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Standardization and chemical composition of traditional recipes prepared from legumes and pulses

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Abstract

Legume and pulses are called poor man's meat. The most commonly consumed pulses in Himachal Pradesh are black gram, cowpea, green gram, lentil and red gram. Recipes prepared from these pulses were *Telia mash*, cowpea *madhra*, green gram, sour lentil and sour red gram. The results revealed that the maximum protein content of raw pulses was found (26.6 g/100g) in cowpeas. The fat content of raw pulses varied between 0.5-2.0 g/100g, minimum in lentil and maximum in red gram. Prepared recipes were also analyzed for the proximate composition. The results revealed that the protein content in the prepared recipes varied from 4.8-19.0 g/100g whereas fat content ranged from. 2.1-28.5 g/100g on as is basis. As regard to other nutrients analyzed, a wide variation was observed. Fat and energy content increased in all the recipes, which may be attributed to the addition of fat during cooking.

Key words: Cowpea, legumes, traditional recipes, protein.

Introduction

Pulses and legumes not only add variety to human diet, but also serve as an economical source of supplementary proteins for a large human population in developing countries like India, where majority of the population is vegetarian (Bishnoi, 1991). Pulses are the major source of protein and are valuable in cereal-based diets because of their complementary character to cereal proteins. Apart from being a good source of dietary protein, they are also important source of calories, certain essential amino acids, minerals and vitamins. A significant part of the world population also relies on pulses and legumes as a staple food for subsistence, particularly in combination with cereals, as pulses and legumes being a major source of protein (18-32%) increase the nutritional quality of predominantly cereal-based diets (Burbano *et al.*, 1999 and Aparana *et al.*, 2000). Although, India produces a large variety of legumes and pulses, but the commonly consumed legumes and pulses are black gram whole (*Phaseolus mungo* Roxb.), bengal gram whole, bengal gram *dhal* (*Cicer arietinum*), green gram (*Phaseolus areus* Roxb.), cowpea (*Vigna catjang*), lentil (*Lens esculenta*) and red gram *dhal* (*Cajanus cajan*) etc.

Therefore, the present investigations were undertaken to standardize recipes for preparation of different products from commonly consumed legumes and pulses in the state and to evaluate their chemical composition.

Methodology

Information regarding the consumption of legumes and pulses, ingredients used and method of preparation was collected from housewives of Palampur region (Himachal Pradesh). On the basis of collected information different ingredients used were procured from the local market, different preparations were standardized and prepared in the laboratory.Cooked preparations were dried, powdered and stored in airtight containers for further analysis.

1. *Telia Mash* (Black gram whole-cooked):

Ingredients: Black gram whole -100g, Curd- 100g, Chillies- 1.5g, Turmeric powder- 1.5g, Salt- 5.0g, Coriander powder – 1.5g, Coconut grated – 5.0g, Raisins- 8-10 (Nos), Dry ginger powder -1.0g, Mustard oil- 100ml, Water- 250ml.

Method: Black gram was boiled. Little amount of oil was heated in a skillet. All the ingredients except raisins were added in the heated oil and fried till golden brown. Boiled black gram was added, mixed well and the leftover oil was added to it.

Cooked weight – 244g, Cooked volume- 260 cm^3

2. *Roungi Madhra* (Cow pea):

Ingredients: Cowpea- 100g, Curd- 100g, Salt – 6.0g, Chillies – 1.0g, Cumin seeds- 2.5g, Cloves- 2

No., Turmeric- 2.5g, Coriander powder- 2.5g, *Garam masala*- 2.5g, Mustard oil- 15ml, Water- 350ml.

Method: Cowpea was soaked overnight. Excess water was discarded and cooked for five minutes. Oil was heated in a skillet and all the ingredients were cooked in heated oil till golden brown in colour followed by addition of cooked cowpea. Immediately curd was added and cooked for five minutes.

Cooked weight- 430g, Cooked volume- 370 cm^3

3. Green gram whole cooked:

Ingredients: Green gram whole- 100g, Salt- 4.0g, Chillies- 1.5g, Coriander powder- 2.5g, Turmeric- 2.0g, *Garam masala*- 1.5g, Onion- 40g, Garlic- 2, Clove – 3 (Nos), Tomato- 30g, Mustard oil- 15ml,Water- 275ml

Method: Green gram whole was cooked in water. Oil was heated in a skillet. All the ingredients were cooked till golden brown. Cooked green gram was added and seasoned with onion and tomato.

