



## EXPLORATION OF NUTRIENT CONTENT OF TRADITIONAL TAMIL NADU RECIPE WITH *SOLANUM TRILOBATUM*

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### ABSTRACT

The majority of Indians are moving away from traditional to westernized food that offer a wide range of cuisines. Therapeutic based foods like herbs are fast disappearing with lack of systematic procedure. This research article is an attempt to resurrect South Indian therapeutic herbal recipes which we are fast being forgotten. *Solanum trilobatum* which is commonly known as Thuthuvalai is a medicinal plant which is extensively used in regional cooking in Tamil Nadu and the leaves of this plant was incorporated in the Adai recipe. Adai is a variety of the more popular traditional Tamil Nadu recipe. The main aim of the study is to standardize and prepare three Adai with different blends of lentils and herb *Solanum trilobatum* and to perform the sensory evaluation for its acceptance level and finally to calculate their nutritive content of all three herbal Adai using Nutritive value of Indian foods by NIN. The results of the sensory evaluation showed that the three Adai prepared with three different lentils was significantly different and it was proved for its high quality with its nutritive value. From this study it was concluded that this therapeutic Adai Code-C can serve as a different recipe as well as useful resource for the food industries particularly hotel industry who wish to restore the traditional therapeutic foods in their commercial market.

**KEY WORDS:** *Solanum Trilobatum*, Therapeutic recipe, Sensory evaluation, Nutritive Value



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## INTRODUCTION

The gastronomic tradition of India has been widely appreciated for its fabulous use of herbs and spices. Indian cuisine is known for its large assortment of dishes. Every Indian develops the taste of their regional cuisine quite early in life. The characteristic flavours, indigenous herbs and spices used in cooking vary according to the availability of these ingredients and climatic conditions. The dishes differ from region to region and are largely divided into South Indian and North Indian cuisine. The cuisine of South India is known for its light, low calorie appetizing dishes. The traditional food of South India is mainly rice based. The cuisine is famous for its wonderful blends of rice and lentils to prepare lip smacking dosas, vadas, idlis, uttapams and adai. Adai is a popular, nutritious lentil crepe breakfast dish from south India<sup>1</sup>. While Dosai is thinner (crepe like), Adai tends to be thicker and heavier. Adai originated in the Udupi town of Karnataka<sup>2</sup>. The original Tamil adai was softer and thicker. The thinner and crispier version of dosai, which became popular all over India, was first made in Karnataka. Adai is rich in carbohydrates and proteins; it is a very simple yet especially delicious and nutritious savoury. As Adai is a multi lentil crepe, it is tasty all by itself. Adai is made of four healthy lentils like channa dal, moong dal, tur dal and urad dal, spiced with red chillies, fresh peppercorns and flavoured with ginger pieces. Usually fresh ginger and methi seeds are added that help in proper digestion. Adai is a high protein dish. There are a variety of Adai's that one can make for whetting the taste buds. Some of the popular Adai recipes are: Cheese Adai Dosa, Rice and Dal Adai, Mixed Vegetable Multi Dal Adai, Moringa-Ragi Adai etc.<sup>3</sup> *Solanum trilobatum* or purple fruited pea egg plant or climbing brinjal is a medicinal plant which is extensively used in regional cooking in Tamil Nadu.<sup>4</sup> *Thuthuvalai* as is called in Tamil is a medicinal plant with loads of health benefits. It has thorns in its leaves. The most common way to cook these thorny plants is in the form of chutney, soup or rasam, khulambu or dosa as these leaves have a sour taste but realizing its natural health benefits *Solanum trilobatum* Adai was formulated and prepared with different lentils. This plant belongs to the family Solanaceae and it is used traditionally for curing numerous diseases such as asthma, cough, and tuberculosis. *Solanum trilobatum* is a thorny creeper, various parts of plant such as roots, berries and flowers are used for treating respiratory ailments. The leaves and fruits of the plant contain many photochemical such as steroidal alkaloid and solasodine etc. due to which the plant exhibits antibiotic, anti-tumour, antibacterial, antifungal and anti-inflammatory activities. The whole plant is used to treat asthma, bronchitis and

