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Standardization, physicochemical properties and sensory evaluation of vidhara vadi *(Argyreia nervosa)*

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Abstract
A combination of cereals and pulses always gives us balanced nutritious food containing lysine and methionine. Hence in many Indian ethnic food preparations, cereals and pulses are mixed at desirable proportions. We use vidhara leaves with combination of cereal and pules to prepare healthy and nutritious food. Vidhara leaves plant is effective against diabetes, anemia, obesity, tuberculosis, syphilis and cerebral disorders. It is also used as a cardiotonic, expectorant, digestive, carminative and appetizer. The hypotension, spasmolytic and anti-inflammatory activity was also reported by the seeds of the A. Nervosa plant. In Ayurveda medicinal system, it is used as Vriddhadaraka, i.e., the plant is associated with the anti-ageing property. The objectives of study were to enhance the nutritional profile and quality of instant multigrain vadi mix to optimize the recipe by incorporating cereal grain flours (rice flour), pulses flour (gram flour) and spices powders (turmeric, cumin seed, garlic, and green chilli), sesame seeds, Asafoetida and salt so as to standardize it during development, processing, packaging, storage and quality evaluation of vadi mix. The experiment was designed to Prepare Nutritional vadi from vidhara leaves. The chemical properties of Vidhara Vadi were carried out which shows moisture content (24.393 %), Fat (19.15 gm), Ash (4.379 %), Carbohydrate (40.991 gm), Energy (380.707 kcal) and Protein (11.078 gm) Vidhara vadi recorded highest sensory score in all the quality attributes. It concluded that the Vidhara vadi can be stored for 6 day at room temperature with satisfies consumer acceptability.

Keywords: vidhara vadi, rice flour, gram flour, sensory evaluation, proximate analysis, storage study

Introduction
Traditional foods play an important role in local identity, consumer behavior, and the transfer of cultural heritage for future generations and the interaction of this heritage with the rest of the world. The consumption of coarse grains and millets have been reported to decreased the incidence of diabetes, cardiovascular diseases, cancer and obesity which are increasing in an exponential manner globally and to combat them a rise in demand for food containing complex carbohydrates with high dietary fibre and health beneficial phytochemicals has been in demand. Apart from balanced nutrition, multigrain product provides variety of phytochemicals, flavors which improve the textural and sensory quality of the product. A combination of cereals and pulses always gives us balanced nutritious food containing lysine and methionine. The objectives of study were to enhance the nutritional profile and quality of instant vadi mix to optimize the recipe by incorporating cereal grain flours (rice flour), pulses flour (gram flour) and spices powders (turmeric, cumin seed, garlic, and green chilli), sesame seeds and salt so as to standardize it during development, processing, packaging, storage and quality evaluation of vadi mix. This is an essential Maharashtrian dish. It is made with besan flour (chickpeas flour) tempered with mustard, cumin seeds, Ajwain, hing for flavoring spiced with crushed green chillies) added to form a batter and is steamed and then fried as fritters. This delicious vadi can also be served with garlic chutney, coconut chutney, tomato sauce or a hot cup of tea. (Madhura Shah *et al*, 2021) The information generated from the present study, regarding the medicinal plant use by the Gond, Madia tribes, and help in creating mass awareness regarding the need for conservation of such plants and also in the promotion of ethnomedico-botanical knowledge within the region besides contributing to the preservation and enrichment of the gene bank of such ethnomedicinal important species. The local name is Vidhara, Botanical Name is Argyreanervosa (B urm.f.) Bojer, Family-Convolvulaceae (Dr. Vijay Khonde, 2020) [7]

Ayurveda is a traditional medicinal practice used in India since ancient times. It primarily focuses on the maintenance of positive health and, secondarily, to cure diseases. There are several herbal plants used in the ayurvedic medicinal system to treat several disorders. One such plant is A. Nervosa which is also known as Vrddhadaru. The description of this plant is mentioned in the Nighantu grants. It is also mentioned in Trikona Kanda in Ashtanga Sangraha. Vrddhadaru has been described in Karcveeradi Varga by Dhanvantri Nighantu. It is used as a Rasayana (rejuvenator) that helps in treating chronic ulcers, strangury and gonorrhoea. However, Vrddhadaru is considered a controversial drug. The external application of the leaves helps in curing the itching, ringworm, eczema, other skin disorders and is used as a local stimulant and rubefacient. Argyreia speciosa (Linn f.) (syn. Argyreia Nervosa) is the traditional ayurvedic medicinal plant that belongs to the Convolvulaceae family. It is commonly known as elephant creeper, Hawaiian Baby Wood Rose and Vidhara or Bidhara. The plant is mainly found in the tropical regions of the world. It is a large woody climber having white woolly hairy stems. In Ayurveda, it is known as Vruddhadaruka and is used as a Rasayana. It is used in various ayurvedic

