International Research Journal of Pure & Applied Chemistry

20(4): 1-4, 2019; Article no.IRJPAC.52910
ISSN: 2231-3443, NLM ID: 101647669

Nutritional Composition of Little Millet Flour

K. Srilekha[1*], T. Kamalaja[2], K. Uma Maheswari[2] and R. Neela Rani[2]

[1]University of Agricultural Sciences, Darwad, India.
[2]Jayashankar Telangana State Agricultural University, Telangana, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IRJPAC/2019/v20i430140
Editor(s):
(1) Dr. Hao-Yang Wang, Department of Analytical, Shanghai Institute of Organic Chemistry, Shanghai Mass Spectrometry Center, China.
(2) Dr. Richard Sawadogo, Research Institute for Health Sciences, Ouagadougou, Burkina Faso.
(3) Dr. SungCheal Moon, Korea Institute of Materials Science (KIMS), Industrial Technology Support Division, Changwon, Republic of Korea.
Reviewers:
(1) Rajaa Seghiri, Ibn Tofaïl University, Morocco.
(2) Benjawan Chutichudet, Mahasarakham University, Thailand.
(3) Christian R. Encina-Zelada, National Agrarian University La Molina, Perú.
Complete Peer review History: http://www.sdiarticle4.com/review-history/52910

Original Research Article

Received 20 October 2019
Accepted 24 December 2019
Published 31 December 2019

ABSTRACT

Modern man is facing a large number of dreadful diseases and disorders which were not known even known to ancient man. Dietary patterns were solely responsible for this ruinous situation. Hence replacement of empty calorie foods with nutritious grains- Millets helps to reduce the dual burden of malnutrition and also prevents and manages modern metabolic disorders. Hence the present study focuses on the evaluation of the nutritional composition of Little millet flour. Proximate and dietary fibre of flour was evaluated by the standard procedures of AOAC. The moisture content was 9.75 ± 0.07%, protein was 8.42 ± 0.27%, fatwas 2.10 ± 0.99%, ash was 1.75 ± 0.10%, energy was 351.65 ± 1.1 K. Cal, carbohydrate was 74.75 ± 0.36%, crude fibre was 3.20 ± 0.15% and dietary fiber was 12.51± 0.31%. Hence, it is suggestive that diversification of diet with little millet-based products would help to achieve food and nutritional security effectively and economically.

Keywords: Food security; nutritional security; lifestyle disorders; RDA (Recommended dietary allowance).

**Corresponding author: E-mail: srilekhafsn@gmail.com, srilekhafsn@gmailmail.com;*

1. INTRODUCTION

Modern man is facing a large number of dreadful diseases and disorders which were not known even known to ancient man. The trend of consumption of polished rice, processed foods which are calorie dense but not nutrient-dense has disposed a man to the variety of modern metabolic disorders like obesity, diabetes, cardiovascular diseases, cancer and so on. Hence, it is clear that our dietary patterns are solely responsible for this ruinous situation. The diet of ancestors had superfoods called millets which provided them with all essential nutrients and phytochemicals that helped them to live a healthy and balanced life [1].

Millets are the oldest crops known, whose origin dates back to 4000 years ago [2,3]. Asia and Africa particularly India and Nigeria contribute to 97% of world millet production. Asian countries contribution towards millet production has increased from 48.72% to 52.25% during 2014 [4].

Millets are comparable with other cereals in terms of nutritional composition millets are superiors to other cereals like rice and wheat concerning fibre, micronutrients and phytochemicals. Millets in addition to being good sources of nutrients and phytochemicals, also sustain adverse climatic conditions, thus help to attain food and nutritional security [5].

In recent years minor millets have gained the attention due to their nutritional composition, ability to grow in poor soil and adverse climatic conditions. They have a short growing season and can be very well fitted into both irrigated as well as dry farming conditions. They provide nutritious grain and fodder in a short period [6].

Little millet (*Panicum sumatrense*) is one among the minor millets grown to a limited extent all over India up to altitudes of 2100 m. This crop is resistant to adverse agro-climatic conditions [4]. The complex carbohydrates, phenolic compounds, antioxidants help to prevent metabolic disorders like diabetes, cancer, obesity etc., The proximate composition of Little millet: protein: 6.87 ± 0.09 g to 7.26 ± 0.1 g; fat: 4.64 ± 03 g to 4.70 ± 0.03 g, carbohydrates: 69.70 ± 4.22 g to 78.53 ± 0.12 g, ash: 4.74 ± 0.45 g to 5.75 ± 0.17g; moisture: 5.76 ± 0.01% to 5.76 ± 0.05%; energy: 374 ± 8.96 K. Cal to 374 ± 3.14 K. Cal [7].

