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Nutritional and Antioxidant Study of Seeds of A Folk Plant - *Gnetum ula* Brongn.

Ramya Krishna Koliyat Valappil, Tandrady Shridhara Bairy¹, Koppala Narayana Sunil Kumar², Sudhakar³

Department of Dravyaguna, Government Ayurveda College, Kannur, Pariyaram - 670503, Kerala, INDIA.

¹Department of PG Studies in Dravyaguna, SDM College of Ayurveda, Kuthpady, Udupi - 574118, Karnataka, INDIA.

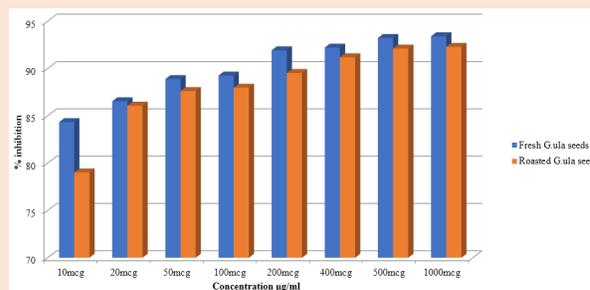
²Department of Pharmacognosy, Siddha Central Research Institute, Siddha Central Research Institute (CCRS, Ministry of AYUSH, Govt of India), Chennai - 600106, Tamil Nadu, INDIA.

³SDM Center for Research in Ayurveda and Allied Sciences, Kuthpady, Udupi - 574118, Karnataka, INDIA.

ABSTRACT

Background: Ayurveda opines that every plant has its own medicinal values, but there are many less explored plants which are not popular though beneficial either as food or as medicine. But this knowledge is passed from tradition to tradition in folklore practices but within a few groups of a society. One such plant from gymnosperm group is *Gnetum ula* Brongn. (Gnetaceae) found commonly in and around Udupi. Locally known as *Kumti beej*. Seeds are roasted or boiled and consumed as food and the seed oil is used in rheumatism and also as *krimighna* by folk practitioners. The present work aimed in such less explored plants for its nutritional assessment and antioxidant study. **Methods:** The study conducted was to reveal preliminary nutritional value of seeds of *G.ula* in which total fat was done in Soxhlet apparatus, total protein taking Bovine serum as standard and total carbohydrates, taking glucose as standard. Antioxidant study was done comparing between aqueous extract of fresh nuts and roasted nuts of *G. ula* taking Vitamin C as standard by DPPH method. **Results:** Study revealed seeds of *G.ula* in which total fat was 2.15%, total protein was 1.26% and total carbohydrates was 0.057% and seeds proved to be nutritious. Antioxidant activity comparing between fresh and roasted seeds revealed that fresh seeds are having more antioxidant property. **Conclusion:** Folklore medicine has tremendous source of information regarding the utility of locally available plants for both as food and as medicines. Such plants have to be properly explored and scientifically documented before putting it into use.

PICTORIAL ABSTRACT



KEYWORDS Antioxidant, Folklore, *Gnetum ula*, *Kumti beej*, *Krimigna*, Nutritional.

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CORRESPONDENCE Ramya Krishna, Government Ayurveda College, Pariyaram 670503, Kannur District, Kerala, INDIA. Email: ramyakrishna037@gmail.com

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1. INTRODUCTION

Ayurveda opines that all *Dravyas* available in the universe are having their own nutritional or therapeutic values of which it can be used for one or the other purpose and by many modes.

^[1] Use of plants in the form of *ahara* (food) and *aushada* (medicine) and usage of locally available drugs as medicine for getting maximum benefit is an age-old practice in Ayurveda.

^[2] Man is ever dependent on plants for his basic requirements, for preventive and curative purpose. Ayurveda has extensively dealt with the use of plants as an effective therapeutic tool for the above purpose and it has been observed that the folklore practitioners are using the various plants species for this. Medicinal plants have traditionally occupied an important position in the social, cultural, spiritual and medicinal arena of rural and tribal lives in India. The significant fact is

that it is still a living tradition. The plant based indigenous knowledge was passed down from generation to generation. To preserve such local wealth of plants and to enrich the existing Ayurvedic pharmacopeia, research and addition of therapeutically useful new plant species is in need. One such is from Gymnosperms in the family Gnetaceae, the sole genus *Gnetum* which includes many species of woody trees, shrubs or even climbers. In India *Gnetum* is represented by 5 species.^[3] *G. ula* with synonym *G. scandens* Brandis Hook. f. (non Roxb.) in part and *G. funiculare* B. Smith ex Wight^[4] is a large dioecious, branched woody climber. *G. ula* is one of the common climbers seen conserved in the sacred groves.^[5] The plant is distributed in Assam, Sikkim, Terrain Himalayas, Evergreen forests of the Eastern and Western Ghats up to 1800 m, Andaman Islands and Malaysia.^[6] In Karnataka it occurs in Udupi, Chikmangaluru, Hassan, North Canara and

Shimoga.^[7,8] Seeds locally known as *Kumti beeja* in Udupi, the seeds are edible either roasted or boiled; the seed oil of this plant is used in various ailments like rheumatism by folklore practitioners.^[9] Keeping these utilities of the seed in mind, nutritional and antioxidant study has been carried out in the present investigation.

2. MATERIALS AND METHODS

2.1 Collection of samples

Seeds of *G. ula* were collected from Barkur, Tantradi and Hebri of Udupi district during September and October 2014. The authenticity of seeds was confirmed by experts at SDM Centre for Research in Ayurveda and Allied Sciences, Udupi with the help of Pharmacognosist. Botanical characters were also compared with various floras and herbarium samples for further confirmation.^[10] The collected seeds are dried and were stored in air tight containers at SDM Centre for Research in Ayurveda and Allied Sciences, Udupi for Nutritional and Antioxidant studies.