formulations to treat various disorders such as diabetes, chronic gonorrhoea, ulcer, strangury, sexual disorders, anorexia, skin disorders, neurological disorders and associated with diuretic and aphrodisiac properties. It is also used as a nervine tonic. The leaves and flower of this plant are associated with great ornamental value and is cultivated as a garden plant. In various religious ceremonies, the seeds of this plant are used by juveniles for hallucinogenic and spiritual purposes in the United States. Because of the hallucinogenic property, the seeds of the A. Nervosa plant are ingested by people either in dried or fresh form or with alcoholic extract. The main active chemical constituent present in the seeds of this plant are ergoline, hypergamies or lysergic acid. The roots of A. Nervosa showed immunomodulatory, antispasmodic, nootropic activity. A Nervosa is mainly distributed in tropical countries worldwide. However, it is a native species of the Indian subcontinent. Because of its ornamental value, this plant is primarily grown in gardens due to its attractive leaves and flowers. In India, the plant is mainly found at an altitude of 500 m above the ground and found in Rajasthan, Uttarakhand, Bengal, Assam, Kerala, Karnataka, and Orissa. Also, it is seen as undergrowth in semi-deciduous forests and mostly at river banks and edges of lakes. (Manish Grover, 2021) [7].

The plant is effective against diabetes, anemia, obesity, tuberculosis, syphilis and cerebral disorders. It is also used as a cardiotonic, expectorant, digestive, carminative and appetizer. The hypotension, spasmolytic and antiinflammatory activity was also reported by the seeds of the A. Nervosa plant. In Ayurveda medicinal system, it is used as Vriddhadaraka, i.e. the plant is associated with the anti-ageing property. The plant is reported to have aphrodisiac, nootropic, immunomodulatory, hepatoprotective, antiinflammatory, wound healing, antidiarrheal, hepatoprotective, analgesic, antiviral, antihyperglycemic and CNS depressant activities. (Manish Grover, 2021) [7]

Materials and methods

Ingredients, chemical and equipments

Raw materials required during present investigation were procured from local market of Saralgaon such as Vidhara leaves, gram flour, rice flour, salt, sesame seeds, green chilli, garlic, carom seeds, lemon, turmeric powder etc. Most of the chemicals and equipments used in this investigation were of analytical grade which are obtained from College of Food Technology Saralgaon, Thane.

Physical and chemical analysis

Chemical Analysis such as moisture is determined by using hot air oven, fat is determined by Soxhlet apparatus and protein is determined by using Kjeldahls method. Acidity is determined by using titration method and pH is measured by digital pH meter. All quality parameters were determined by AOAC (2000).

Organoleptic evaluation

Prepared product were evaluated for sensory characteristics in terms of appearance, color, flavor, aftertaste, texture and overall acceptability by 10 semi-trained panel members comprised of academic staff members using 9- point Hedonic scale. Judgments were made through rating the product on a 9point Hedonic scale with corresponding descriptive terms ranging from 9 like extremely to 1 dislike extremely. The obtained results were recorded in sensory score card.

Statistical Analysis

The analysis of variance of the data obtained was done by using completely randomized design (CRD) for different treatments as per the method given by Panse and Sukhatme (1967). The analysis of variance revealed at significance of $p<0.005$ level S.E and C.D. at 5 percent level is mentioned wherever required.

Formulation of Standardization & Process Technology For preparation of Vidhara Vadi (Argyrea nervosa)

For preparation of Vidhara vadi different formulations were made such as T1, T2 and T3. Vidhara vadi were prepared by using various ingredients such as gram flour were used at 15 % and cumin seeds, carom seeds, sugar, lemon, garlic, green chilli, salt, sesame seeds were used at 5% each and rice flour 10% and vidhara leaves were used at 20% 25% 30% respectively. 30% vidhara leaves sample selected for further study.

Preparation of flow sheet for preparation of grinding of green chilli and garlic paste

Raw materials such as paste of green chilli, garlic, salt, cumin seed used for preparation of Vidhara vadi. Firstly-wash green chilli then ground the green chilli and garlic into fine paste as shown in flow sheet as per method given by Dessalegn Engeda (2020) [1].