eosinophilia.<sup>5-6</sup> The traditional claim for the usefulness of this herb in bronchial asthma has been confirmed by a clinical study.<sup>7</sup> The plant also exhibits chemopreventive<sup>8</sup> and hepatopreventive properties.<sup>9</sup> In traditional societies, nutrition and health care are strongly interconnected and many plants have been consumed both as food and for medicinal purposes. Nearly one thousand species of plants with edible leaves are known. *Solanum trilobatum* is one of the important medicinal plants, the leaves are rich in calcium, iron, phosphorous, carbohydrate, protein, fat and crude fibre.<sup>10</sup> The plant has been declared as Kayakalpa in Siddha therapy. As per the quotes of Benjamin Franklin (1706-1790) Poor Richard's Almanac, "Time is an herb that cures all Diseases." Indian home with special reference to mother's of yester years of Tamilnadu have to their acclaim the practice of using a variety of traditional recipes like Thuthuvalai rasam, Karpuravalli rasam, Ponnakanni keerai poriyal, Nattu kozhi soup, vazhathandu soup, Tulsi tea, Ingi thuvaiyal, Sukku malli coffee, Milagu paal (pepper milk), Chola dosai and so on to cure or relive symptoms of diseases or properties to rejuvenate and to maintain good health<sup>11</sup>. The purpose of this study was to prepare and standardize Adai with three different blends of lentils and *Solanum trilobatum*. We have also performed the sensory evaluation of the three different standardized herbal adai for accessibility level of the consumers. The nutritive value of three herbal adai of different blends of Lentils using nutritive values of Indian foods by ICMR was calculated. The details pertaining in this article will help, assist and formulate nutritious and healthy breakfast menu for housewives for the family and community feeding programmes. Hostels, restaurants and cafeterias can take a few dietary guidelines from this article.

## MATERIAL AND METHODS

### Materials

The formulations of indigenous herb and lentils used for Code A Adai: *Solanum trilobatum*, Chenna dhal and Rice; Code B Adai: *Solanum trilobatum*, Toor dhal and Rice; Code C Adai: *Solanum trilobatum*, Rice and Black gram dhal. The other ingredients used in the formula of Adai were: *Allium cepa* var. *aggregatum* (shallots), *Zingiber officinale* (ginger), *capsicum frutescens* (green chillies), *Coriandrum sativum* (coriander leaves), *Murraya koenigii* (curry leave), Gingelly oil and salt. Purchasing of ingredients *Solanum trilobatum* leaves were collected from herbal garden from Vels University, Chennai, Tamil Nadu and the lentils and other ingredients were procured from the local market in Tambaram, Chennai, Tamil Nadu. All the ingredients were checked for its high quality.

**Table 1**  
**Recipe Formulation of Adai with *Solanum trilobatum* (No. of Portion = 1 (2 nos))**

Ingredient	Code A Formulation	Code B Formulation	Code C Formulation
Thuthuvalai	50 gm	50 gm	50 gm
Black gram	-	-	100 gm
Channa dal	100 gm	-	-
Toor dal	-	100 gm	-
Raw Rice	50 gm	50 gm	50 gm

Ginger chopped	2tsp	2tsp	2tsp
Shallots	12 nos	12 nos	12 nos
Coconut cubes	50gm	50gm	50gm
Red chillies	6 nos	6 nos	6 nos
Curry leaves chopped	1 sprig	1 sprig	1 sprig
Salt and water	As needed	As needed	As needed
Ghee	5 ml	5 ml	5 ml

**PREPARATION OF ADAI WITH SOLANUM TRILOBATUM**

The lentil chenna dal and raw rice was washed as per quantities specified for Code A in Table 1 and strained them thoroughly. Fresh water was added to the mixture and soaked it for 3-5 hours. The leaves of *Solanum trilobatum* (Thuthuvalai) were shredded and blanched. Red chillies and salt were ground with soaked ingredients. Consistency of batter was thick. Shredded thuthuvalai, chopped shallots and curry leaves was incorporated to batter. The batter was ladled on to a non stick griddle and spread little thick and cooked on a medium flame with a teaspoon of ghee. The Adai Code-B and Code-C was prepared using the same procedure given by code- A but the different lentils were taken as specified in Table 1.