Cooked weight- 320g, Cooked volume- 380 cm^3

4. Sour whole lentil:

Ingredients : Whole lentil- 100g, Mango powder- 5.0g, Salt- 4.0g, Chillies- 1.0g, Coriander powder- 15.g, Cumin seeds- 2.5g, Turmeric powder- 2.0g, Onion - 25.0g, Mustard oil- 25.0ml , Water- 425ml.

Method: Whole lentil was cooked in water. Oil was heated in a skillet. All the ingredients were cooked till golden brown and cooked lentil was added and seasoned with onion and mango powder.

Cooked weight – 500g, Cooked volume – 420cm^3

5. Sour red gram (*Arhar dhal*):

Ingredients: Red gram – 100 g, Salt- 5.5 g, Chillies- 1.5 g, Turmeric powder- 1.5 g, *Garam masala*- 1.5 g, Mango powder- 4.0 g, Coriander powder- 2.0 g, Mustard oil – 20 ml, Water- 350 ml.

Method: Red gram *dhal* was cooked in water. Oil was heated in a pan. All the ingredients were added then cooked red gram was added and seasoned with spices and mango powder

Chemical composition

Raw pulses like black gram whole, cow pea, green gram whole, lentil and red gram as well as their respective preparations as per pre standard recipes were analyzed for various nutrients. Moisture, protein, fat, total ash and crude fiber was estimated according to AOAC, 1990 while carbohydrates and energy values in the raw as well as in cooked preparations were determined by using calculation method as described by (Khan et.al. 1986), Similarly calcium and iron content were estimated by following standard method (Piper, 1950). Triplicate determinations were made for each attribute and statistical analysis was carried out.

Results and Discussion

The result revealed that the protein content of raw pulses varied from 12.1 to 26.6percent, minimum in black gram and maximum in cowpeas (Table 1). Gopalan *et al.* (1991) reported the average value of protein in lentil as 25.1%. The fat content of raw pulses varied between 0.5-2.0 g /100g, minimum being in lentil and maximum in cowpea, whereas higher values of fat were reported in raw chickpea, green gram and black gram as 1.8, 1.7 and 1.4 per cent, respectively (Kaur, 1990).

Table 1. Nutrient composition of raw pulses and legumes consumed (g/100g)

Name of pulse / legume	Protein (g)	Fat (g)	Ash (g)	Crude fibre (g)	CH_2O (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)
Black gram whole	12.1±1.00	0.8±0.01	3.3±1.02	2.0±1.01	82±1.00	383±1.00	71.9±1.50	4.7±1.57
Cow pea	26.6±2.09	2.0±0.58	3.5±0.58	3.3±2.08	65±2.0	384±2.65	84.1±1.00	8.2±0.90
Green gram whole	19.3±1.02	0.8±0.01	3.3±1.02	3.9±2.09	73±1.00	376±2.65	98.0±1.54	3.9±2.23
Lentil whole	24.4±3.06	0.5±0.02	2.1±1.01	3.8±2.07	69±2.00	377±9.85	71.2±1.03	6.8±1.57
Red gram	19.0±1.54	1.4±0.56	3.6±1.51	0.8±0.09	75±2.00	388±4.58	97.5±2.09	3.3±0.90

Values are on per cent basis

The ash content of the raw pulses ranged between 2.1-3.6 g/100g with minimum in lentil and maximum in red gram. Green gram whole showed maximum content of crude fiber (3.9 g/100g). Higher content of crude fiber (4.1%) in green gram was also reported by Raghuvanshi *et al.*(1993). Carbohydrate content varied between 65-82g/100g with minimum in cowpea and maximum in black gram whole. Energy content was found minimum in green gram whole (376Kcal/100g) and maximum in red gram (388Kcal/100g). The calcium content of all the raw samples was found to be in the range of 71.2-98.0 mg/100g with minimum in lentil whole and

maximum in green gram whole. Kaur and Mehta (1993) reported a calcium content of 149mg/100g in black gram *dhal*, while Rincon *et al.* (1993) reported a value of 35mg/100g in mature dry cowpeas. The iron content was found to range between 3.3 to 8.2 mg /100g with minimum in red gram and maximum in cowpea.

The nutrient composition of recipes (on as is basis) is presented in Table 2.

