The Journal of Phytopharmacology 2015; 4(4): 217-220
Online at: www.phytopharmajournal.com

Research Article

ISSN 2230-480X
JPHYTO 2015; 4(4): 217-220
July- August

Debendra Nath Roy
Department of Pharmacy, Jessore University of Science and Technology, Jessore- 7408, Bangladesh

A. K. Azad
Department of Pharmacy, Bangladesh University, Mohammadpur, Dhaka-1207, Bangladesh

Farzana Sultana
Department of Pharmacy, Jessore University of Science and Technology, Jessore- 7408, Bangladesh

A.S.M.Anisuzzaman
Department of Pharmacy, University of Rajshahi, Rajshahi-6205, Bangladesh

Proma Khondkar
Department of Pharmacy, University of Rajshahi, Rajshahi-6205, Bangladesh

Correspondence:
Debendra Nath Roy
Department of Pharmacy, Jessore University of Science and Technology, Jessore- 7408, Bangladesh

Nutritional profile and mineral composition of two edible mushroom varieties consumed and cultivated in Bangladesh

Debendra Nath Roy*, A. K. Azad, Farzana Sultana, A.S.M. Anisuzzaman, Proma Khondkar

ABSTRACT

In this study we have evaluated the nutritional analysisand mineral content of two varieties of mushroom species include oyster (*Pleurotus ostreatus*) and Reshii (*Ganoderma lucidum*). The mushroom varieties were harvested and dried, then taken to the laboratory for proximate and mineral analysis by standard assay methods. For both mushrooms the nutritional composition was analyzed namely pH, moisture content, crude fibre, ash, water soluble protein, total lipid, total soluble sugar, reducing sugar, non-reducing sugar and starch content. However ten mineral elements were analyzed: potassium, calcium, magnesium, sodium, phosphorus, sulfur, cupper, iron, manganese and zinc having no significance difference in values of both mushroom species. Based on the result these mushrooms have high nutrient potentials hence it will serve as a good means of reducing the incidence and high prevalence of malnutrition in Bangladesh since it is a cheap food source that is within the reach of the poor.

Keywords: Mushroom, Nutritional composition, Mineral, Sugar, Crude fibres.

INTRODUCTION

Mushrooms are macro fungi with distinctive fruiting bodies, which can be hypogenous or epigeous, large enough to be seen with the naked eye and to be picked by hand [1]. Wild edible mushrooms are traditionally used by many African countries as food and medicines; they are appreciated not only for texture and flavour but also for their chemical and nutritional characteristics [2-3]. Mushrooms are valuable healthy foods, low in calories, fats, and essential fatty acids, and high in vegetable proteins as well as vitamins and minerals [4-5].

The focus on the nutritional value of brightly colored fruits and vegetable has unintentionally left mushrooms in the dark. However mushrooms provide many of the nutritional attribute commonly found in meat, beans, grains or other produce.

P. oysteratus is rich source of proteins, minerals (Ca, P, Fe, K and Na) and vitamin C, Bcomplex (thiamine, riboflavin, folic acid and niacin) [6]. Likewise *G. lucidum* contains mainly protein, fat, carbohydrate and fiber. Artificially cultivated variety has similar contents of nutritional components compared with wild types and the extraction significantly increases the amounts of crude protein and carbohydrates and deleted crude fiber [7]. Fresh mushrooms are known to contain both soluble and insoluble fibres; the soluble fibre is mainly beta-glucans polysaccharides and chitosans which are components of the cell walls [8]. There is need to assess the nutrient potentials of mushrooms as they can help in the fight against micro-nutrient malnutrition. Therefore, analysis of the nutrient values and mineral analysis of these two mushroom varieties is the focus of this study.

The use of mushrooms may contribute significantly in overcoming protein deficiency in the developing countries where good quality proteins from animal sources are either unavailable or unacceptable for religious beliefs [9-10]. Therefore this study will help to bring home the importance and benefits of mushroom consumption in Bangladesh.

