



Physicochemical and standardization of calci malt preparation

Naveen Kumar¹, Bargale Sushant Sukumar^{2*}

¹ Post Graduate Scholar, Department of Ayurveda Swasthavritta and Yoga, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan, Karnataka, India

² Assistant Professor, Department of Swasthavritta and Yoga, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan, Karnataka, India

Abstract

The present article deals with study of phytochemical analysis and standardization of Calci Malt preparation. Calci Malt is one of the richest sources of micro nutrients it contains Ragi (finger millet-*Eleusine coracana*), Mudga (*Vignaradiata*), Jeeraka (*Cuminum cyminum*), Shunti (*Zingiber officinale*). Various preparation of malt is available in the market used in the deficiency and treatment of many clinical conditions in India.

Objectives: Evolution of Physico-chemical values and phytochemical analysis and standardization of Calci Malt preparation.

Material and Methods: The current investigation deals with extraction and detection or screening of active phytochemical compounds from different extracts of Calci Malt. Preliminary phytochemical studies were carried out.

Result and conclusion: The result shown were Loss on drying 7.49%, total ash obtained was 2.70%, acid insoluble ash was 0.0% and water-soluble extractive was 1.05 %, Alcohol soluble extractive value was 3.29% and water-soluble extractive value 12.20%. The phytochemical investigation revealed the presence of various phytochemical constituents such as Tannin, flavonoids, carbohydrate, Steroids Coumarins and Phenols.

Keywords: jeeraka (*cuminum cyminum*), malt, mudga (green gram- *vignaradiata*), ragi (finger millet- *eleusine coracana*), shunti (*zingiber officinale*)

Introduction

Micronutrients are required in smaller amounts by the human body, but they play an important role in maintaining health in the same way that macronutrients do. Calcium, a micronutrient with a recommended dietary requirement of 1000mg/day for adults, is found to be ingested in disproportionately lower amounts, resulting in deficiency. According to a dietary survey, Asians take less than 400-500 mg of calcium per day, while Indians consume 429 mg per day.

Adults' bone health may be harmed by low calcium intake. Adults' bone health may be harmed by low calcium intake. Calcium shortage can lead to skeletal weakness or fractures, dental decay, osteopenia or osteoporosis, and blood coagulation problems. About half of the calcium in the blood is tied to albumin, the most common protein. ^[1, 2]

Ragi (*Eleusine coracana*) is a high-protein, calcium, phosphorus, iron, and vitamin-rich staple meal that ranks fourth among all millets.

Ragi malting increases vitamin bioavailability and improves overall nutritional quality. Calci malt contains calcium-rich ingredients such as Ragi (*Eleusine coracana*), Mudga (*Vignaradiata*), Jeeraka (*Cuminum cyminum*), Shunti (*Zingiber officinale*), and milk. Deepana (appetisers) and Pachana (improve digesting power) qualities are found in Jeeraka and Shunti. ^[3, 4, 5]

Objectives

Evolution of Physico-chemical values and phytochemical analysis and standardization of Calci Malt preparation.

Ethics committee clearance

Approval no: SDM/IEC/49/2019
CTRI No- CTRI/2020/10/028307

Material and methods

Source and authentication of raw drug and analysis

The identity of the plant was confirmed by Department of Dravyaguna, Sri Dharmasthala Manjunatheshwara College of Ayurveda & Hospital, Hassan and SDM centre for research in Ayurveda and allied Sciences, Kuthpady, Udipi (Analysis Report 1256/21013001).

Method of preparation

Calci malt is prepared in teaching pharmacy of Rasa Shastra and Bhaishajya Kalpana department of Sri Dharmasthala Manjunatheshwara Teaching Pharmacy Hassan.

Calci Malt ingredients

Table 1: Calci Malt ingredients

Sr. No.	Name of Drug	Botanical name	Part used
1.	Ragi	<i>Eleusinecoracona</i>	Seed
2.	Mudga	<i>Vigna radiate</i>	Seed
3.	Jeeraka	<i>Cuminumcyminum</i>	Seed
4.	Shunti	<i>Zingiberofficinale</i>	Root
5.	Cow milk		

Method of Preparation of Calcimalt

The process of preparation of Calci malt powder and beverage.

