

## DEVELOPMENT OF RAGI & URAD LADDU AND ITS NUTRITIONAL ANALYSIS

Mishra Ashish<sup>1</sup>, Kumari Sapna<sup>2</sup>, Kulkarni Medha<sup>3</sup>

1. Phd Scholar, Department of Swasthavritta, All India Institute of Ayurveda
2. PG scholar, Department of Swasthavritta, All India Institute of Ayurveda
3. Professor & HoD, Department of Swasthavritta, All India Institute of Ayurveda

### ABSTRACT

In India malnutrition and anemia are common health problems. With the help of Ayurveda and traditional method of preparation of food this study was done to develop the Ragi & urad laddu as a simple measure to tackle this problem. The laddu was prepared and nutrient analysis was done by standard procedure. This study showed laddu prepared with the ratio 1:1:2(ragi, urad dal and jaggery respectively) was found to be more acceptable. The highly accepted variation was analysed for its biochemical composition. It contained 11.74g protein, 21.54g of fat, 1170.93mg of calcium, 4.14mg of iron, 2.08g ash per 100g of laddu. Due to its good content of nutrients it can be used daily as nutritional supplement in malnutrition and nutritional deficiency of anemia.

**Key words:** Ragi, Ragi & urad laddu, food, supplement

### INTRODUCTION

Ayurveda has vast knowledge on health science as well as traditional foods and their dietary guidelines. There are lots of similarity in ayurvedic dietetics and traditional foods. In the era of globalization of the population and international food trading, health conscious citizens around the globe will benefit from the wealth of knowledge on traditional Indian and ayurvedic health foods of Indian origin (1). In India grains are the primary staple food and are nutritionally rich product in turn deliver recommended nutrients to the body. Ragi (*Eleusine coracana*) and urad (*Vigna mungo*) dal are also famous and staple food in most parts of India. In many ayurvedic texts the health benefits of Ragi and urad are given.

Ragi is a good source of iron and calcium, which is crucial for bone health and helps in dealing with conditions like insomnia, anxiety and depression and amino acids present in Ragi, works as a natural relaxant (2).

Urad is rich in protein, which helps in growth and repair, and has high iron content (3).

**Ragi (Finger millets)**

*Ragi* is rich in dietary fibre and nutrient. The calcium component of ragi is 344 mg/ 100 gm of edible portion higher than other millets (4). It strengthens the bones and prevents fractures. Potassium content of finger millet is also high compared to other cereals and millets absorption. Ragi displays a rather impressive nutritional profile, encompassing all the essential macronutrients - carbohydrates, fibres fats and proteins, along with noteworthy levels of key micronutrients - vitamins and minerals. Several studies are also available on the antioxidant properties (5).

Botanical name – *Eleusine coracana*

Vernacular names – *Ragi, Nagli, Keppai*

*Rasa – Madhura*

*Virya – Ushna*

*Vipaka – Madhura*

*Guna – Ruksha, Laghu* (6)

**Urad (black gram)**

The black gram beans are referred as '*Masha*' in the Ayurvedic texts and is highly recommended for gaining weight and improving immunity. ancient Ayurvedic text *Charaka Samhita* dedicated a chapter *Mashaparni bhriteeya adhyaya* to explain about the goodness of these beans. Ayurveda describes black gram or *Masha* as a bean that is sweet to taste but hot in potency, that can calm down and regularise the imbalances caused due to *Vata*.

Botanical name – *Vigna mungo*

Family – Leguminosae

Vernacular names – *Masha, Udad, Urad* (It acts as energizer and pacifies vata dosha) (7)

*Rasa-Madhura*

*Guna – Guru, Snigdha*

*Virya – Ushna*

*Vipaka – Madhura*

**Guda (Jaggery)**

*Guda* (jaggery) is rich in several important vitamins and minerals like potassium, magnesium, iron, zinc, selenium, calcium and phosphorus.

Jaggery helps in maintaining the electrolyte balance and helps prevent water retention. It is a good source of energy, it also prevents rheumatic afflictions; prevents disorders of bile; helps in relieving fatigue, relaxation of muscles, nerves and blood vessels; maintains blood pressure (8).

**Ghee (clarified butter)**

*Ghee* is beneficial for maintenance of *Agni* and it is best among the *Sneha (unctuous) drayas*.

Further as per modern science *ghee* exhibit immuno - modulatory, antioxidant and anti-ageing properties. *Ghrita* alleviates *pitta and vata*, it is conducive to *Rasdhātu, Sukradhātu* and *Ojas* (9). It has cooling and softening effect upon body. It also promotes memory, intellect power of digestion.

