

Nutrient Composition of Some Nuts and Oilseeds Based Recipes of Assam, India

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ABSTRACT Nuts and oilseeds being an important source of many nutrients, was included in the study to evaluate the major nutrients, calcium and iron from some common Assamese recipes. The study revealed that all the recipes are energy dense. Protein content was highest in *charchari* with fish. Considerable amounts of mineral and fibre were found in the recipes, out of which highest mineral content was observed in gingelly *laddu* and highest fibre content in *charchari* with drumstick. The carbohydrate content was highest in groundnut *chikki*. Compared to other recipes calcium content was considerably high in gingelly recipes. Similarly, gingelly and most of the mustard recipes had higher iron content.

INTRODUCTION

In nutrition, a new era is emerging that is characterized by search for dietary constituents that have benefits beyond those ascribed to the macro and micronutrients. Nuts and oilseeds are complex plant foods that are not only rich sources of unsaturated fat but also contain several non fat constituents such as plant protein, fibre, micronutrients (e.g. copper and magnesium), plant sterols and phytochemicals (Rainey and Nyquist, 1997). Frequency of nut consumption seems to be inversely related to all-cause mortality in several population groups (Fraser et al., 1997; Fraser and Shavlik, 1997). However, in amounts they are consumed, may not contribute much to the intake for the beneficial effect. Therefore, efforts are needed to educate the public about the health benefits of nuts and oilseeds and ways to use them in planning a healthy diet.

Nuts and oilseeds has an important place in Assamese dietaries. Most commonly used nuts and oilseeds in Assamese dietaries are gingelly seeds, mustard seeds and coconut. But even for these nuts and oilseeds, frequency of consumption is not very high. Though some of the other nuts and oilseeds are occasionally consumed, they are usually not incorporated in traditional or typical recipes. Gingelly seeds and coconut are typically used in sweet snacks preparation by Assamese communities. Mustard

seed which is common in Assamese dietaries are mostly used in preparation of curries as well as for some other accompaniments of main course. However, information on even the major nutrient composition of such regional preparations are not available. Whereas in recent years world research on nuts and oilseeds are getting importance not only for its nutrient composition but also for various other compounds present in it, which have health benefits. Therefore as a preliminary step, the study was undertaken to evaluate for some of the nutrient compositions of some commonly consumed recipes prepared with nuts and oilseeds. Gingelly seeds are mostly and predominantly used as sweet stuffings of traditional rice based *pithas*, but these were covered elsewhere under cereal based products, hence not covered in this particular study.

METHODOLOGY

Preparation procedures of the recipes were collected from selected experienced persons and raw materials were procured from local market places. Selected recipes were standardized and prepared in the laboratory. General description of the recipes are presented in Table 1. Out of these gingelly *laddu*, coconut *laddu*, groundnut *chikki*, coconut *samosa* are used as snacks items. Gingelly *chutney*, coconut and coriander *chutney*, *kahudi*, *kharali* are used as accompaniments for lunch and dinner, *charcharis* are used as curries in lunch and dinner.

Prepared recipes were homogenized and subjected to chemical analysis for different nutrients.

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Table 1: General description of recipes based on nuts and oilseeds commonly consumed in Assam, India

