's ghee 22%). In the present investigation, *Vadis* made from Indian water chestnut were subjected to proximate analysis and sensory analysis which exhibited better results in terms of nutritional quality when compared with the control sample.

KEYWORDS: *Singhara*, *Vadi*, *Acidity pacifier*, Cow's ghee.

INTRODUCTION

Indian traditional food; as described in ancient Ayurvedic literature always emphasise on overall health of an individual. *Vadi* is a small square or diamond shaped sweet which is calorie dense traditional sweet with good carbohydrate, protein, and fats along with many essential nutrients required during various life phases. Some types of *Vadis* are also prepared using functional ingredients like black gram, lotus roots, wheat flour, and rice flour.

'*Singhara*' also known as Indian water chestnut is primarily used to relieve acidity (Kar DM et al, 2010), to increase weight, to relieve fatigue; and also can be used as

Indian water chestnut is an annual, floating-leaved aquatic plant of temperate and tropical freshwater wetlands, rivers, lakes, ponds and estuaries. Native to Eurasia and Africa, water chestnut has been widely gathered for its large nutritious fruits since the Neolithic. It is now a species of conservation concern in Europe and Russia. Indian water chestnut possesses Antioxidants such as Flavanoids, flavons and

Trapa bispinosa possess significant antiulcer activity in both pyloric ulceration and aspirin induced ulceration. it was shown; ulcer index was reduced to a significant extent in both the cases. (Kar D. et al. 2010). The red and green varieties of the herb show antimicrobial activity. (Mohammed Razvy A. et al 2011). It has been used in traditional system of medicine like *Ayurveda* since centuries in many health conditions like stranguria,

dysuria, polyuria, sexual debility, and general fatigue, sore throat, dysentery. Modern researches also have supported its traditional uses and explored other important properties such as analgesic, antibiotic, antidiabetic, immune-modulatory neuroprotective. (Shaikh I. et al 2013). *Ayurveda* prefers powdered form of herbs because by tasting the herb, digestive process begins and sends signals to the body to initiate the body's own supportive mechanisms. (Acharya Balkrishna, 2008).

Though the powdered form of *Singhara (Trapa bispinosa)* is considered better for assimilation, in practical scenario, swallowing of powdered form with milk or water has

been complained of giving nauseatic sensation for many individuals including adolescent girls and pregnant, lactating women. Thus *Vadis* prepared with is a better option for *Singhara (Trapa bispinosa)* ingestion in powdered form. In addition, *Vadi* is easy to prepare, consume, carry and widely accepted with better shelf life.

MATERIALS AND METHODS

Raw materials procurement

Functional raw materials like Water Chestnut flour (*Singhara* flour), Cow's ghee, sugar, Cardamom powder, were procured from local supermarket of Pune.

Experimental Trials and *Vadi* preparation

Vadi was prepared according to the standard methods given by IJFNS (International Journal of Food and

Nutritional Sciences, 2013, ISSN: 2320-7876) and *Kshemkutuhala grantha* with some modifications in the formula.

Water chestnut flour, cow's ghee, sugar and cardamom powder blends were in the ratio, T1 (Control) (12:60:80:5), T2 (500:250:350:10) respectively.

Vadi was prepared as per traditional method of *Vadi* preparation.

Water chestnut flour was roasted in ghee till desired colour and aroma developed. Sugar syrup of 1 thread consistency was prepared. The flour with cardamom powder was then added to sugar syrup. This mixture was then set in ghee greased pan for 10 minutes. *Vadis* of 5 gm each were prepared from the above mixture and stored in airtight, moisture free container. (Please refer Table 2). Various trials were conducted to evaluate best acceptable treatment (T4). Please refer Table 1).

Analysis of *Singhara Vadi*

Sensory Analysis

Vadis were scored for surface appearance and eating characteristics (shape, colour, taste, texture, flavour, mouth-feel etc) by a panel of 10 semi-trained judges on 5 points hedonic scale using score-card. (Please refer table 3)

Proximate Analysis

Proximate analysis was carried out according to standard methods of AOAC (1995) for evaluating ash, moisture, carbohydrates, proteins, fat, and calcium and magnesium.

