

# An iron rich food supplement: Niger seed *Laddoo*

DEEPIKA BARANWAL AND RASHMI SINGH

In India where Iron Deficiency anemia is a most common health problem, there is a need to know about the iron rich food supplements. These supplements should be including in our daily diet. Niger seed (*Guizotia abyssinica*) is a type of oilseed crop which is reported to be containing very high amount of iron in plant based foods and may be of immense help in improving the iron status of vulnerable population group. In the present study, an iron rich food supplement *i.e.* niger seed *Laddoo* has been prepared and its nutrient analysis was done by standard procedure. This study showed that the supplement made with two parts of niger seeds and one part of jaggery *i.e.* 2:1 ratio was found to be more acceptable. The highly accepted variation was analyzed for its biochemical composition. It contained 20.71 g protein, 34 g of fat, 7.83 g crude fibre, 213 mg calcium, 42.61 mg iron, 4.7 g ash per 100 g of *Laddoo*. It was concluded in the present study that niger seed *Laddoo*s had a large amount of nutrients among other plant foods. Due to its easy availability and convenient method to prepare the *Laddoo*, it can be used for preventing anaemia and malnutrition.

**Key Words :** Niger seeds, Iron, Supplement, Food.

**How to cite this article :** Baranwal, Deepika and Singh, Rashmi (2017). An iron rich food supplement: Niger seed *Laddoo*. *Food Sci. Res. J.*, 8(2): 187-190, DOI : 10.15740/HAS/FSRJ/8.2/187-190.

## INTRODUCTION

Iron deficiency anaemia (IDA) is the most prevalent micronutrient deficiency among human beings all over the world. Food-based approaches such as food or dietary diversity should be used to combat IDA. Food diversity involves increasing the quantity and the variety of iron-rich foods consumed (Allen *et al.*, 2006). In country like India where plenty of natural resources are available and majority of population is vegetarian, which has low bioavailability, consumption of iron rich foods significantly help for reduction of iron deficiency anaemia. Niger seed (*Guizotia abyssinica*) is a type of oilseed crop which is reported to be containing very high amount of iron in plant based foods and may be of immense help in improving

the iron status of vulnerable population group. In India niger seed is cultivated in the states of Madhypradesh, Orissa, Maharashtra Bihar, Karnatak, Andhrapradesh, Uttar Pradesh, Rajasthan, Gujarat and Tamil Nadu. The annual production in India is about 180.00 tones (Getinet and Sharma, 1996). According to Prasad (2000) niger seed is perhaps the oldest known and used by human beings. There is evidence that niger originated in the highlands of Ethiopia, from Ethiopia it is believed to have migrated to east African highlands and during the second millennium BC may have moved across to India. Niger is an annual dicotyledonous herb. The stem of niger is smooth to slightly rough and the plant is usually moderately to well branched. Niger stems are hollow and break easily. The colour of the stem varies from dark purple to light green and is about 1.5 cm in diameter at the base. The plant height of niger is an average of 1.4 m. The niger flower is yellow and, rarely, slightly green (Seegeler, 1961). Niger is usually grown on light poor soils with coarse texture (Chavan, 1961). Niger seed is grown on about

### MEMBERS OF RESEARCH FORUM

**Author for correspondence :**

**DEEPIKA BARANWAL**, Department of Home Science, AM P.G. College, Banaras Hindu University, VARANASI (U.P.) INDIA

**Associate Authors' :**

**RASHMI SINGH**, College of Home Science, C.S.A. University of Agriculture and Technology, KANPUR (U.P.) INDIA

600,000 hectares. In India niger is planted as rain-fed crop in *Kharif* and *Rabi* season (ICAR, 1992). Niger seeds is also known as *Ramtil*, *Kalatil* and *Sorguja*. Per 100g; the seed is reported to contain 515 Kcal energy, 23.9g protein, 39.0 g fat, 17.1 g carbohydrates, 300 mg calcium, 22mg phosphorus and 56.7 mg iron (Gopalan *et al.*, 2000). Upadhyay *et al.* (1998) stated that tribal communities use flowers of *Guizotia abyssinica* which posse's medicinal value. Niger seed is also a rich source of linoleic acid which is an essential fatty acid. The oil and seed completely free from any toxic substance. The high amounts of phylloquinone, vitamin D and menadion (vitamin K3) (Ramadan, 2003) as well as antioxidant related components are also present in niger seeds (Shahidi and Desilva An Amarowiez, 2003).