Table 2: Preparation of Calci malt powder

Step -1	Soak Ragi, Mudga in water for 12 hrs
Step -2	Sprout Ragi (36 hrs), Mudga (24 hrs)
Step -3	Dry the sprouted grains
Step -4	Remove the rootlets
Step -5	Mill to get the fine powder Sieve
Step -6	Calci Malt powder

Table 3: Preparation of Calci malt beverage

Step -1	Boiling one cup of milk
Step -2	Make a slurry of 20 gm Calci malt powder with milk
Step -3	Slurry add to boiling milk and boil for a minute
Step -4	Add sugar and boil for a minute
Step -5	Cool and serve a nutri beverage

Physicochemical studies

Physicochemical parameters were determined as per guidelines of WHO. Total ash value, loss on drying, water soluble ash, acid insoluble ash, alcohol soluble extractive value and water soluble extractive value were determined. [6, 7, 8]

Loss on drying at 105 °C

10g of sample was placed in tarred evaporating dish. It was dried at 105 °C for 5 hours in hot air oven and weighed. The drying was continued until difference between two successive weights was not more than 0.01 after cooling in desiccator. Percentage of moisture was calculated with reference to weight of the sample. [9]

Total Ash

2g of sample was incinerated in a tared platinum crucible at temperature not exceeding 450 °C until carbon free ash is obtained. Percentage of ash was calculated with reference to weight of the sample. [10]

Acid insoluble Ash

To the crucible containing total ash, add 25ml of dilute HCl and boil. Collect the insoluble matter on ashless filter paper (Whatmann 41) and wash with hot water until the filtrate is neutral. Transfer the filter paper containing the insoluble matter to the original crucible, dry on a hot plate and ignite to constant weight. Allow the residue to cool in suitable desiccator for 30 mins and weigh without delay. Calculate the content of acid insoluble ash with reference to the air dried drug. [11]

Alcohol soluble extractive

Weigh accurately 4g of the sample in a glass stoppered flask. Add 100 ml of distilled Alcohol (approximately 95%).

Shake occasionally for 6 hours. Allow to stand for 18 hours. Filter rapidly taking care not to lose any solvent. Pipette out 25ml of the filtrate in a pre-weighed 100 ml beaker. Evaporate to dryness on a water bath. Keep it in an air oven at 105°C for 6 hours, cool in desiccator for 30 minutes and weigh. Calculate the percentage of Alcohol extractable matter of the sample. Repeat the experiment twice, and take the average value. [12]

Water soluble extractive

Weigh accurately 4g of the sample in a glass stoppered flask. Add 100 ml of distilled water, shake occasionally for 6 hours. Allow to stand for 18 hours. Filter rapidly taking care not to lose any solvent. Pipette out 25ml of the filtrate in a pre-weighed 100 ml beaker. Evaporate to dryness on a water bath.

Keep it in an air oven at 105 °C for 6 hours. Cool in a desiccator and weigh. Repeat the experiment twice. Take the average value. [13]

Results

Table 4: Results of standardization parameters of Calci Malt

Parameter	Results n = 3 %w/w
	Avg ± SEM
	Calci Malt
Loss on drying	7.49 ± 0.01
Total Ash	2.70 ± 0.05
Acid Insoluble Ash	0.00 ± 0.00
Water soluble Ash	1.05 ± 0.01
Alcohol soluble extractive value	3.29 ± 0.00
Water soluble extractive value	12.20 ± 0.00

Table 5: Results of preliminary phytochemical screening of Calci Malt

Test	Inference
Alkaloid	-
Steroid	+
Carbohydrate	+
Tannin	+
Flavonoids	+
Saponins	-
Terpenoid	-
Coumarins	+
Phenols	+
Carboxylic acid	-
Amino acids	-
Resin	-
Quinone	-
(+) – present; (-) – negative	

Table 6: Results of preliminary phytochemical screening of Calci Malt

Tests	Colour if positive	Aqueous extract of Calci Malt
Alkaloids		
Dragendroff's test	Orange red precipitate	Brown precipitate
Wagners test	Reddish brown precipitate	Brown precipitate
Mayers test	Dull white precipitate	Dull white colour
Hagers test	Yellow precipitate	Yellow colour
Steroids		
Liebermann- buchard test	Bluish green colour	Bluish green colour
Salkowski test	Bluish red to cherry red colour in chloroform layer and green fluorescence in acid layer	Bluish red to cherry red color in chloroform layer and green fluorescence in acid layer
Carbohydrate		
Molish test	Violet ring	Violet ring