MATERIALS AND METHODS

Sample collection and processing

The Oyster (*Pleurotus ostreatus*) and Reishi (*Ganoderma lucidum*) mushroom were selected for this investigation. These were collected and identified from mushroom development and extension centre, Savar, Dhaka-1213 in Bangladesh.

Drying and pulverization

About 1 kg of Oyster mushroom and 1 kg of Reishi the mushrooms were cut into small pieces with the help of a knife. These small pieces were sun dried for 7-10 days and finally kept in an electric oven for 72 hours at 40° C. After complete drying, the dried pieces were then pulverized into a coarse powder with the help of a grinding machine (FFC-15, China) and were stored in an airtight container for further use.

Nutritional analysis

Fresh Oyster mushroom (*Pleurotusostreatus)* and Reishi mushroom (*Ganodermalucidum)* were brought to the protein laboratory at Pharmacy Department in University of Rajshahi for the analysis of nutritional profile.

Chemical Analysis of nutritional parameters

Chemical studies of both mushrooms were done for moisture content (%) and for crude fiber (%) by gravimetric method [11].Ash content was determined following the method of A.O.A.C [12].

Chemical studies were also done to determine the values of water-soluble proteins [13], lipid content [14], total soluble sugar [12], reducing sugar and non-reducing sugar [15]. The value of starch content was also determined following laboratory manual in Pharmacy [16].

Mineral Analysis

Determination of mineral content

The dry ash was qualitatively washed through Whatman No1 (70mm diameter) filter paper into a 25ml class A volumetric flask with sub-boiling 5% HNO_3 and made up to volume before storing in a polyethylene bottle. The determination of endogenous minerals was done in Soil Resource Development Institute, Regional Research centre at Rajshahi in Bangladesh by A.O.A.C method [12].

Mineral Tested	Method
Potassium (k)	Ammonium acetate method
Calcium (Ca)	Ammonium acetate method
Magnesium (Mg)	Ammonium acetate method
Sodium (Na)	Ammonium acetate method
Phosphorus (P)	Modified Olsen method
Sulfur (S)	Calcium bi phosphate extraction
Copper (Cu)	DTPA extraction method
Zinc (Zn)	DTPA extraction method
Iron (Fe)	DTPA extraction method
Manganese (Mn)	DTPA extraction method

Statistical Analysis

The data was analyzed to determine the means and standard deviation (SD).

RESULTS AND DISCUSSION

Analysis of nutritional values

pH, moisture content, ash content and crude fibers content of oyster mushroom (*Pleirotus ostreatus*) and Reishi Mushroom (*Ganoderma lucidum*) are described by the following Table and Figure 1.

Moisture is necessary for most of the physiological reaction in plant tissue and if it is lack, life does not exist. It is known that the moisture content of mushrooms depends on their harvesting time, maturation period and environmental conditions such as humidity and temperature in growing period, and storage conditions [5]. The moisture content was found to be varied significantly in two mushrooms (84% and 47%) respectively. The results reveal that the moisture content of oyster mushroom is high with compare to Reishi. The main components are cellulose and lignin and it has pronounced effect on digestion and absorption of nutrients. As shown in the Table 1 and Figure 1, the highest amount of crude fibers was present at the Reishi i.e.3.5%.

Water soluble protein, total lipid, total soluble sugar, reducing sugar, non-reducing sugar and starch content of both oyster mushroom and Reishi mushroom are described by the following Table 2 and Figure 2.

Cultivated mushrooms have higher protein contents and minerals, low in fat and rich in vitamins B, vitamin D, vitamin K and sometimes vitamins A and C [17]. From the Table 2 and Figure 2 it is clear that Reishi contain more protein than oyster significantly.