S. No.	Name of the recipe	Ingredients used	Description of recipe	Cooked weight	Cooked volume/No.
1.	Gingelly laddu	Gingelly seeds - 100.0 g Jaggery - 100.0 g Fat - 5.0 g Water - 125.0 ml	Mixed jaggery and water. Brought to boil. Added roasted gingelly seeds and when thickened removed from fire and made balls.	250.0 g	10 nos.
2.	Coconut laddu (with sugar)	Fresh grated coconut - 250.0 g Sugar - 250.0g	Cooked grated coconut in a thick bottomed pan stirring constantly for 10-12 min. Added sugar and cooked for 5 more minutes in sim. Removed from fire and made small balls.	350.0g	18 nos.
3.	Coconut laddu (with jaggery)	Fresh grated coconut - 250.0g Jaggery - 250.0g	Cooked grated coconut in a thick bottomed pan stirring constantly for 10-12 min. Added grated jaggery and cooked for 5 min in sim. Removed from fire and made small balls.	350.0 g	18 nos.
4.	Ground nut chikki	Groundnut - 50.0 g Jaggery - 100.0g Fat - 5.0g Water - 125.0ml	Mixed jaggery and water. Brought to boil till hard ball consistency. Added roasted, deskinced and pounded groundnut. Spread on a greased plate. Cut into pieces when cool.	200.0 g	10 pieces
5.	Coconut samosa	Fresh grated coconut - 100.0g Coriander leaves - 250.0g Maida - 200.0g Fat/Oil - 70.0g Green chilli - 10.0g Salt - 10.0g Cumin seeds - 2.0g	Seasoned 2g of cumin seeds in 5 g of oil. Added grated coconut. Cooked for few minutes to remove excess moisture. Added chopped coriander and green chillies. Seasoned with salt. Rubbed 20g of oil to the maida. Made dough with hot water. Made small balls, rolled into puri like size. Cut into half. Filled each half with coconut mixture. Deep fried.	350.0g	10 nos.
6.	Gingelly chutney	Gingelly seeds - 50.0g Garlic - 10.0g Green chilli - 5.0g Salt - 5.0g Mustard oil - 5.0g	Mixed all ingredients and ground to paste	125.0 g	112 ml
7.	Coconut – Coriander chutney	Fresh coconut - 50.0g Coriander leaves - 50.0g Green chilli - 5.0g Salt - 10.0g Sugar - 5.0g Lemon juice - 10.0 ml	Mixed all ingredients and ground to paste	125.0g	113 ml
8.	Kharali (mustard preparation)	Mustard seed - 100.0g Khar - 200.0 ml Salt - 10.0g Red chilli - 5.0g	Cleaned and ground mustard seeds to powder. 250.0g Sieved. Burned dry peel of a banana (local variety) to red hot. Added the peel to 1 cup of water and strained. The liquid is alkaline in nature and locally known as <i>khar</i> . Mixed <i>khar</i> , mustard powder, salt and slitted red chilli. Wrapped in a banana leaf and kept for 3 days.	250.0g	241 ml
9.	Kahudi	Mustard seed - 100.0g Tamarind - 15.0g Water - 200.0 ml Salt - 10.0g Red chilli - 10.0g	Cleaned and ground mustard seeds to powder. 270.0g Sieved. Made tamarind pulp with 1 cup of water. Mixed all ingredients and wrapped in a banana leaf and kept for 3-4 days.	270.0g	262 ml
10.	Charchari with drumstick (mustard preparation)	Drumstick - 250.0 g Potato - 50.0g Onion - 50.0g Mustard seed - 30.0g Mustard oil - 30.0g Green chilli - 10.0g Turmeric - 5.0g Salt - 10.0g Water - 200.0 ml	Peeled and cut the vegetables into pieces. Ground mustard seeds, onions and green chillies to paste. Heatid oil and added vegetables, mixed paste, salt turmeric. Stir fried for 5 minutes. Added water and cover coked till done.	340.0g	331 ml

Table 1: Contd...

S. No.	Name of the recipe	Ingredients used	Description of recipe	Cooked weight	Cooked volume/No.
11.	Charchari with fish (mustard preparation)	Fish (Hilsa) - 250.0g Mustard seed - 30.0g Green chilli - 20.0g Turmeric - 10.0g Mustard oil - 50.0g Onion - 100.0g Salt - 15.0g Water - 400.0 ml	Made medium sized pieces of fish. Applied salt and turmeric and kept aside. Made paste with 50.0g, onions, mustard seed, green chilli. Fried fish and removed. Chopped remaining onions and fried in the same oil. Added spice paste, salt and stir fried for 2 minutes. Added water, brought to boil, added fish pieces and cooked for 5-8 minutes. Added slitted green chillies, 10 g of mustard oil and remove from fire.	400.0g	393 ml

Proximate composition and calcium content of the recipes were determined by AOAC methods (AOAC, 1990) and total iron was determined using the method given by Wong (1928). Carbohydrate was calculated by differential method and energy was calculated by multiplication method.

RESULTS AND DISCUSSION

Nutrient Composition on Fresh Basis: Nutrient composition of the recipes per 100 g, fresh weight basis are presented in Table 2. Moisture content of the recipes ranged from 4.3 ± 0.00 g/100g in gingelly laddu to 68.0 ± 0.27 g/100g in charchari with drumstick. Protein content was highest (14.5 ± 0.72 g/100g) in charchari with fish and lowest (3.1 ± 0.07 g/100g) in coconut laddu with sugar. Highest protein content of the recipe was because of the incorporation of fish in the preparation. Fat content was recorded highest (31.6 ± 0.06 g/100g) in coconut samosa, which was a deep fat fried product, and lowest (11.0 ± 0.11 g/100g) was recorded in groundnut chikki. Maximum amount of mineral was found in gingelly laddu (3.0 ± 0.22 g/100g) and minimum amount (0.6 ± 0.09 g/100g) in coconut samosa. Crude fibre was maximum (3.8 ± 0.27 g/100g) in charchari with drumstick and minimum (0.6 ± 0.00 g/100g) in groundnut chikki. Carbohydrate content was maximum (76.1 ± 0.10 g/100g) in groundnut chikki and minimum (0.6 ± 0.01 g/100g) in charchari with fish. An amount of energy of 445.3 ± 6.27 kcal and 168.1 ± 6.02 kcal was recorded as highest and lowest in case of gingelly laddu and charchari with drumstick respectively. Gingelly being a rich source of calcium, both the gingelly recipes had high amounts of calcium. However, in the chutney, gingelly being the only major ingredient had highest calcium content of 481.7 ± 0.41 mg/

