

Original Research Article

Nutritional Quality Of Ready-To-Eat Products Of Chickpea

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ABSTRACT

Background: Ready-to-eat products of chickpea are rich in energy and various macro and micronutrients and eaten as such. A variety of sweet and savoury ready-to-eat chickpea products are available in the market and consumed all over India due to its excellent flavour and taste. **Aim:** The present study was planned to assess the nutritive value of ready-to-eat products of chickpea available locally. **Methods and Material:** Four products, roasted chickpea - with and without husk, roasted spiced chickpea, and *Chana zor garam* were procured from the local market of Jaipur city. Standard techniques given by AOAC were used to assess moisture, total ash, total fat, crude fibre, crude protein, total carbohydrates, total fat, calcium and iron content. **Results and Conclusion:** The average energy content of the four types of roasted products of chickpea studied ranged from 369.05 ± 3.8235 to 388.30 ± 6.2283 kcal, while protein and total fat contents ranged from 16.05 ± 1.935 to 21.22 ± 1.937 3.95 ± 0.91 to 8.50 ± 1.3977 g/100g respectively. The mean carbohydrate and fibre contents ranged from 60.50 ± 3.2850 to 64.19 ± 1.3261 g and 0.77 ± 0.1345 to 1.0 ± 0.2479 g respectively. The iron content ranged between 5.09 ± 0.3021 and 9.76 ± 0.565 mg/100g. The iron content ranged between 5.09 ± 0.3021 and 9.76 ± 0.565 mg/100g. The sodium and potassium values ranged from 56.6 to 194 mg/100g and 856 to 1375 mg/100g respectively. The antinutrient phytic acid ranged from 156.5 ± 3.473 to 165.0 ± 7.40 mg/100g. Thus, the ready-to-eat products of chickpea are affordable good options for nutritionally rich any-time snacks providing high energy, protein and micronutrients particularly.

Keywords: Chickpea, Nutritional quality, Micronutrients, Ready-to-eat

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is a nutritional rich legume consumed throughout the world by the vegetarians ^[1] and a very good source of energy, protein, carbohydrate and minerals and vitamins. ^[2, 3, 4, 5] At the same time, chickpea contains antinutrients that can be removed by processing methods. ^[6, 7]

Proteins in chickpea have adequate amounts of essential amino acids and hydrolysates, this can be used as functional ingredients. ^[8] Chickpea possesses various hypocholesterolemic, anticancer, antioxidants, antihypertensive compounds. ^[9,10] Chickpea contains soluble and insoluble fibres. The fibre in these legumes can lower the total and low-density lipoprotein cholesterol level and thus helpful in cardiovascular diseases. Chickpea also supplies a significant amount of magnesium, which benefits cardiovascular health. The insoluble fibre found in chickpea can help increase stool bulk, which can help prevent constipation and irritable bowel syndrome. Bioactive compounds present in chickpea helps in management of type 2 diabetes. ^[11]

Being a low glycemic indexed food, chickpea also help in preventing lifestyle related diseases. ^[12] Due to its high protein and fibre content, it aids in controlling hunger which in turn can prove helpful in managing body weight. ^[13]

The reason behind the consumption of chickpea is its low cost. Almost everyone can afford different chickpea products irrespective of their poverty & richness. Secondly, its products are ready to eat anywhere. The consumption of chickpea products is also high because of having low fat, high calories and high protein. Processed chickpeas are ready for consumption on daily basis. Various product forms obtained from chickpea, like chickpea flour (besan), dal etc., are of high consumption value. Various sweet and savoury products are made using chickpea flour like namkeens, *dhokla*, *ladoo*, *munthal*, *khandwa*, *cheela*, *pakoda*, *bondas* etc. are used by the people because of their delicious taste and flavour. These products

are ready-to-eat available in the market, so no further preparation is required. Hence, their consumption is very high. The shelf life of roasted products is very high because of the low moisture content.

The nutritional quality varies with the varietal variations of roasted products of chickpea, and storage conditions also affect bioavailability, nutritional quality, and acceptability. Products which are openly placed are of poor nutritional quality, and their shelf life is low, while the products which are appropriately packed are of good nutritional quality and have a better shelf life. No precise information is available on the nutritional quality of ready-to-eat products of chickpea; hence work on ready-to-eat products of chickpea, namely roasted chickpea without husk, roasted chickpea with husk, roasted spiced chickpea without husk and *chana zor gram* with husk has been carried out in this study.

MATERIALS AND METHODS

Collection of samples: Ten samples each of ready-to-eat products of chickpea, namely Roasted chickpea without husk, Roasted chickpea with husk, Roasted spiced chickpea without husk and *Chana zor gram* with husk were collected from various shops situated in different regions of Jaipur city namely Panipache, Bani Park, Chauti chaupad, Johri bazaar, Jhotwara, Durgapura, Vaishali Nagar, Shastri Nagar, Chandpole, Khatipura proportionately and stored under dry and ambient conditions.