The present data of those mushrooms clearly indicate that oyster contained very little amount of lipid. So it cannot be considered as a source of lipid also. The total lipid content was highest in Reishi 3 (gm %) while oyster contains 1.05 (gm %). The amount of total sugar present in the oyster mushroom is 4.33 (gm %) and Reishi mushroom is 5.41 (gm %) i. e highest amount of total sugar was found in Reishi mushroom. Mature oyster mushroom contained 3.22 (gm %) reducing sugar and 1.11 (gm %) non-reducing sugar where as Reishi mushroom contained 4.39 (gm %) reducing sugar and 1.02 (gm %) non-reducing sugar respectively. Starch content of oyster and Reishi mushroom are also shown in Table 2 and Figure 2. In case of both Reishi and oyster mushrooms there were no amount of the starch found, which indicate the presence of non-starch polysaccharides.

Mineral analysis

The amount of minerals present in the oyster and Reishi mushrooms is shown in the following Table 3 and Figure 3.

Values of ten important minerals were determined in the two mushroom varieties. The amounts are presented in Table and Figure 3.3.; all the mineral elements were found in appreciable amounts and not varied widely among these laboratory species.

Table 1: pH, moisture, crude fibers and ash content of Oyster mushroom and Reishi mushroom.

Parameter	Oyster (gm %)	Reishi (gm %)
pH	6.14	5.6
Moisture	84	47
Crude fiber	2.4	3.5
Ash	5.5	6.3

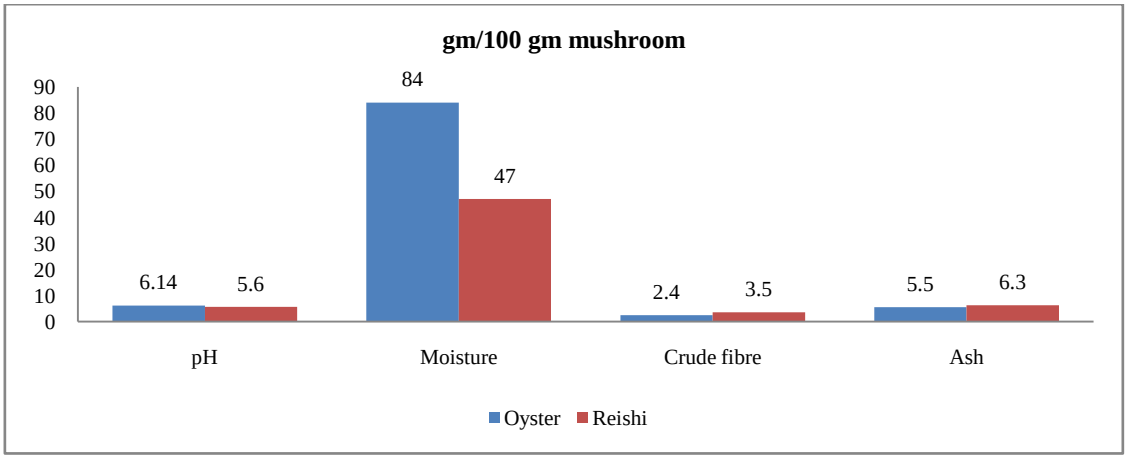

Figure 1: pH, moisture, crude fibers and ash content of Oyster mushroom and Reishi mushroom

Table 2: Water-soluble protein, lipid, total soluble sugar, reducing sugar, non-reducing sugar and starch present in the oyster and Reishi mushrooms

Parameter	Oyster (gm %)	Reishi (gm %)
Water-soluble protein	16.20	19.50
Total Lipid	1.05	3.00
Total soluble sugar	4.33	5.41
Reducing sugar	3.22	4.39
Non-reducing sugar	1.11	1.02
Starch content	0.000	0.000