Microbial Analysis

Pour plating method on Nutrient Agar was used for microbial testing. Total plate count was evaluated for control and test samples.

Statistical Evaluation

The original sensory panel data and other results were statistically analyzed using analysis of variance (ANOVA) and least significance difference at a significance of probability 5%.

RESULTS AND DISCUSSION

Development of *Singhara Vadi*

For every batch of *Vadis*, 500 gm of flour was used. The flour blend included 45% Water Chestnut flour + 32%

Sugar + 22% Cow's ghee. Every batch resulted in production of 25 *Vadis* with every *Vadi* weighing approximately 5 gm.

Sensory Evaluation

The following tabulated data gives the details of organoleptic evaluation of the *Vadi* samples. It is observed that treatment 2 (T2) sample scored highest points next to control sample in terms of flavour, mouth feel, taste and overall acceptability. (Please refer table 3)

Physico chemical Analysis of *Singhara Vadi*

The following tabulated data gives the details of proximate composition of test sample of the most acceptable trial (T2) and that of the control sample (T1).

It is observed after analyzing the data, there were no statistically significant differences observed in all the parameters. (Please refer Table 4).

Microbial Analysis

Microbial testing was carried out to study the microbial quality of the product. It was carried out on the day of production of *Vadi* (zero day) using nutrient agar on pour plate method.

CONCLUSION

A wholesome, nutritious and functional *Vadis* prepared from *Singhara* (*Trapa bispinosa*) which has medicinal properties was successfully developed. These *Vadis* can be especially recommended as acidity pacifier and can be considered as tonic in certain population like adolescent girls, women in age group of 18-30 years and pregnant women.

Incorporation of *Singhara* in a routine diet would result in significant enhancement of calcium and magnesium content of the food and thus would help in acidity reduction.

There is a scope in the future to study the shelf life of the sample and further clinical implementation.

ACKNOWLEDGEMENT

The author 1 thanks Asst.Prof. Priya Darshane and Head of the Dept. Dr. Abhjit Joshi for their meticulous guidance. The author is also thankful to Tilak Maharashtra Vidyapeeth for providing the necessary facilities in conducting the experiment.

Table 1. Experimental Treatment Details.

Ingredients	T1(Control)	T2
Water Chestnut flour	120 gm	500 gm
Cow's Ghee	60 gm	250 gm
Sugar	80 gm	350 gm
Cardamom Powder	5 gm	10 gm

Table 2. Processing characteristics of the Vadi.

Sr.No	Characteristics	Value
1.	Flour Composition	45% water chestnut flour + 32% sugar + 22% cow’s ghee
2.	Quantity of flour blend used per batch	500 gm
3.	Number of Vadi per batch	25
4.	Weight of each Vadi	5 gm
5.	Colour and Aroma	Light brown

Table 3. Screening of the most Acceptable Treatment by Sensory Evaluation.*

Treatment Sample	Surface Appearance			Eating Characteristics				Overall Acceptability (Mean)	Rank
	Shape	Colour	Characteristic Appearance	Taste	Flavour	Mouth-feel	Texture		
(Control) T1	4.2	4.5	4.44	3	4	4.25	4.75	4.1	I
T2	4.50	4.75	4.55	4.95	4.75	4.65	4.75	4.70	I

*Mean values of ten judges using five point hedonic scale (5 Excellent -1 Poor)

[key points: Excellent: 1, Very Good:2, Good: 3, Fair:2, Poor:1]

[Ranking : Rank 1: >3.50, Rank II: 3.50-2.50, Rank III: <2.50]

(Please refer Figure 1 below)

Table 4. Proximate composition of Singhara (Trapa bispinosa) Vadi per 100 gm.

Parameters	Result	Units
Energy value	410.86	Kcal
Protein	3.23	gm
Carbohydrate	75.95	gm
Total Fat	10.46	gm
Moisture	9.57	gm
Ash	0.79	gm
Calcium	36.46	mg
Magnesium	81.96	mg
Potassium	500	mg

Table 5 Microbial testing of Singhara Vadi.