Table 2. Nutrient composition of recipes based on pulses and legume (% as is basis)

Name of recipes	Protein (g)	Fat (g)	Ash (g)	Crude fibre (g)	Carbohydrates (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)
Black gram whole cooked (*Telia mash)*	19.0±2.00	28.5±1.54	3.74±2.09	1.8±0.61	22±1.73	421±1.00	54.6±2.09	4.0±1.00
Cowpea- *Madhra*	19.0±0.99	9.8±2.09	2.89±1.54	1.1±0.04	14±1.00	181±2.00	31.3±2.68	5.9±1.60
Green gram whole cooked	7.9±1.54	7.4±1.47	3.07±1.00	1.4±0.56	20±2.65	178±3.61	37.3±2.68	3.2±1.10
Sour whole lentil	4.8±1.53	2.1±1.01	1.53±0.57	0.9±0.01	15±1.00	104±2.00	17.1±1.99	3.7±1.53
Sour red gram	7.8±1.54	5.5±1.54	3.33±0.99	0.3±0.02	21±1.00	165±3.00	36.4±3.04	2.9±1.41

Values are on per cent basis .

The sour whole lentil showed minimum protein (4.82 g/100g) and fat (2.1 g/100g) content, while *Telia mash* showed maximum protein (19.01g/100g) and fat (28.5 g/100g) content. The increase in fat and energy content may be due to additional fat used during cooking (Satya Bhama 1999). Ash content was recorded minimum (1.53g/100g) in lentil and maximum (3.74g/100g) in *Telia mash*. There was a decrease in fat content after cooking. Chavan *et al.* (1983) found that cooking resulted in decreased ash content of mung bean, black gram, pigeon pea and chickpea to 1.8, 2.3, 2.8 and 2.3%, respectively as compared to 2.4, 2.8, 3.1 and 2.4 per cent, respectively for raw dhal. The crude fibre varied from 0.3-1.8 g/100g with minimum in the sour red gram and maximum in *telia mash*, while the carbohydrate content was found to be as low as 14g/100g in cowpea *madhra*. It was observed that *telia mash* contained good amount of energy and calcium content i.e. 421Kcal and 54.6mg/100g, respectively. Iron content ranged between 2.9-5.9 mg /100g, with minimum being in sour red gram and maximum in cowpea *madhra*.

Nutrient composition of prepared recipes is presented in the Table 3.

Table 3. Nutrient composition of recipes based on pulses and legumes consumed in H.P. (% dry matter basis)

Name of recipes	Protein (g)	Fat (g)	Ash (g)	Crude fibre (g)	CH_2O (g)	Energy (Kcal)	Calcium (mg)	Iron (mg)
Black gram whole cooked (*Telia mash*)	25.7±1.52	38.5±2.06	5.0±1.01	1.6±0.57	29±2.00	565±3.51	73.8±3.07	4.2±1.01
Cow pea- *Madhra*	24.4±1.01	26.6±2.15	7.8±1.54	3.1±1.02	38±1.00	489±8.52	84..5±1.54	6.1±1.00
Green gram whole- cooked	20.1±2.64	19.0±1.55	7.9±1.52	3.7±1.53	49±2.65	447±13,79	75.1±0.99	3.5±1.53
Sour whole lentil	20.9±2.06	8.6±1.49	6.4±1.51	3.9±1.54	52±1.00	366±5.29	71.2±2.02	4.1±1.00
Sour red gram	20.3±2.64	14.4±2.66	8.7±1.54	0.7±0.02	56±1.00	435±3.00	94.5±2.06	2.9±1.54

Values are on per cent basis

From the study it was revealed that the protein content of prepared recipes ranged between 20.1-25.7g/100g, minimum in green gram and maximum in black gram whole (*Telia mash*). Fat content ranged between 8.6-38.5 g/100g, minimum in sour whole lentil and maximum in black gram whole cooked (*Telia Mash*). Ash content ranged between 5.0-8.7 g/100g, minimum in *Telia mash* and maximum in sour red gram whereas, crude fibre content was minimum in sour red gram (0.7 g/100g) and maximum (3.9 g/100g) in sour whole lentil. *Telia mash* showed minimum carbohydrates (29 g/100g) content and maximum content of energy (565 Kcal/100g). Calcium content ranged between 71.2-94.5 mg/100g, minimum in sour whole lentil and

maximum in sour red gram. Iron content ranged between 2.9-6.1mg/100g minimum in sour red gram and maximum in cowpea *madhra*.

Conclusion

All the above mentioned legume and pulse based recipes being good source of nutrients especially calories and proteins can be recommended for combating protein calorie malnutrition. Their inclusion in daily diets may vary depending upon the nutrient requirements of the vulnerable section of population.

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