While collecting the samples, the seller asked for information regarding the quantity of preparation in stock, type of storage containers, storage conditions, and the shop's name and location.

Assessment of quality: The nutritional values obtained were compared with values of the whole seed of chickpea as given by Longvah *et al.* (2017) (Table 1).^[4] Nutritional and

antinutritional qualities of the collected samples were analyzed using standard methods (Table 2). The results of the experimental work are presented here.

RESULTS AND DISCUSSION

Chickpea due to its low cost is consumed by almost all the people irrespective of their socio-economical status. Also chickpea products are ready-to-eat and can be consumed without further processing on daily basis. The results of nutritional quality of various chickpea products are discussed below.

Nutritional quality of roasted chickpea without husk: The mean energy content of roasted chickpea without husk analyzed in the present study was 369.05 ± 3.83 kcal. The mean contents of protein, total fat and carbohydrate were 21.20 ± 4.61 , 3.95 ± 0.91 and 62.41 ± 4.043 g respectively. Because these samples were without husk so the average fiber content was 0.85 ± 0.243 g. The average moisture and ash contents were found 9.27 ± 0.054 g and 2.86 ± 0.21 g respectively. The mean iron content was 9.75 ± 0.565 mg / 100 g and phytic acid content was 162.50 ± 4.4075 mg / 100 g (Table 3).

Nutritional quality of roasted chickpea with husk: The average energy content of roasted chickpea with husk evaluated in the present study was 371.32 ± 6.047 Kcal. The mean protein content was found to be 21.22 ± 1.937 g while mean carbohydrate content being 6.50 ± 3.285 g. The average fiber and total fat content was 1 ± 0.2479 g and 4.92 ± 1.397 g respectively. The average iron, phytic acid, moisture and ash contents were found to be 9.76 ± 0.565 mg/100g, 165 ± 7.5 mg/100g, 9.17 ± 0.3511 g and 3.19 ± 0.3511 g respectively (Table 3).

Nutritional quality of Spiced chickpea without husk: The mean energy content of roasted spiced chickpea without husk evaluated in the present study was 370.21 ± 5.095 Kcal, while protein and total fat contents were 17.18 ± 1.3523 g and 4.82 ± 0.632 g respectively. The average carbohydrate content was found to be 64.19 ± 1.326 g. The crude fiber content was

0.77 ± 0.1345 g while moisture, ash and phytic acid contents being 9.63 ± 0.1000 g, 3.4 ± 0.1054 mg/100g and 156.5 ± 3.473 mg/100g respectively (Table 3).

Nutritional quality of roasted *chana zor garam*: The mean energy content of samples of *chana zor garam* was 388.30 ± 6.2283 Kcal, while protein and total fat contents were 16.05 ± 1.935 g and 8.5 ± 1.3977 g respectively. The average carbohydrate content was found to 61.98 ± 2.3262 g while the crude fiber content was 0.82 ± 0.1380 g. The mean iron, phytic acid, moisture and ash content were found to be 5.09 ± 0.565 mg, 156.5 ± 3.43 mg/100g, 9.45 ± 0.1636 g and 3.17 ± 0.6361 g respectively (Table 3).

The average energy content of all four roasted products of chickpea was ranging from 369.05 ± 3.8235 to 388.30 ± 6.2282 Kcal while protein and total fat contents ranged from 16.05 ± 1.935 to 21.22 ± 1.937 g and 3.95 ± 0.91 to 8.50 ± 1.3977 g respectively. The mean carbohydrate, fiber and moisture contents ranged from 60.50 ± 3.2850 to 64.19 ± 1.3261 g, 0.77 ± 0.1345 to 1 ± 0.2479 g and 9.17 ± 0.3511 to 9.45 ± 0.1636 g respectively. Moisture content was almost same in all the four products. The ash content ranged from 2.86 ± 0.21 to 3.40 ± 0.3891 g while iron and phytic acid contents were 509 ± 0.3021 to 9.76 ± 0.565 mg/100g and 156.5 ± 3.473 mg/100g. The phytic acid content was high in roasted chickpea with and without husk and low in spiced chickpea and *chana zor garam* (Table 3).

In the present study, the nutritional composition of ready-to-eat products of chickpea was found to be variable. It was found that roasting caused a slight change in the nutrient content of chickpeas. A legume seed, e.g. chickpea, has antinutritional factors which may reduce the bioavailability of some compounds or inhibit enzymes necessary for digestion. [17, 18, 19] The various anti-nutritional factors in chickpea, predominantly phytic acid was found very less in all four products in the present study and being least in *chana zor garam* (156.5 mg/100g) as compared to the whole seed of chickpea (578 mg/100 g) as given in Tables 1 and 3.