Flow sheet (Dessalegn Engeda, 2020) [1]

Green chilli, salt, cumin seeds and garlic

↓

Clean and wash

↓

Grinding

↓

Paste

Preparation of vidhara vadi

Cleaning of raw materials for removing unwanted material. Weight all the ingredient accurately, Make a paste of green chilli, garlic, cumin seeds and salt. Mix it with gram flour, rice flour, turmeric powder, carom seeds, lemon and sesame seeds. Add water and make thick paste. Now take one leaf and put it on a clean surface. Put the paste all over its underside and then place another leaf over it. Repeat the process for three-four leaves. Roll the layered leaves to form a cylindrical shape or rolls and add paste on both sides of rolls. Make such more rolls of all the leaves and put them in pressure cooker with some oil and boil. We can also use momos' steamer or turmeric leaves cover for effective cooking. After cooking, cool then cut into pieces then Fry and ready to serve. Or without frying steam vadi is pack with suitable packaging and then refrigerate. (Madhura shah *et al*., 2021) Flowsheet for Preparation of Vidhara Vadi (Madhura shah *et al*., 2021)

Make a paste of green chilli, garlic, cumin seeds and salt.
↓
Mix it with gram flour, rice flour, turmeric powder, carom seeds, lemon and
sesame seeds
↓
Add water and make thick paste
↓
Now take one leaf and put it on a clean surface
↓
Put the paste all over its underside and then place another leaf over it.
Repeat the process for three-four leaves.
↓
Roll the layered leaves to form a cylindrical shape or rolls and add paste on both
sides of rolls
↓
Make such more rolls of all the leaves and put them in pressure cooker
with some oil and boil. We can also use momos' steamer or turmeric
leaves cover for effective cooking.
↓
After cooking, cool then cut into pieces → Fry → ready to serve
↓
Packaging
↓
Storage and refrigeration

Procedure

1. Cleaning of raw materials for removing unwanted material.
2. Weight all the ingredient accurately, Make a paste of green chilli, garlic, cumin seeds and salt.
3. Mix it with gram flour, rice flour, turmeric powder, carom seeds, lemon and sesame seeds.
4. Add water and make thick paste. Now take one leaf and put it on a clean surface.
5. Put the paste all over its underside and then place another leaf over it. Repeat the process for three-four leaves.
6. Roll the layered leaves to form a cylindrical shape or rolls and add paste on both sides of rolls.
7. Make such more rolls of all the leaves and put them in pressure cooker with some oil and boil. We can also use momos' steamer or turmeric leaves cover for effective cooking.
8. After cooking, cool then cut into pieces then Fry and ready to serve. Or without frying steam vadi is pack with suitable packaging and then refrigerate.

Results and discussion

Table 1: physical properties of vidhara vadi

Physical Properties	Selected sample
Color	Green
Texture	Crispy

Physical properties of vidhara vadi observed by visual observation colour green and texture crispy respectively.

Table 2: chemical properties of vidhara vadi

Chemical Parameter	Selected sample {as per 100 gm}
Moisture (%)	24.393 %
Fat(gm)	19.15 gm /100gm
Protein(gm)	11.078 gm /100gm
Carbohydrate(gm)	40.991 gm /100gm
Ash (%)	4.379 %
Total Energy(kcal)	380.707 kcal/100gm

The chemical parameters were found more or less similar with result found by AOAC 1990 standard method. The chemical properties of Vidhara Vadi were carried out which shows moisture content (24.393 %), Fat (19.15 gm), Ash (4.379 %), Carbohydrate (40.991 gm), Energy (380.707 kacl) and Protein (11.078 gm)

Table 3: sensory evaluation of vidhara vadi

Sample	Colour	Flavour	Taste	Texture	Appearance	Overall Acceptability
Control	8	8	8	8	8	8
T_1	8	7	7	8	8	7.6
T_2	8	7.5	7.5	8	8	7.8
T_3	9	8.5	8.5	9	9	8.8

Prepared various formulations of Vidhara Vadi was evaluated for sensory characteristics in terms of parameters like Colour, Flavour, Taste, Texture and Appearance. In this evaluation sample T3 is more acceptable than sample T1 and T2 because sample T3 contain 30g of vidhara leaves which gives better flavor and taste as compared to sample T1 and T2 which gives excessive vidhara flavor as it contain 20g and 10g of vidhara leaves respectively. Sample T3 gives better texture than T1 and T2. The sensory score given for selected sample T3 by panel members was Colour (9), Flavour (8.5), Taste (8.5), Texture (9) and Appearance (9) respectively.

Conclusion

It can be concluded from the result Standardization & Process Technology for preparation of Vidhara Vadi (Argyrea nervosa) can improve the nutritional value of vadi and was found acceptable by the panel members. Vidhara vadi packed in aluminium foil was found stable and acceptable upto 6 days of storage.

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