Parameter	Result	Units	Test Methods
Total Plate Count	2.1*10 ⁴	CFU/g	IS:5402:2012

CFU: Colony Forming Units

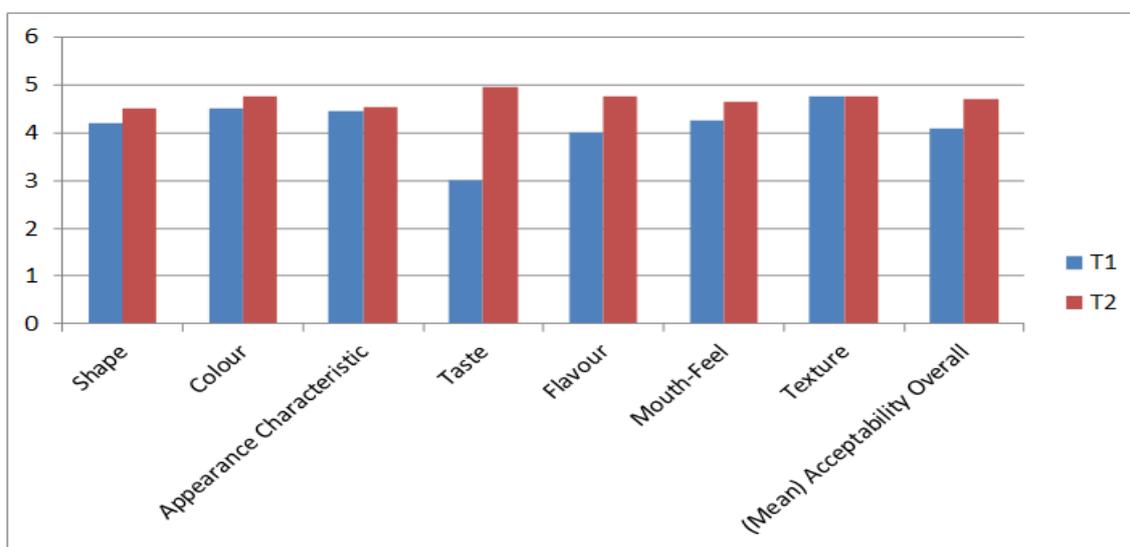


Figure 1 Sensory Evaluation of Singhara Vadi.

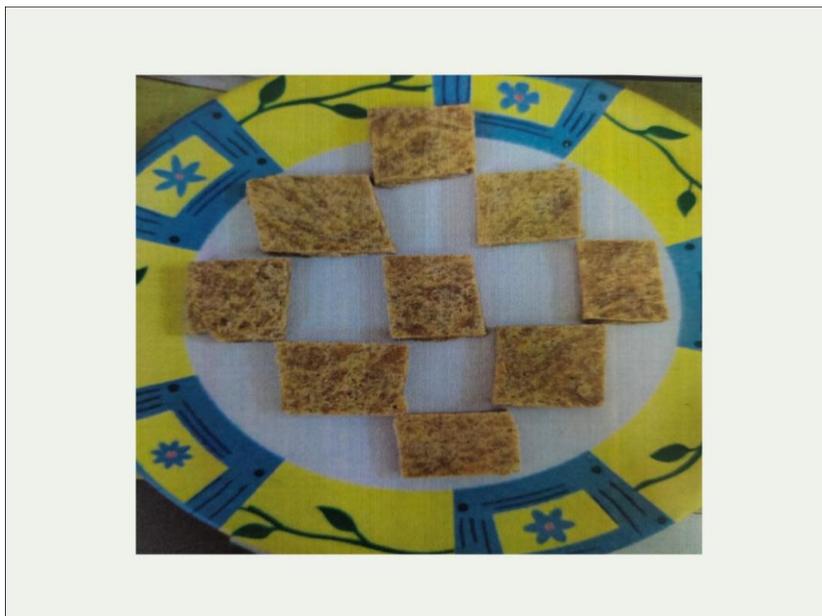


Figure 2 *Singhara Vadi (T2).*

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