100g. The lowest value of 14.3 ± 0.71 mg/100g was recorded in coconut laddu. Highest iron content (4.4 ± 0.23 mg/100g) was recorded in gingelly laddu and lowest (1.2 ± 0.07 mg/100g) in coconut and coriander chutney.

Nutrient Composition on Dry Matter Basis:

The nutrient composition of the recipes on dry matter basis are presented in Table 3. As in case of fresh basis, protein content was highest (32.2 ± 1.59 g/100g) in charchari with fish. There was a wide variation in fat content which ranged from 11.6 ± 0.12 g/100g (groundnut chikki) to 60.0 ± 0.58 g/100g (charchari with fish). Mineral content ranged from 0.9 ± 0.13 g/100g (coconut samosa) to 5.6 ± 0.37 g/100g (charchari with drumstick). Crude fibre content was lowest in groundnut chikki amounting 0.6 ± 0.00 g/100g and highest in charchari with drumstick amounting 11.8 ± 0.84 g/100g. Wide variation was also observed in carbohydrate content amounting a minimum of 1.4 ± 0.02 g/100g in charchari with fish to a maximum of 80.2 ± 0.11 g/100g in groundnut chikki. Energy value was highest (674.4 ± 46.10 kcal) in charchari with fish and lowest (451.2 ± 0.11 kcal) in groundnut chikki. Gingelly chutney had a very high amount of calcium (1204.2 ± 1.03 mg/100g), compared to other recipes. Lowest calcium (20.4 ± 1.01 mg/100g) was recorded in coconut laddu. Iron content of the recipes ranged from 1.7 ± 0.14 mg/100g (coconut laddu) to 10.5 ± 0.18 mg/100g (gingelly chutney).

In conclusion, most of the recipes analysed were good sources of energy, protein, fat, total mineral, calcium and iron. Though these recipes are occasionally consumed by Assamese communities, regular use can be good source of energy and other nutrient dense foods. Its content of various nutrients and non-nutrient bioactive compounds will be helpful in normal and therapeutic conditions. Therefore, future research can

Table 2: Nutrient composition of food items based on nuts and oilseeds commonly consumed in Assam, India (per 100g as is basis)

S. No.	Name of the recipes	Moisture (g)	Protein (g)	Fat (g)	Minerals (g)	C. fibre (g)	CHO (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)
1.	Gingelly laddu	4.3±0.00	7.8±0.23	15.7±0.06	3.0±0.22	1.0±0.01	68.2±0.02	445.3±6.27	440.0±0.01	4.4±0.23
2.	Coconut laddu (with sugar)	30.0±0.07	3.1±0.07	28.5±0.03	0.9±0.01	2.4±0.07	35.1±0.06	409.3±10.09	14.3±0.71	1.2±0.10
3.	Coconut laddu (with jaggery)	32.0±0.12	4.6±0.13	28.6±0.17	0.9±0.02	2.4±0.12	31.5±0.70	401.8±0.10	52.8±0.02	2.8±0.01
4.	Groundnut chikki	5.2±0.10	6.2±0.03	11.0±0.11	0.9±0.20	0.6±0.00	76.1±0.10	428.2±0.10	26.0±0.11	3.0±0.01
5.	Coconut samosa	31.0±0.02	8.3±0.01	31.6±0.06	0.6±0.09	1.3±0.01	27.2±0.07	426.4±10.2	23.7±0.21	2.2±0.20
6.	Gingelly chutney	60.0±0.02	8.4±0.10	20.0±0.01	1.9±0.03	1.3±0.06	8.4±0.09	247.2±0.03	481.7±0.41	4.2±0.02
7.	Coconut coriander chutney	61.0±0.18	3.4±0.01	16.2±0.03	1.2±0.20	1.8±0.19	16.4±0.22	225.0±0.13	77.7±0.60	1.2±0.07
8.	Kharali (mustard preparation)	54.0±0.01	8.8±0.03	15.2±0.16	1.6±0.57	0.8±0.03	19.6±0.51	250.6±0.42	164.4±0.07	3.3±0.04
9.	Kahudi (mustard preparation)	56.1±0.10	8.4±0.21	14.1±0.11	1.7±0.13	1.1±0.06	18.6±0.03	234.6±0.04	165.2±1.92	4.2±0.00
10.	Charchari with drum stick (mustard preparation)	68.0±0.27	4.0±0.37	12.5±0.23	1.8±0.12	3.8±0.27	9.9±0.00	168.1±6.02	43.3±3.10	2.2±0.27
11.	Charchari with fish (mustard preparation)	55.0±0.17	14.5±0.72	27.0±0.26	2.0±0.10	0.9±0.30	0.6±0.01	303.4±20.74	161.2±0.03	3.9±0.10