Although minor millets were superior to other cereals with many nutritional benefits, their utilization was limited because of low palatability, the coarseness of grain, and lack of diversified food preparations. Hence evaluation of the nutritional quality of millets would help to understand, diversifying the usage of millets in ensuring food, nutritional security in the ever-changing modern world.

2. MATERIALS AND METHODS

Little millet grains were procured from the local market of Hyderabad, Telangana, India. Grains were cleaned and milled. Flour was used to assess the nutritional quality.

2.1 Nutritional Composition of Little Millet Flour

The moisture content of the sample was analyzed by the standard procedure of AOAC [8]. The protein content of the sample was analyzed by the standard procedure of AOAC [9]. The fat content of the sample was analyzed by the standard procedure of AOAC [10]. Ash content of the sample was analyzed by the standard procedure of AOAC [8] using Centex digital muffle furnace. The crude fibre content of the sample was analyzed by the standard procedure of AOAC [11]. Carbohydrate and energy content of the sample was computed by the standard procedure of AOAC [12]. Dietary fibre of Little millet flour was analyzed by the standard procedure of AOAC [13].

3. RESULTS AND DISCUSSION

Millets are good sources of the nutrients and thus their name has become synonymous to health and wellbeing. Nutritional composition of little millet flour is presented in Table 1.

Moisture: The moisture content of little millet was 9.75%. As the moisture content of the flour was less than 10%, it indicates a good keeping quality, however, the keeping quality is influenced by other environmental and storage conditions [14].

Protein: Little millet protein content was 8.42 g/100grams. The protein content was similar to the values reported in a previous study [15]. 100 grams of Little millet flour in the form of roti or chapatti would approximately account for 14% and 15% of total RDA of reference man and

women respectively [16]. As Millets are rich in amino acids like methionine and cysteine which are usually a deficit in pulses, a judicious combination of millets like little millet and pulses would provide proteins that are of high value both in terms of quality and quantity. Owing to these factors millet would help to combat protein deficiency disorders effectively and economically.

Table 1. Nutritional composition of little millet flour

Moisture	9.75 ± 0.07 %
Protein	8.42 ± 0.27 %
Fat	2.10 ± 0.99 %
Ash	1.75 ± 0.10 %
Crude fiber	3.20 ± 0.15 %
Dietary fiber	12.51± 0.31 %
Carbohydrates	74.75 ± 0.36 %
Energy	351.65 ± 1.1 K. Cal

Fat: Fat content of Little millet flour was 2.10 g/100 grams. The fat content of the millet flour was found to be little lower than earlier study [17] which could be probably due to varietal differences.

Ash: Ash content of little millet flour was 1.75 g/100 grams which were found to be similar to the ash content of wheat [15]. The ash content of little millet was found to be higher than the rice [18]. Diversifying the millet consumption can thus help in alleviating hidden hunger proficiently.

Carbohydrates: Carbohydrate content of little millet flour was 74.75 g/100 grams. The carbohydrate content of little millet flour was online with the carbohydrate content of Kodo millet, Little millet, Pearl millet and Proso millet flours [15].

Energy: 100 grams of Little millet flour was found to provide 351.65 K.Cal. 100 grams of Little millet would account for 15% of total energy RDA of sedentary men and moderately active women and would account for 12% of total energy RDA of moderately active men and heavy working women. For sedentary women, 100 grams of little millet would provide 18% of total energy RDA [16]. Therefore replacement of empty-calorie processed foods with millets helps to meet provide not only energy but also other nutrients.

Crude fibre: Crude fibre content of little millet flour was 3.20 ± 0.15. The crude fibre content of little millet was found to be similar to the crude fibre content of Ragi [19].

Dietary fibre: 100 grams of little millet flour was found to have 12.51 grams of dietary fibre, the dietary fibre content of Little millet flour was found to be similar to that of foxtail millet [20]. Dietary fibre has a large number of positive health implication like maintains GI tract function, lower blood sugars and cholesterol thus reducing the risk and complications of diabetes and cardiovascular diseases. Dietary fibre also helps improve immune functioning by increasing the proliferation of B- cells of the immune system. It was found that the glycemic index of little millet flakes was lower when compared to rice flakes [21], suggesting that Little millet can be meritoriously employed in the management of diabetes.