**SENSORY EVALUATION**

Sensory evaluation is a scientific discipline that analyses and measures human responses to the composition of food and drink, e.g. appearance, touch, odour, texture, temperature and taste<sup>12</sup>. This is an experimental study for the newly developed products of three different Adai in order to test, evaluate and get feedback on Code A,

Code B and Code C. Thirty (30) panellists were selected to conduct sensory characteristics of cooked Adai which were assessed for sensory acceptability level of the panel members . The sensory profile was taken on appearance, aroma, texture, taste, flavour and acceptance. The sensory acceptability tests on 3 different formulations of *solanum trilobatum* (Thuthuvalai) Adai was determined by using 9 point hedonic scale ranging from 1 indicating Dislike Extremely to 9 suggesting Like Extremely with a neutral category of 5 indicating neither like nor dislike for parameters like appearance, aroma, texture, taste, over all acceptance. Sensory tests were carried out in a sensory evaluation room, with white light and good ventilation, and away from distractions noise, odors and the preparation room. All the samples were prepared properly. Temperature was controlled and the same for all samples. The volume of all the samples were equal. Samples were labeled as Code A Adai (*Solanum trilobatum*, Chenna dhal and Rice); Code B Adai (*Solanum trilobatum*, Toor dhal and Rice); Code C Adai (*Solanum trilobatum*, Rice and Black gram dhal) to avoid bias as given in Figure 1.

**Figure 1**  
**Scorecard Used for Hedonic Rating Test for Adai with Solanum trilobatum**

Score Card- Hedonic Rating Scale					
Date: _____		Name: _____			
Product Code: _____		Panelist No: _____			
Taste the given coded sample and tick (✓) how much you like or dislike it on the point in the scale which best describes your feeding. You can taste the sample more than one.					
Score*	Taste	Texture	Appearance	Aroma	Overall Acceptance
(9) Like Extremely					
(8) Like very much					
(7) Like moderately					
(6) Likes lightly					
(5) Neither like nor dislike					
(4) Dislike slightly					
(3) Dislike Moderately					
(2) Dislike very much					
(1) Dislike extremely					

**Statistical analysis**

Mean score ratings were calculated, statistics was used to determine if the means are significantly different. The data was plotted onto Bar diagram to easily compare samples with scores.

**Calculation of nutritive value**

After making the sensory evaluation of the three products Code A, Code B & Code C by using different lentils and *solanum trilobatum* the nutrition value was generated with the help of Nutritional value of Indian foods by NIN<sup>13</sup>.

**RESULTS AND DISCUSSION**

This research paper was not intended to prove that Indian traditional recipes were superior to modern or westernised foods. Assorted lentils were used to test which particular sample was most palatable.

**Sensory evaluation**

From Table 2 the sensory evaluation test confirmed the acceptance level of the respondents with their scores. Code C Adai was most acceptable for its appearance and aroma which shows an equal and the