CONCLUSIONS

Presently, many options are available for snacks, and there is a vast range of items with very low to very high costs. Nevertheless, the healthier options are not economical or pocket friendly. In India, chickpea is traditionally consumed and easily accessed in every locality like rural, urban, slums etc. In the present study, four products of chickpea namely roasted chickpea with husk; roasted chickpea without husk, roasted spiced chickpea and *chana zor garam* analyzed were found high in protein and energy, low in total fat and are ready to eat. *Chana zor garam* has been processed with fat to stick spices on it; hence the fat content was higher to the other products. Two products, roasted spiced chickpea and *chana zor garam* were high in sodium and potassium values as they are fried and prepared by adding extra spices. Thus, these ready-to-eat products of chickpea are cheap, affordable, nutritionally balanced sources of high energy, protein and micronutrients particularly iron.

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Table 1: Nutritional and antinutritional quality of chickpea and its products ^[4]

Name of items	Moisture (g)	Protein (g)	Total fat (g)	Total fiber (g)	Carbohydra te (g)	Energy (kcal)	Iron (mg)	Phytate (mg)
Chickpea whole	8.56	18.77	5.11	25.22	39.65	287.05	6.78	578
Chickpea dal	9.18	21.55	5.31	15.15	46.72	329.11	6.08	450
Chickpea roasted	10.7	22.5	5.2	1.0	58.1	369	9.5	159*

*Gopalan *et al.* (1971) ^[14]

Table 2: Tools of Research and Method of Estimations

Variables	Parameters	Techniques ^[15]
Nutritional quality assessment	Total moisture content	Oven drying method
	Ash content	Dry ashing method in muffle furnace.
	Crude protein	Micro kjeldal method
	Crude fiber	Acid/ Alkali washing
	Total fat content	Solvent total fat extraction in soxhlet apparatus
	Total carbohydrates	By difference method
Anti-nutritional factor	Phytates	Wheeler and Ferrell (1971) ^[16]
Minerals	Iron	Spectrophotometry
	Sodium & Potassium	Flame photometer
Observation	Storage condition	Questionnaire and observation

*For the estimation of crude protein, the total nitrogen content estimated by Kjeldahl method was multiplied by 6.25 to get the values for crude protein content.

Table 3: Nutritional compositions of ready-to-eat products of chickpea

Nutrients and antinutrient	Products			
	Roasted chickpea without husk	Roasted chickpea with husk	Spiced chickpea without husk	<i>Chana zor garam</i>
Energy (kcal/100g)	369.05 (\pm 3.8235)	371.32 (\pm 6.0465)	370.218 (\pm 5.0950)	388.30 (\pm 6.2283)
Protein (g/100g)	21.20 (\pm 4.61)	21.22 (\pm 1.937)	17.18 (\pm 1.3523)	16.05 (\pm 1.935)
Total fat (g/100g)	3.95 (\pm 0.91)	4.92 (\pm 1.397)	4.82 (\pm 0.632)	8.5 (\pm 1.3977)
Carbohydrate (g/100g)	62.41 (\pm 4.0432)	60.50 (\pm 3.2850)	64.19 (\pm 1.3261)	61.98 (\pm 2.3262)
Crude Fiber (g/100g)	0.85 (\pm 0.243)	1 (\pm 0.2479)	0.77 (\pm 0.1345)	0.82 (\pm 0.1380)
Moisture (g/100g)	9.27 (\pm 0.045)	9.17 (\pm 0.3511)	9.63 (\pm 0.1000)	9.45 (\pm 0.1636)
Ash (g/100g)	2.86 (\pm 0.21)	3.19 (\pm 0.3511)	3.40 (\pm 0.3871)	3.17 (\pm 0.6361)
Iron (mg/100g)	9.75 (\pm 0.565)	9.76 (\pm 0.565)	9.68 (\pm 0.1054)	5.09 (\pm 0.3021)
Sodium (mg/100g)	56.5 (\pm 11.629)	53.6 (\pm 13.2604)	194.0 (\pm 9.1651)	140.0 (\pm 14.3961)
Potassium (mg/100g)	865.0 (\pm 45.00)	965.0 (\pm 39.0512)	1375.0 (\pm 55.9016)	1250.0 (\pm 38.7298)
Phytic acid (mg/100g)	162.50 (\pm 0.4075)	165.0 (\pm 7.540)	156.5 (\pm 3.473)	156.5 (\pm 3.473)

*Values are mean of 10 samples each **Note:** Values in parenthesis are standard deviation