Agro web project (2001) reported that Niger seeds have a great vitamin action (as for vitamin E). The niger seeds had sawn that has suspend reaction in getting the mice old. The young mice, in which in their diet they added 20% powder of Niger, they present a delay and suspension of getting old and special in relation with some factors, like vision, shiny hair and roughness of the skin. In the mice that had been applied regular, the above factors had been increased from the 20<sup>th</sup> month. Wherein the mice that had Niger in their diet did not. It is powerful anti-inflammatory agent. Niger seed *Laddoos* is good for preventing osteoporosis and also good for hormone balance for ladies (MESA, 2001). Barnwal *et al.* (2011) found in their study that 25 g/day of niger seed *Laddoo* supplementation to iron deficient adolescents girls (16-17 yrs) improves the nutritional status of girls. Niger seed *Laddoo* is a type of sweet made with jaggery. Jaggery is a natural sweetener made by the concentration of sugarcane juice without the use of any chemicals/synthetic additives or preservatives. It contains an enormous wealth of minerals/protein/vitamins. Ancient medical scriptures dating back to 2500 years state how it purifies the blood prevents rheumatic afflictions and disorders of bile and possess nutritive properties of high order (Sushruta Samhita, Chapter 45, Sloka 146). On the basis of above sited literature, it was found that niger seed and jaggery have good nutritional and medicinal properties and both can be used to prepare a food product named niger seed *Laddoo*.

## METHODOLOGY

### Procurement of raw materials :

The niger seeds and jaggery were obtained from

the local market of Kanpur. This research project was carried out at Department of Food and Nutrition, College of Home Science, C.S.AU.A.T, Kanpur, U.P.

### Standardization of niger seed *Laddoos* :

For the standardization of recipe, three variations has been done in which different ratios (1:1, 2:1 and 3:1) of niger seeds and jaggery were used,, respectively. The 1:1 ratio was prepared using equal amount of niger seed and jaggery.

### Organoleptic analysis of the prepared niger seed *Laddoos* :

Organoleptic evaluation was done using nine point headonic scale by a panel of five judges selected randomly from the College of Home Science, Food Science and Nutrition Department, C.S.A. University of Agriculture and Technology, Kanpur. The Judges were requested to score the product with the help of score card especially prepared for the purpose.

### Method of standardized recipe :

Niger seeds were cleaned properly and roasted as slow flame for 10 minutes. Jaggery was kept into pan and 50 ml water was added to it. Syrup was heated till it attained one thread consistency. Then niger seed was added in the syrup and mixed properly for 2-3 minutes and balls were prepared from it. Each *Laddoo* to be prepared was of 25 g (Plate 1).



Plate 1 : Niger seed *Laddoo*

### Nutrient analysis of niger seed *Laddoo* :

All nutrient analysis of standardized prepared *Laddoos* was done in three replicates. Results were expressed on a dry matter basis. Moisture Content (MC): The samples (5g) were allowed to dry at 110°C in an

oven until constant weight was obtained (A.O.A.C., 1980). The dried samples were kept for analysis of ash. Ash: After moisture determination sample was ignited and residue was kept at  $500^{\circ}\text{C} \pm 50^{\circ}\text{C}$  for 1- 2 hours in a muffle furnace (A.O.A.C., 1980). Fat: Fat was determined by the Socs operational procedure (A.O.A.C., 1980) using 2g of samples and petroleum ether. Extraction was done for 1h. Crude Fibre (CF): Fat extracted material (2g) was used for determination of crude fibre by the method of A.O.A.C. (1980). Crude Protein (CP): CP (g/100g) was determined by the Kjeldahl technique, using an automated nitrogen determination system (A.O.A.C., 1980). The protein factor used was 6.25. Carbohydrate (CHO): Carbohydrate content of *Laddoos* was calculated by difference method followed this formula:  $(\text{CHO} = 100 - \text{MC} - \text{Ash} - \text{fat} - \text{CF} - \text{CP})$  on a dry matter basis.