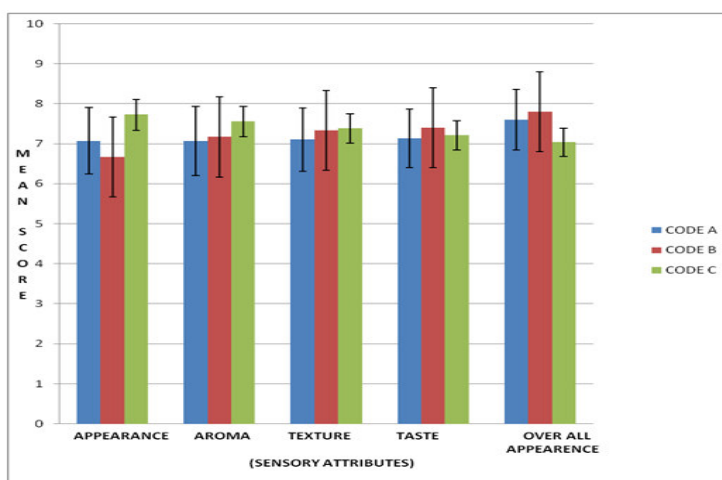
maximum mean score of 8. Similarly an equal score of 7.5 obtained for texture, taste and overall appearance of Code C Adai. The outcome of the three different blends of lentils was appreciated by all the panellists.

Comparably by averaging the three different recipes the Code C was found most acceptable which is plotted in Graph 1.

**Table 2**  
**Mean Score of Sensory Evaluation of Three different Adai**

SENSORY ATTRIBUTES	CODE A (MEAN SCORE)	CODE B (MEAN SCORE)	CODE C (MEAN SCORE)
Appearance,	7.6	7.8	8.0
Aroma	7.0	6.66	8.0
Texture	7.0	7.16	7.56
Taste	7.1	7.33	7.5
Overall acceptance	7.16	7.4	7.56

**Graph 1**  
**Error Bar of Sensory Evaluation of the Respondents**



#### **Nutritive information of three different adai**

*Solanum trilobatum* contains a potassium nitrate, fatty acid, diosgenin, caffeic acid, solasodine, solasonine, solamargine, quercetin, apigenin, histamine, acetylcholine. Milk contains significant amounts of saturated fat, protein and calcium as well as vitamin C. Whole plant – Consumption cures bronchitis and other respiratory disorders, carcinoma, aphrodisiac, dyspnoea, anorexia, constipation, worm infestation,

blood disorders, hemiplegia, trachyphonia, skin diseases, oedema, urinary calculi, amenorrhoea, coryza, epilepsy, dysuria<sup>14</sup>. From this study the nutritive value of three different blends of lentils with *Solanum trilobatum* which includes both macro and micro nutrients namely energy, moisture, protein, fat, minerals, crude fibre, carbohydrates, calcium, phosphorus, iron using Nutritive value of Indian foods, National Institute of Nutrition, ICMR were calculated.

**Table 3**  
**Nutritive Information of Three Different Adai (No. of Portion = 1 (2 nos))**

NUTRIENTS (PER 100 GRAMS)	CODE A	CODE B	CODE C
ENERGY (k.cal)	648.95	623.95	619.95
MOISTURE (gm)	80.565	81.565	83.065
PROTEIN (gm)	28.345	31.545	32.645
FAT (gm)	12.03	7.83	7.13
MINERALS (gm)	5.8	6.3	5.2
CRUDE FIBRE (gm)	6.29	5.99	5.79
CARBOHYDRATES (gm)	106.97	106.77	106.17
CALCIUM (mg)	249.5	347.5	262.5
PHOSPHORUS (mg)	490	544	452
IRON (mg)	9.3	7.8	11.58

## **CONCLUSION**

The majority of Indians are moving away from traditional to global foods since it offers a wide range of cuisines

and is the fad among the new generation. Therapeutic based foods like herbs are fast disappearing with lack of the awareness of their beneficial properties. *Solanum trilobatum* which is commonly known as Thuthuvalai is a medicinal plant and the leaves of this plant was

incorporated in the Adai recipe in this study. The results of the sensory evaluation showed that Code C adai was most satisfactory among the three adai that was sampled. Further it was proved that all the three Adai prepared with different lentils had a high nutritive value. From this study it was concluded that this Code C therapeutic Adai can serve as a novel recipe as well as a useful resource for the food industries particularly hotels wishing to restore the traditional therapeutic food in their menus

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## CONFLICT OF INTEREST

Conflict of interest declare none.

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