2.2. Nutritional assessment

2.2.1 Total fat

5 g of the sample weighed in a thimble and placed it in a Soxhlet fitted with a condenser. Taken 90 ml of petroleum ether (B.P. 40 to 60°C) in the 150 ml RB flask and boiled for 6 hr. The extract was taken in a pre-weighed conical flask and petroleum ether was evaporated on a water bath. Removed the traces of petroleum ether in vacuum pump. Taken the weight of fat to constant weight.^[12]

2.2.2 Total carbohydrates

Weighed 100 mg of the sample into a boiling tube. Hydrolysed by keeping it in a boiling water bath for 3 h with 5 ml of 2.5 N HCl and cooled to room temperature. Neutralized it with solid sodium carbonate until the effervescence ceases. Pipetted out 0.2, 0.4, 0.6, 0.8 and 1 ml of the working standard into a series of test tubes. Pipetted out 0.1 and 0.2 ml of the sample solution in two separate test tubes. Made up the volume in each test tube to 1 ml with water. Set a blank with 1 ml of water. Added 1 ml of phenol sulphuric acid reagent in each test tube. Added 5 ml of 96 % of sulphuric acid to each test tube and shake well. After 10 min kept the test tubes in water bath at 25 to 30°C for 20 min and read the colour at 490 nm.^[11]

2.2.3. Total protein

To 1 g of sample added 3 ml of water and mixed. From that 1 ml of supernatant was taken and made up to 10 ml with 95 % ethanol, mixed well and centrifuged at 3000 rpm for 15 min. The precipitate obtained was dissolved in 1 ml of 0.1 N NaOH. From that, 10 µl (0.01 ml) was taken for the estimation.

To 0.5 ml of sample blank and standard taken in duplicate, added 0.5 ml of alkaline copper reagent, mixed and let stand undisturbed for 10 min. Then added 2 ml of phenol reagent

forcibly and rapidly to each tube. Mixed immediately and heated in a water bath at 55°C for 5 min. Cooled in running water and read the absorbance of samples and standard at 650 nm against blank. Calculated the protein content of the sample by comparing with standard.^[11]

2.3 Antioxidant activity by DPPH method

Assessments of antioxidant properties of natural compounds are very important because of their uses in medicine, food and cosmetics. DPPH assay is routinely practiced for assessment of free radical scavenging potential of an antioxidant molecule and considered as one of the standard and easy colorimetric methods of the evaluation of antioxidant properties of pure compounds. Estimation of antioxidant activity by DPPH method using Vitamin C as standard.^[11]

3. RESULTS

The study conducted to reveal preliminary nutritional value of seeds of *G. ula* in which total fat which was done in Soxhlet apparatus 2.15%, total protein taking Bovine serum as standard 1.26% and total carbohydrates, taking glucose as standard 0.057% (Table 1).

Comparison between aqueous extract of fresh nuts and roasted nuts of *Gnetum ula* taking Vitamin C as standard by DPPH method. Study showed comparatively higher antioxidant activity of aqueous extract of fresh nuts with respect to roasted nuts (Table 2).

Table 1. Nutritional Assessment, seeds of *G. ula*

Parameter	Results n = 3 %w/w
Total fat	2.15
Total protein	1.26
Total carbohydrates	0.057

Table 2. Estimation of antioxidant activity by DPPH method using Vitamin C as standard.

	Vitamin C	<i>Gnetum ula</i> Fresh nuts	<i>Gnetum ula</i> Roasted nuts
Concentrations	% inhibition	% inhibition	% inhibition
10 µg	69.53	84.33	79.01
20 µg	76.19	86.53	86.07
50 µg	88.14	88.88	87.61
100 µg	90.25	89.25	87.97
200 µg	91.26	91.92	89.52
400 µg	91.93	92.19	91.18
500 µg	92.19	93.22	92.10
1000 µg	92.29	93.40	92.28

4. DISCUSSION

As per the folk information of people of Udupi, the seeds of this plant are used for edible purpose either roasted or boiled. It is considered to be highly nutritious. The seeds are used in intestinal worms in children; roasted seeds are given on empty stomach in morning. Preliminary nutrition value assessment shows - total fat: 2.15%, total protein: 1.26% and total carbohydrates: 0.057% when compared to, much higher nutritional value of almond and cashew. Still it can be considered as poor substitute for the above nuts along with additional therapeutic benefits like *krimigna karma* (anthelmintic activity).

Antioxidant study was conducted, comparing between fresh seeds and roasted seeds. Result shows aqueous extract of fresh nuts of *G. ula* showed comparatively higher antioxidant activity with respect to roasted nuts.

5. CONCLUSION

Ayurveda *Acharyas* have opined to make use of the drug found in the vicinity but after thorough examination before incorporating in medicine. Folklore medicine has tremendous source of information regarding the utility of locally available plants for use as food or medicines. Such plants have to be properly explored and scientifically documented before putting it in use. Use of Gymnosperm in Ayurveda is very rare. *Gnetum ula* Brongn locally called as *Kumti beja* of family Gnetaceae is not considered as a source for any classical Ayurvedic drug. There are many numbers of valuable plants which has to be explored to include in Ayurvedic Pharmacopeia. These less explored plants need a systematic and scientific study.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

BP: Boiling Point, **DPPH:** 2,2-Diphenyl-1-picrylhydrazyl.

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