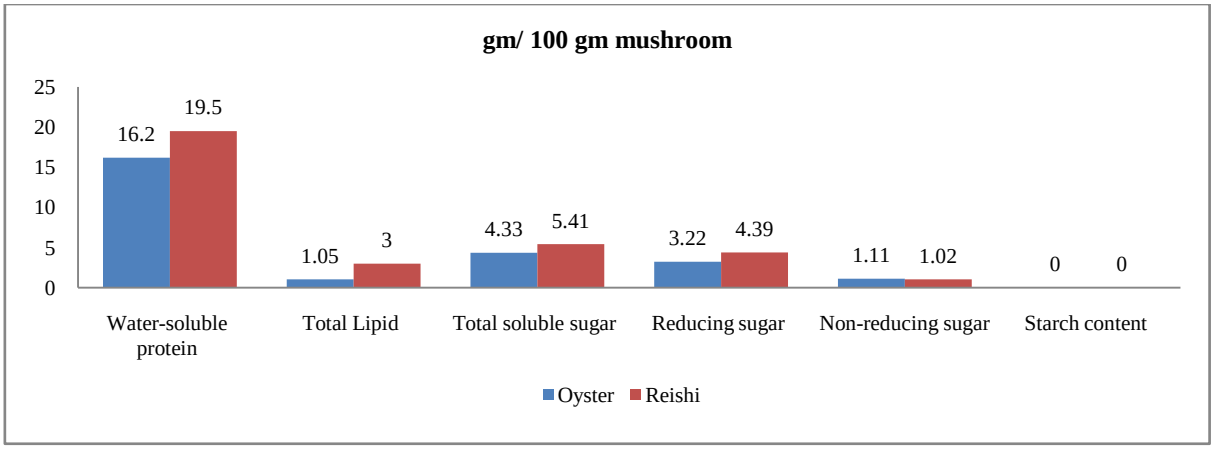

Figure 2: Water-soluble protein, lipid, total soluble sugar, reducing sugar, non-reducing sugar and starch present in the Oyster and Reishi mushrooms

Table 3: Mineral content of Oyster and Reishi mushrooms

Name of mineral	Amount (mg/100g) in Oyster	Amount (mg/100g) in Reishi
Potassium	425	432
Calcium	1.78	1.88
Magnesium	7.74	7.95
Sodium	2.9	2.82
Phosphorus	212	225
Sulfur	133	129
Cupper	28	26
Ferrous	2.19	2.22
Manganese	19	22
Zinc	0.5	0.7

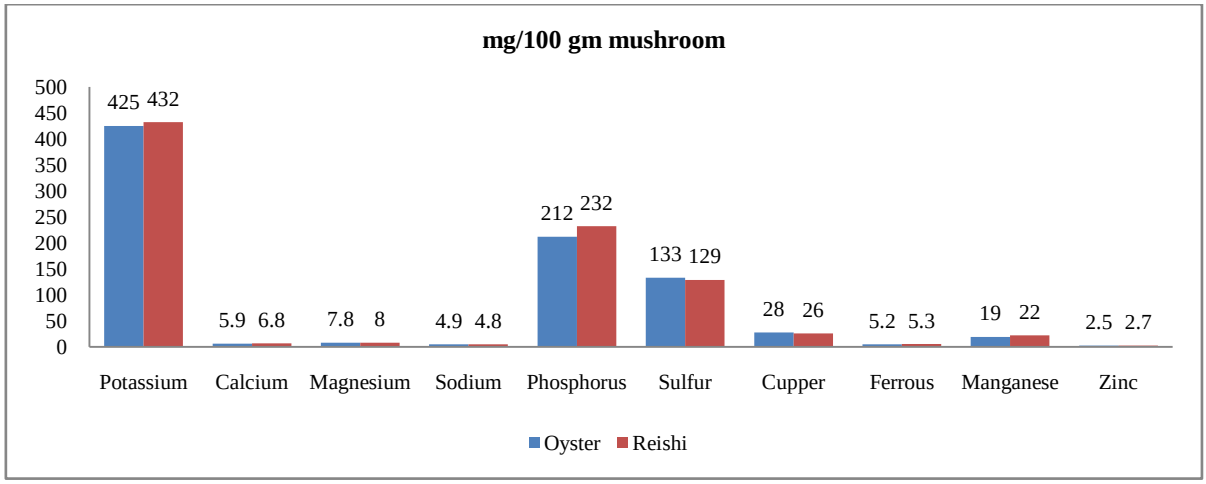

Figure 3: Mineral content of Oyster and Reishi mushrooms

CONCLUSION

The findings from this study revealed that oyster and Reishi mushrooms are highly nutritious foods. They are rich in macro nutrients and minerals. Their protein content is high, offering higher than the protein content of most vegetables. Mushrooms are foods that can be eaten by anybody, both the old and young. They are also good food for hypertensive patients as its high potassium content can help to control blood pressure. Therefore, mushroom consumption should be encouraged in the communities and also its cultivation should be encouraged so that there will be a year-round production and availability of both mushrooms.