Fehlings test	Brick red precipitate	Brick red precipitate
Benedicts test	Red precipitate	Red precipitate
Tannin		
With FeCl ₃	Dark blue or green or brown	Green colour
Flavanoids		
Shinoda's test	Red or pink	Light pink colour
Saponins		
With NaHCO ₃	Stable froth	No stable froth
Triterpenoids		
Tin and thionyl chloride test	Pink	Brown colour
Coumarins		
With 2 N NaOH	Yellow	Yellow colour
Phenols		
With alcoholic ferric chloride	Blue to blue black	Light buff colour
Carboxylic acid		
With water and NaHCO ₃	Brisk effervescence	No brisk effervescence
Amino acid		
With ninhydrine reagent	Purple colour	No purple colour
Resin		
With aqueous acetone	Turbidity	No turbidity
Quinone		
Conc. sulphuric acid	Pink/purple/red	Yellow colour

Ragi (finger millet- *Eleusine coracana*)

Properties of Ragi

Rasa-Madhura, Kashaya, Tikta,

Virya-Sheeta,

Guna-Laghu, Ruksha,

Karma-Jalashoshana, Pitta Ashmari

Dosha Karma- Vatavardaka, Pittashamaka.

Ragi (finger Mellit) Nutrient value per 100gms

Protein 7.3gm, Fat 1.3g, Minerals 2.7gm, Crude fibers 3.6gm, Carbohydrate 72.0gm, Energy 328kcal, Calcium 344mg, Iron 3.9mg, Phosphorus 283mg, Zinc 2.3mg, Vitamins Carotene 42 microgram, Thiamine 0.42 mg, Riboflavin 0.19mg, Niacin 1.1mg. ^[14]

Mudga (green gram)

Properties of Mudga (green gram)

Rasa- Madhura,

Virya-Sheeta,

Vipaka-Katu,

Guna-Ruksha, Laghu,

Dosha Karma-Kapha Pittahara, Grahi,

Karma-Drusta Prasadana, Pustikaraka, Balavardaka ^[15].

Nutritional facts of green gram

Green gram (Mudga) is known for its high nutritional value. 100 grams of it produces 334 Kcal of energy. It is rich in carbohydrates (56.7g/100g) and is very good source for minerals like potassium (843 mg/100g), magnesium (127 mg/100g), calcium (124 mg/100g), phosphorous (326 mg/100g) and Iron (4.4 mg/100g). Vitamins like carotene, thiamine, niacin, riboflavin, ascorbic acid, and folic acid are also present in green gram. ^[16]

Jeeraka (*Cuminum cyminum*)

It is good Deepana and Panchana Dravya having Tikshna Ushna Guna, Katu Rasa and Agni Vardhaka and Shleshmanilahara and also Krimihara action ^[16] Jeeraka has nutritive value (in 100gm) protein (18.7gm), fat (15.0gm), minerals (5.8gm), crude fibres (12.0gm), carbohydrate

(36.6gm), energy (356Kcal), calcium (1080mg), iron (11.7mg) and phosphorus (511mg). ^[17] The anti-osteoporotic activity of *Cuminum cyminum* was evaluated in rats. Adult Sprague-Dawley rats were bilaterally ovariectomized. Later Serum was evaluated for calcium, phosphorus, alkaline phosphatase and tartarate resistant acid phosphatase. And there was significantly increased calcium content and mechanical strength of bones in comparison to OVX control. It showed greater bone and ash densities and improved microarchitecture of bones in Scanning Electron Microscope analysis. ^[18]

Shunti (*Zingiber officinale*)

It is Snigdha, Rochaka, Vrishya, Hrudya, Deepana, Laghu Guna, UshnaVeerya, Vatakaphahara, Madhura Vipaka. ^[19] Shunti has nutritive value (in 100 gm) protein (2.3 gm), fat (0.9 gm), minerals (1.2 gm), crude fibres (2.4 gm), carbohydrate (12.3 gm), energy (67 Kcal) calcium (20 mg), iron (3.5 mg) and phosphorus (60 mg). ^[20] Previous studies that were conducted on rats and patient simultaneously had shown that increase in serum calcium was observed in animal as well as patients treated groups. The treatment of *Zingiber officinale* rosc showed extremely significant and increase of serum calcium level compared to standard drug of Dexamethasone in both tested groups, further study need to extend the mechanism of calcium increases in the treatment groups. ^[21]

Conclusion

The present study was carried out with an aim of authenticity of the drug along with phytochemical analysis of Calci Malt. The result shown were Loss on drying 7.49%, total ash obtained was 2.70%, acid insoluble ash was 0.0% and water soluble extractive was 1.05%, Alcohol soluble extractive value was 3.29% and water soluble extractive value 12.20%. The phytochemical investigation revealed the presence of various phytochemical constituents such as Tannin, flavonoids, carbohydrate, Steroids Coumarins and Phenols. Malted Calci Malt will be beneficial to all age group as it is more digestible with rich fibre content,

calcium, Iron, sodium, potassium, magnesium and phosphorus. It is an inexpensive and traditional way to reduce bulk density and increase nutrient density in food, hence appropriate for infant. Therefore, it could be employed to formulate supplementary food products in calcium deficiency disorders and maintain the calcium level in the body.