### Energy:

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 4 Kcal and one gram of fat yield 9 Kcal. Estimation of minerals like iron and calcium was done by the method of Wong (1928) and A.O.A.C. (1980), respectively.

### Statistical analysis:

Results obtained were analysed by ANOVA one way classification.

## OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

### Sensory evaluation of niger seed *Laddoo* :

Different ratio of niger seeds and jaggery were used to prepare *Laddoos*. The different ratios were 1 : 1, 2 : 1 and 3 : 1. *Laddoo* prepared with 2 : 1 ratio was found to be most acceptable (8.40) as shown in Table 1. According to the nine point headonic scale it was scored as liked very much while other variations were liked moderately.

### Nutritional composition of niger seed *Laddoos* :

The highly accepted variation was analyzed for its biochemical composition (Table 2). It contained 20.71 g protein, 34 g of fat, 7.83 g crude fibre, 213 mg calcium, 42.61 mg iron, 4.7 g ash per 100 g of *Laddoo*. 25g niger seeds *Laddoo* contained 10.65 mg iron, when it supplemented to adolescents girls. This *Laddoo* fulfilled requirement 35.5 per cent of RDA for iron which was quite sufficient for adolescent girls. Iron is very necessary mineral for adolescent girls because low iron status among

**Table 1 : Acceptability scores of niger seed *Laddoos***

Variations	Flavour	Body and texture	Colour and appearance	Sweetness	Taste	Overall acceptability
I (1 : 1)	6.20	7.00	6.80	7.60	7.20	7.00
II (2 : 1)	7.60	7.60	7.60	8.80	8.20	8.40
III (3 : 1)	6.60	6.80	7.60	7.00	7.40	7.00
Mean	6.80	7.13	7.33	7.80	7.60	7.47
S.E. $\pm$	$\pm 0.23$	$\pm 0.18$	$\pm 0.23$	$\pm 0.26$	$\pm 0.22$	$\pm 0.30$
C.D. (P=0.05)	0.71	0.56	0.71	0.80	0.67	0.91
C.V	7.69 per cent	5.72 per cent	7.04 per cent	7.04 per cent	6.36 per cent	8.82 per cent

**Table 2 : Nutrient content of the *Laddoo***

Replication	Components								
	Moisture (g)	Protein (g)	Fat (g)	Carbohydrate (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)	Ash (g)	Crude fibre (g)
R <sub>1</sub>	10	20.13	32	36.37	472.52	240	43.46	4.0	7.5
R <sub>2</sub>	8	21.00	35	31.00	491.00	200	42.0	5.0	8.0
R <sub>3</sub>	8	21.00	35	31.00	491.00	200	42.16	5.0	8.0
Mean	8.6	21.71	34	32.79	484.84	213	42.16	5.0	8.0
S.D.	$\pm 1.6$	$\pm 0.5$	$\pm 1.7$	$\pm 1.7$	$\pm 10.67$	$\pm 23.09$	$\pm 0.55$	$\pm 0.58$	$\pm 0.27$
Experimental value of 25g niger seed <i>Laddoo</i>	2.15	5.18	5.86	8.20	121.21	53.25	10.65	1.175	1.96

adolescent may limit their growth spurt (Brabin and Brabin, 1992).

Zanvar and Devi (2007) also developed supplementary foods like iron rich biscuit which is prepared using locally available iron rich food stuffs *i.e.* garden cress seeds and rice flakes. It contained 29.61 gm of fat, 0.99 gm fibre, 2.8g protein and 6.11g /100g minerals. The iron content was 13.16 mg/100 g was found in a biscuit.

### Conclusion:

It was concluded in the present study that niger seed *Laddoos* had a large amount of nutrients among other plant foods. Due to its easy availability and convenient method to prepare the *Laddoo*, it can be used for preventing anaemia and malnutrition. This study will be useful for the other researchers and common people for the betterment of health.

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Received : 16.02.2017; Revised: 25.07.2017; Accepted : 11.08.2017