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Influential exploration of roasting and soaked roasting on flaxseed for Nutritional Traits

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Abstract

Nutritive potential of the oilseed crops are known for improvising the human diet, because, these crops provide food security and assurance of employment generation in the society. Therefore, the present experimentation entitled "Influential exploration of roasting and soaked roasting on flaxseed for Nutritional Traits" was under taken at Department of Food Science, Nutrition and Technology, CSKHPKV, Palampur, Himachal Pradesh. with objective to standardize the processing techniques and to analyze the nutritive aspects of the flaxseed (*Surbhi*) was given treatments viz. roasting and soaking roasting. Flaxseed was soaked in water for six hours and roasted at 95-120 °C for 6-10 minutes. Soaked roasted treatment decreased the crude protein, crude fibre, crude fat, total ash content, carbohydrate content, total energy significantly ($p \leq 0.05$) when compared to roasted seeds.

Keywords: Roasting and soaked roasting, nutritional traits, food

Introduction

Oilseed crops are one of the utmost imperative crops in the world. Their role in the human safflower, coconut, sesame, flax, soybean, sunflower, olive, etc. Meanwhile, the fat yields from the oilseed crops are generally high, though varies from crop to crop (species) in the process of extraction of oil. Flaxseed (*Linum usitatissimum*) acknowledged as "Alsi, Jawas, Aksebija" in Indian language, a known member of the family Linaceae and a blue flowering "Rabi crop" (Anonymous 2002) [1]. It is interesting to know that; flaxseed was native to India and utilized as a staple food crop (Ranveer *et al.* 2015) [18]. In India flaxseed is chiefly grown in Madhya Pradesh, Maharashtra, Chhattisgarh and Bihar. The seed cotyledons of flaxseed comprise about 75 per cent of lipids and 76 per cent of protein; and endosperm covers merely 23 per cent and 16 per cent of lipids and protein, respectively (Daun *et al.* 2003) [3]. It benefits in lessening the risk of many chronic diseases like heart disease, stroke, and cancer, as well as lower LDL "bad" cholesterol. In addition to this, Omega-3 FA is a vital component of all cell membranes. In functional foods, flaxseed has been found as a novel potential functional ingredient with many medical benefits. Oil of flaxseed, precursors of lignans and its mucilage has several latent usages in the preclusion or treatment of disease as a nutraceutical drug (Madhusudhan 2009) [10]. The products of flaxseed contain high amount of phytochemicals, soluble fibres, protein and polyunsaturated fatty acid. Apart from the oil content flaxseed contains other nutritional compositions, which makes this crop a foremost choice among food technologists to be utilized in a more prominent way for the development of functional food product, without compromising the nutritional status of product. It contains a fair-quality amount of α -Linolenic acid (ALA), which is good for the brain development of infants. Whereas, rich in SDG i.e. secoisolariciresinol diglucoside (Ganorkar and Jain 2013) [5]. The above nutrients make flaxseed more alluring functional food ingredients (Fitzpatrick 2007). Its unique nutrient profile and ability to affect the risk and cause of cardiovascular disease and certain types of cancers make it as a functional food source (Saarinen *et al.* 2005) [19]. Flaxseed is utilized to illustrate; when consumed by humans, and flaxseed signifies when utilized for industrial purpose. Majorly all plant parts of flaxseed are used for numerous purposes such as refined seed oil of flaxseed is used for cooking or edible purpose. Humans have been overpoweringly flaxseed from the very commencement as it has been grown for textile and for medicinal purposes and as a nutritional ingredient (Krishna *et al.* 2015) [9]. Many people are unaware of the benefits of flaxseed (Udenigwe *et al.* 2009) [21].

Material and methods

The seeds of Flaxseed variety – *Surbhi* commonly grown oilseeds crop in Himachal Pradesh were procured from the Department of Crop Improvement, College of Agriculture and Krishi Vigyan Kendra, Kangra, CSKHPKV. The processing of seed was done with two major treatment has been initiated, includes roasting and soaked roasting. The processes are elaborated in details as mentioned viz., (1) Roasted flaxseed: Raw flaxseeds without any treatment were roasted at 95°C for 6-8 minutes to get the desired aroma. (2) Soaking: The flaxseeds were soaked in water at the temperature of 20° C for six hours and after six hours the seeds were dried in hot air oven for one hour at 60°C temperature and then roasted at 120°C for 6-8 minutes to get the desired aroma. The nutritional composition of roasted and soaked roasted flaxseeds were evaluated and studied. Proximate composition is the term usually used in the field of feed/food and means the six components of moisture, crude protein, crude fat, crude fiber, crude ash and crude protein, which are expressed as the content (%) in the food, respectively (AOAC, 2010) [2]. The above proximate parameters were analyzed by using standard methods. The observations were made in triplicate. Carbohydrate Content was determined by the method mentioned by Hedge and Hofreiter, 1962 [7]; Energy through O'Shea and Maguire, 1962; True Protein in samples was calculated by the following formula: True Protein (%) = (Crude protein nitrogen- Non Protein Nitrogen) X 6.25; whereas, the Non Protein Nitrogen was analyzed by the procedure mentioned by Pellet and Young, 1980 [16]. From the data obtained for various parameters the mean values for each sample were calculated. The significant difference between the nutritional compositions of the samples was tested using the analysis of variance in one way ANOVA.

Result and discussion

Nutritional composition of roasted and soaked roasted flaxseed and sesame seeds

Moisture content: The results of proximate composition indicated that the moisture content of roasted and soaked roasted flaxseeds were 8.68 and 8.12 per cent respectively. There was no significant difference in moisture content (table-1). The results were similar with Gopalan *et al.* 2004 who had reported that the flaxseed contained 6.5-10 per cent moisture content in 6 different varieties of flaxseeds. Sharma (2018) [20]

reported 7.86-8.83 per cent moisture content in 4 varieties of flaxseeds.