4. CONCLUSION

It can be concluded that the diversification of diet with little millet-based products would help to achieve food and nutritional security effectively and economically.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Rajalakshmi P, Devanathan R, Sahayam SC. Special Medicinal Implications of Navadhanyam. International Journal of Pharmaceutical and Clinical Research. 2014;6(1):54-62.
2. Changmei S, Dorothy J. Millet-the frugal grain. International Journal of Scientific Research and Reviews. 2014;3(4):75–90.
3. Singh AK. Ancient alien crop introductions integral to Indian agriculture: An Overview. Proceedings of the Indian National Science Academy. 2017;83(3): 549-568.
4. Rao BD, Bhaskarachary K, Christina, GDA, Devi GS, Tonapi VA. Nutritional and Health Benefits of Millets. ICAR Indian Institute of Millets Research (IIMR) Rajendranagar. 2017;112:1-150.
5. Bhat SC, Nandini V. Tippeswamy and Prabhakar. Significance of small millets in nutrition and health -A review. Asian Journal of Dairy and Food Research. 2018;37(1):35-40.

6. Michaelraj SJ, shanmugam. A study on millets based cultivation and consumption in India. International Journal of Marketing, Financial Services and Management Research. 2013;2(4):49-58.
7. Kamatar MY, Hemalatha S, Meghana DR, Talwar S, Naik RK. Evaluation of little millet land races for cooking and nutritional composition. Current Research in Biological and Pharmaceutical Sciences. 2013;2(1):1-10.
8. AOAC. Official Methods of Analysis for ash, moisture in flour. Association of Official Analytical Chemists.; 18th Edition. Arlington VA 2209, USA. AOAC 929.09 & 03, chap 32. 2005;1-2.
9. AOAC. Official Methods of Analysis for protein. Association of Official Analytical Chemists.; 18th Edition. Arlington VA 2209, USA. AOAC 984.13, chapter 04. 2005;31.
10. AOAC. Official Methods of Analysis for fat (crude) or ether extract in flour. Association of Official Analytical Chemists; 16th Edition. 3rd Revision. Gaithersburg, Maryland 20877-2417. AOAC 920.85, chap 32. 1997;05.
11. AOAC. Official Methods of Analysis for crude fiber. Association of Official Analytical Chemists. 15th Edition. Washington, D.C. USA; 1990.
12. AOAC. Official Methods for computation of carbohydrates and energy. Association of Official Analytical Chemists. 14th Edition. Washington, D.C. USA; 1980.
13. AOAC. Official Methods of Analysis for fiber. Association of Official Analytical Chemists.14th Edition. Washington, DC. USA.
14. Wakeel MAEl. Ultra structure and functional properties of some dry Mixes of food. Faculty of Agriculture. 1995; Ain Shams University, Cairo. 2007;56.
15. Thilagavathi T, Kanchana S, Banumathi P, Hemalatha G, Vanniarajan C and Sundar. Physico-chemical and functional characteristics of selected millets and pulses. Indian Journal of Science and Technology. 2015;8(7):147–155.
16. Krishnaswamy K. Dietary guidelines for Indians. National Institute of Nutrition. 2011;89.
17. Kamatar MY, Sreeramaiah H, Megha DR Talawar S and Naik, R.K. Evaluation of Little Millet (Panicum sumatrense) Land Races for Cooking and Nutritional Composition. Current Research in Biological and Pharmaceutical Sciences. 2013;2(1);7-11.
18. Singh N, Singh D. The Nutritional Composition of Local Rice Varieties in Guyana. Greener Journal of Agricultural Sciences. 2019;9(2):138-145.
19. Verma V, Patel S. Value added products from nutri-cereals: finger millet (Eleusine coracana). Emirates Journal of Food and Agriculture. 2013;25(3):169-176.
20. Doddamani S, Yenagi NB. Cooking and organoleptic quality of pre-treated foxtail Millet (Setaria italica) rice. Asian Journal of Dairy and Food Research. 2018;37(4): 326-330.
21. Patil KB, Bharati V, Chimmad and Itagi S. Glycemic index and quality evaluation of little millet (Panicum miliare) flakes with enhanced shelf life. Journal of Food Science and Technology. 2014;52(9): 6078–6082.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/52910