Financial Support and sponsorship

Nil

Conflicts of interest

There are no conflicts of interest.

References

- Bargale S, Shashirekha H. *Text book of Swasthavritta*. 1st ed. New Delhi: Chaukhambha Publication, pp.38.
- Park K. Park's textbook of preventive and social medicine 24th edition. Banarasidas Bhanot Jabalpur. 2017, 2016, 659
- Shobana S, Krishnaswamy K, Sudha V, Malleshi NG, Anjana RM, Palaniappan L *et al*. Finger millet (Ragi, *Eleusine coracana* L.): a review of its nutritional properties, processing, and plausible health benefits. *Advances in food and nutrition research*,2013:1:69:1-39.
- www.easyayurveda.com>2019/10/16>green-gram-mung-bean
- Nene YL. A new vision of pulse pathology research in India. *Indian Journal of Pulses Research*,2000:13(1):10.
- Anonymous. The Ayurvedic Pharmacopoeia Of India, New Delhi Department Of Ayush, Ministry Of Health And Family Welfare, Government Of India, 2009, 70-72.
- Anonymous. Pharmacopoeia of India. Vol.2, Edition 4: 1996 Government of India, Ministry of Health, Controller of publication, New Delhi, 1996, 53-55.
- Lohar DR, Ravindra Singh. Quality Control Manual for Ayurvedic, Siddha and Unani Medicine. Ghaziabad: Department of Ayush, Ministry of Health and Family Welfare, Pharmacopoeial Laboratory for Indian Medicine, 2008, 21-24.
- Joseph L, George M, Agrawal S, Kumar V. Pharmacognostical and Phytochemical studies on *Jasminum grandiflorum* leaves. *Int J Pharm Frontier Res*,2011:1:80-92.
- Joseph L, George M, Agrawal S, Kumar V. Pharmacognostical and Phytochemical studies on *Jasminum grandiflorum* leaves. *Int J Pharm Frontier Res*,2011:1:80-92.
- Joseph L, George M, Agrawal S, Kumar V. Pharmacognostical and Phytochemical studies on *Jasminum grandiflorum* leaves. *Int J Pharm Frontier Res*,2011:1:80-92.
- Joseph L, George M, Agrawal S, Kumar V. Pharmacognostical and Phytochemical studies on *Jasminum grandiflorum* leaves. *Int J Pharm Frontier Res*,2011:1:80-92.
- Joseph L, George M, Agrawal S, Kumar V. Pharmacognostical and Phytochemical studies on *Jasminum grandiflorum*
- Shobana S, Krishnaswamy K, Sudha V, Malleshi NG, Anjana RM, Palaniappan L *et al*. Finger millet (Ragi, *Eleusine coracana* L.): a review of its nutritional properties, processing, and plausible health benefits. *Advances in food and nutrition research*,2013:1:69:1-39.
- www.easyayurveda.com > 2019/10/16 > green-gram-mung-bean
- Nene YL. A new vision of pulse pathology research in India. *Indian Journal of Pulses Research*,2000:13(1):10.
- C Gopalan, BV Rama Sastri, SC Balasubramanyan. Nutritive value of Indian foods, 2nded, hyderabad, ICMR, 2012, 47-57.
- Prof Dr Ali Esmail Al-Snafi. The pharmacological activities of *Cuminum cyminum* - A review. *IOSR Journal of pharmacy*. [Internet]. [cited 2021-03-03], Version 2,2016:6(2):46-65.
- Dr. S. D. Kamat (ed.), Dhanvantari Nighantu, Reprinted Edition 2011, Delhi; Chaukhambha Sanskrit Pratishtana; shloka no, 48-49,2011:(1-2):156.
- C Gopalan, BV Rama Sastri, SC Balasubramanyan. Nutritive value of indian foods, 2nded, hyderabad, ICMR, 2012, 47-57.
- J Viswanath. Effect Of Two Ayurvedic Drugs On Serum Calcium Level In Osteoarthritis Induced Rats And Osteoarthritis Patients. *Indo American journal of pharmaceutical sciences*. [Internet] [cited 2021-03-03],2017:4(7):2057-61.