Acknowledgement

The present work was supported by the National mushroom development and extension centre, Savar, Dhaka-1213, Bangladesh for giving the selected desired mushrooms in this research work. The authors would like to extend their gratitude to theSoil Resource Development Institute, Regional Research centre at Rajshahi in Bangladesh for their cordial support for mineral analysis and the authors would also like to extend their gratitude to the Department of pharmacy, University of Rajshahi Bangladesh for providing necessary facilities to complete this research work successfully.

REFERENCES

1. Chang S.T. and Buswell J.A. Mushroom Neutriceuticals.World Journal of Microbiology and Biotechnology. 1996;12:473- 76.
2. Ezeibekwe I.O., Ogbonnaya C.I.L., Unamba C.I.N., Osuala O.M. Report and Opinion, 2009;1(4):32-36.
3. Mattila P., Konko K., Eurola M., Pihlawa J.M., Astola J., Lietaniemi V., Kumpulainen J., Valtonen M. and Piironen V. Journal of Agriculture and Food Chemistry. 2001;49:2343-48.
4. Crisan E.V., Sands A. In The Biology and Cultivation of Edible Mushrooms", Chang ST, Hayes WA, Eds., Academic Press, New York, 1978, pp. 137-168.
5. Agrahar – Murugkar D., Subbulakshmi G. Food Chem. 2005;89:599-603.
6. Çağlarırmak, N. The nutrients of exotic mushrooms (*Lentinula edodes* and *Pleurotus* species) and an estimated approach to the volatile compounds.Food Chemistry 2007;105:1188-94.
7. Zhou, X., J. Lin, Y. Yin, J. Zhao, X. Sun and K. Tang. Ganodermataceae: natural products and their related pharmacological functions. Am. J. Chin. Med., 2007;35(4): 559-74.
8. Sadler M. Nutritional properties of edible fungi. Br. Nutr. Found. Nutr. Bull. 2003;28:305-308.
9. Bahl N. Handbook on mushrooms.2nd ed. Oxford 85 IB Publishing Co. PVT. New Dehli, 1985.
10. Singh N.B. and Singh P. Journal of Indian Botanical Society 2002;81:235-37.
11. James C.S. Analytical Chemistry of Foods 1 edn, Chapman and Hall New York, 1995.
12. A.O.A.C. Official methods of analysis, 13th Edn. Association of official analytical chemists, Washington, D.C, 1995.
13. Lowry, O.H., N.J. Rosenbrough, A.L Farr and RJ. Rendall. Protein measurement with the Folin Phenol reagent, Biol, Chem. 1951;183:265-75.
14. Bligh, E. G. and W.J. Dyer. Total lipid extraction and purification. Can. J. Bio. Chem. Physiol. 1995;37:911.
15. Miller GL. Use of dinitrosalicylic acid reagent for determination of reducing sugar. Analytical Chemistry. 1959;31(3):426–428.
16. Jayaraman, j. Laboratory Manual in Pharmacy (1st ed). Wiley Estern Ltd. New Delhi, India, 1981.
17. P. Manzi, A. Aguzzi, L. Pizzoferrato. Nutritional value of mushrooms widely consumed in Italy, Food Chemistry, 20001;73:321.

HOW TO CITE THIS ARTICLE
Roy D N, Azad A K, Sultana F, Anisuzzaman A S M, Khondkar P. Nutritional profile and mineral composition of two edible mushroom varieties consumed and cultivated in Bangladesh. The Journal of Phytopharmacology 2015;4(4):217-220.