Crude protein: Maximum crude protein was found in roasted flaxseeds (16.98 per cent) followed by soaked roasted flaxseeds (15.08 per cent). Statistically soaked roasted treatment decreased the crude protein content of seeds and every value of seed varied significantly. This happened may be because of roasting after soaking treatment as it was mentioned by Handa *et al.* 2017 that the value of foaming capacity for horse gram before soaking was 38ml after soaking for 6 hours it was 39.67ml there was an increase in the total protein at surface which concluded that when seeds were roasted at particular temperature more protein gets denatured because of presence of high total protein on surface area. Oomah and Mazza (1993) [13] assessed protein content in the flaxseeds and found it in the wide range of 10.52 per cent to 31 per cent. Preeti and Chimmad (2010) [17] also reported crude protein content as 17.23 per cent. Gopalan *et al.* 2004 reported it as 20.3 per cent. The difference in the protein content may be due to varietal difference, climatic conditions and the effect of roasting which decreased the protein content in seeds. The present results are within the range reported by Sharma (2018) [20] where the result ranged from 14.57 to 16.34 per cent for 4 different varieties of flaxseeds.

Crude fat: The crude fat content was highest in roasted flaxseeds (32.03 per cent) followed by soaked roasted flaxseeds (31.93 per cent). There is no significant difference between roasting and soaked roasting of seeds but both flaxseeds and sesame seeds varied significantly from each other. The high fat content of the seeds gave the flour an oily and compacted and rough appearance instead of a smooth, powdery appearance. Kajihaua *et al.* 2014 reported that high fat content of sesame flour was result of the very high oil content of the seeds and the sharp drop in the percentage of fat after sprouting was result of the breakdown of complex compounds into a more simple form during sprouting. The present results can be confirmed with the results of Sharma (2018) [20] who reported for four varieties of flaxseed i.e. *Himalsi, Nagarkot, Surbhi* and KL-241 and values ranged from 33.33 to 47.38 per cent. Morris (2007) [11] and Gopalan *et al.* 2004 reported similar results where crude fat content of flaxseeds was found in the range from 31.9 to 37.8 per cent.

Table 1: Proximate composition, carbohydrate and energy content of roasted and soaked roasted flaxseeds

Treatment	Moisture (%)	Crude Protein (%)	Crude Fat (%)	Crude Fiber (%)	Total ASH (%)	Carbohydrate (%)	Energy (Kcal)
Roasted flaxseed	8.68 ^a	16.98 ^a	32.03 ^a	5.6 ^a	1.74 ^a	36.98 ^a	523.25 ^a
Soaked roasted flaxseed	8.12 ^a	15.08 ^b	31.93 ^a	5.54 ^a	0.998 ^a	34.97 ^a	512.85 ^a
CD (P≤0.05)	(0.70)	(0.54)	(1.5)	(0.23)	(0.96)	(2.05)	(6.24)

*Means having different superscripts within the column are significantly different at p≤0.05

Crude fibre: There is no significant difference in seeds treatment maximum crude fiber was present in roasted flaxseeds (5.60 per cent) followed by soaked and roasted flaxseeds (5.54 per cent). Nagaraj (1995) [12] reported 5 to 9 per cent crude fiber in flaxseeds which was similar in line of the present results. Payne (2000) [15] and Gopalan *et al.* 2004 observed crude fiber of raw flaxseeds as 4.8 per cent which is very less as compared to present findings. Sharma (2018) [20] reported that there was 5-6 per cent crude of fiber in raw flaxseeds. The difference between the varieties and agro-climatic conditions may be the cause of different values of crude fiber.

Total ash: Total ash content of flaxseeds after given different treatments ranged from 1.74 to 0.99 per cent for roasted and soaked roasted flaxseeds. Preeti and Chimmad (2010) [17] reported for ash content as 4 and 3.55 per cent in flaxseeds which was not in line with the present findings of. The differences might be due to different variety of seeds. Whereas Sharma (2018) [20] reported 1.3 per cent total ash in *Surbhi* variety of flaxseeds which was near to present findings.

Carbohydrate: The carbohydrate content was calculated as 36.98, 34.97 and 31.45 per cent for roasted, soaked roasted

and raw flaxseeds. Flaxseeds values were non-significant for different treatment. The results were in line with the values reported by Sharma (2018) [20] for flaxseed (34.54 per cent). Maria and Victoria (2018) reported that the carbohydrate content in sprouts of sesame seed decreased continuously with increasing of soaking and germination time, from 13.1 to 9.6 per cent. This observation could be due to the utilization of fat and carbohydrate for biochemical activities of the germinating seeds.

Energy: The values varied significantly from each other where the maximum energy was found in roasted flaxseeds (523.25Kcal) followed by soaked roasted flaxseeds (512.85Kcal). Gopalan *et al.* 2004 also reported the nutrients per 100g of flaxseeds as 530 Kcal which is in concurrent to the present findings. Sharma (2018) [20] reported 503Kcal for raw flaxseed which was nearly same to present findings. Due to decrease of crude protein, crude fat and carbohydrate content there was decrease in total energy.

Conclusion

Flaxseeds being rich in so many nutrients like crude protein, crude fat, carbohydrate and energy also prevents from age-related degenerative diseases for successful ageing. So it can be incorporated in the development of nutritious products for all age group of people to provide adequate amount of nutrients in an easy and affordable form and which can be consumed as snack as well as meal also. One can get highly nutritive, cheap and convenience bars.

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