**Table no.1. (Properties of contents according to Ayurveda)**

CONTENT	RASA	GUNA	VIRYA	VIPAKA
<i>Ragi</i>	<i>Madhura</i>	<i>Laghu, ruksha</i>	<i>ushna</i>	<i>Madhura</i>
<i>Urad</i>	<i>Madhura</i>	<i>Guru, snigdha</i>	<i>ushna</i>	<i>Madhura</i>
Jaggery	<i>Madhura</i>	<i>Guru, snigdha</i>	<i>ushna</i>	<i>Madhura</i>

**MATERIALS & METHODS**

All the ingredients are procured from the local market, cleaned before using them. Traditional way to make laddu is used. Ingredients of laddu are given below in the table:

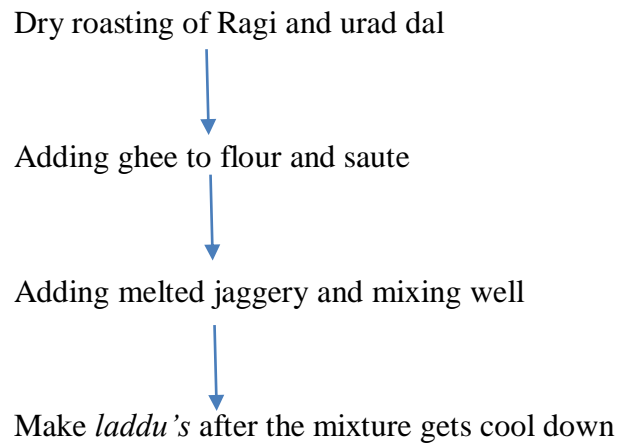
**Table no. 2 (Ingredients along with quantity)**

	Ingredients	
1	Ragi	1 part
2	Urad dal powder	1 part
3	Jaggery	2 part
4	Ghee	1 tsp

### Methods of preparation:

1. Dry roast the *Ragi* flour and *Urad dal* powder until aromatic and nutty texture.
2. Add *ghee* to the flour and mix well. Keep cooking on low flame without burning. Keep adding *ghee* until the mixture is thick and separated from sides of *kadai* (sauce pan).
3. Remove from pan and add the mixture in the heated and melted jaggery and mix well.
4. Make *laddu's* after the mixture gets cool down.

### Flow diagram of Ragi and urad laddu:



## RESULT AND DISCUSSION

The sensory scoring was done by a panel of 15 members in the department of swasthavritta, all india institute of Ayurveda using 9 points of hedenoic scale. Scale was adopted to score each of the attributes like colour, taste, texture, flavor, mouthfeel and overall acceptability. While scoring, highest score (9) was assigned to the most preferred characteristics and least score (1) to the least desired characteristics(10).

**Table no. 3 (Nutritional value of Ragi & urad laddu)**

1	Carbohydrate	58.61g/100g
2	protein	11.74g/100g
3	Fat	21.54g/100g
4	Total sugar	31.18g/100g
5	Sodium	79.29mg/100g
6	Calcium	1170.93mg/100g
7	Iron	4.14mg/100g
8	Moisture	6.03g/100g
9	Ash	2.08g/100g
10	Energy	475.26Kcal/100g

Energy value of foods is often calculated from the analysis of foods for protein, fat and carbohydrate and multiplication of the content of these components with appropriate factors. One gram of carbohydrate or protein yields 4Kcal and one gram of fat yield 9Kcal. Estimation of minerals like iron and calcium was done by the method of AGSS/CHEM/SOP/ICP-MS/09 and IS:9497 respectively.

**Table no.4 (The effect of storage time on sensory attribute and chemical parameters of Ragi & urad laddu)**

S.no.	Test parameters	Unit	Initial day	After 7 days
1	Appearance	-	Brown colour round shape ragi & urad laddu	Brown colour round shape ragi & urad laddu
2	colour	-	Brown colour	Brown colour
3	odour	-	Unobjectionable	Unobjectionable
4	Taste	-	Acceptable	Acceptable
5	Rancidity	-	Absent	Absent
6	Moisture	%	6.11	6.18

**Table no. 5 (Microbiological parameters of ragi & urad laddu)**

S.no.	Test parameters	Unit	Initial day	After 7 days
1	Total plate count	cfu/gm	310	390
2	Coliform count	cfu/gm	<10	<10
3	Yeast & mould count	cfu/gm	<10	<10
4	E. Coli	/gm	Absent	Absent
5	Staphylococcus aureus (coagulase positive)	cfu/gm	<10	<10
6	Salmonella	/25gm	Absent	Absent
7	Listeria monocytogenes	/gm	Absent	Absent

Sensory & chemical and Microbial analysis of Ragi & urad laddu were done by using accelerated shelf- life method, in which product was stored at elevated stress condition (such as temperature, humidity and pH). In this research work, sample of laddu stored at 48 °C and

analysis were done regular for 7 days. Table no.4 reflect the effect of storage time on sensory attributes and rancidity which was throughout the days and moisture content of laddu. Colour of sample visually observed and there was no difference found in colour during accelerated storage condition. Characteristics odour of sample was observed during the storage period of sample. The moisture percentage of sample was slightly increased during the storage period. Table no.5 shows the growth of microbial parameters of ragi and urad laddu. Total plate count content in laddu sample was 310 cfu/gm on initial day and 390 cfu/gm after 7 days. The growth of coliform count and yeast & mould in given sample are not significant, it is almost same for duration of storage. E. coli, Salmonella and Listeria monocytogenes were absent throughout the storage of sample. The overall acceptability of laddu after 7 days of accelerated storage condition was good and as per calculation aging test, it indicates that product's shelf life of sample is more than three months at ambient temperature.

## CONCLUSION

It was concluded in the present study that the ragi & urad laddu has a large amount of nutrients. Ragi & urad and other ingredients of laddu are easily available and also method of preparation is very convenient. Ragi is good source of iron and in the nutrition analysis it can be seen laddu consist of good amount of iron so it can be used for the prevention of nutritional deficiency of Anaemia. Hence it can be used for prevention of malnutrition. This laddu can be used for the common people for the betterment of health.

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