Table 3: Nutrient composition of food items based on nuts and oilseeds commonly consumed in Assam, India (dry matter basis)

S. No.	Name of the recipes	Protein (g)	Fat (g)	Minerals (g)	C. fibre (g)	CHO (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)
1.	Gingelly laddu	8.2±0.24	16.4±0.06	3.1±0.28	1.0±0.01	71.3±0.02	465.5±6.55	459.7±0.01	4.6±0.24
2.	Coconut laddu (with sugar)	4.4±0.09	40.7±0.04	1.3±0.01	3.4±0.09	50.2±0.09	584.7±14.41	20.4±1.01	1.7±0.14
3.	Coconut laddu (with jaggery)	6.8±0.19	42.1±0.25	1.3±0.03	3.5±0.17	46.3±1.03	591.3±0.15	77.6±0.05	4.1±0.01
4.	Ground nut chikki	6.5±0.03	11.6±0.12	0.9±0.20	0.6±0.00	80.2±0.11	451.2±0.11	27.4±0.12	3.2±0.01
5.	Coconut samosa	12.0±0.01	45.8±0.09	0.9±0.13	1.9±0.01	39.4±0.10	617.8±14.78	34.3±0.30	3.2±0.29
6.	Gingelly chutney	21.0±0.25	50.0±0.02	4.7±0.07	3.2±0.15	21.1±0.23	618.4±0.08	1204.2±1.03	10.5±0.18
7.	Coconut coriander chutney	8.7±0.03	41.5±0.08	3.1±0.52	4.6±0.48	42.1±0.56	576.7±0.33	199.2±1.54	3.1±0.18
8.	Kharali (mustard preparation)	19.2±0.06	33.0±0.35	3.5±1.25	1.7±0.06	42.6±1.11	544.2±0.91	357.4±31.06	7.2±0.09
9.	Kahudi (mustard preparation)	19.1±0.48	32.1±0.25	3.9±1.31	2.5±0.14	42.4±0.07	534.9±0.09	376.3±4.37	9.6±0.00
10.	Charchari with drum stick (mustard preparation)	12.5±1.16	39.1±0.72	5.6±0.37	11.8±0.84	31.0±0.00	525.9±18.83	135.3±9.68	6.9±0.85
11.	Charchari with fish (mustard preparation)	32.2±1.59	60.0±0.58	4.4±0.22	2.0±0.67	1.4±0.02	674.4±46.10	358.2±0.07	8.7±0.22

be undertaken for indepth studies on favourable fatty acid profile and various bioactive compounds of nuts and oilseeds in relation to human health. Data out of such studies will be helpful in planning diets for reducing risk of a number of chronic diseases and in increasing longevity (Fraser, 1999). Perhaps one of the most unexpected and novel findings in nutritional epidemiology in the past five years is that nut consumption seems to protect against ischemic heart disease – the leading cause of death in men and post menopausal women world wide (Sabate, 1999). However, the epidemiologic evidence for protective effect of other plant food groups such as fruit, vegetable, legumes, cereals against chronic diseases began to appear in the literature much earlier (National Research Council, 1989; Steinmetz and Potter, 1991; Block et al., 1992; Kushi et al., 1999). The delay in investigating the effects of nuts was because nuts were not considered most desirable food to protect against heart diseases, because they are very high in fat (American Heart Association, 1991). In India which has millennia of vegetarian tradition, peanuts and peanut oil are predominant parts of the diet. But while considering Assamese dietaries frequency of consumption of nuts and oilseeds, particularly those nuts which have much higher health benefits, like peanuts, almonds, walnuts (Hyson et al., 2002; Feldman, 2002; Kris-Etherton et al., 1999) need to be encouraged by educating the public about health benefits of such nuts.

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