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Comparative Study on Nutraceuticals of Five Strains of Milky Mushroom (*Calocybe indica*)

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A B S T R A C T

The global food and nutritional security of growing population is a great challenge. Mushrooms provide a rich addition to the diet in the form of protein (12-35%), carbohydrates (26-82%), valuable salts, minerals and phenols. They are also good source of vitamins especially those of B complex group but are relatively poor in fat soluble vitamins, A, D, E and K. Among B complex vitamins, mushrooms are especially rich in thiamine (B1), riboflavin (B2), niacin and biotin. The present investigation is biochemical analysis through the modified methods in milky mushroom strains. We find out the total phenol was maximum content in strain CI-4 (13.42 µg) followed by CI-15 (7.70µg), CI-13 (3.73µg), CI-18 (3.15µg) and CI-14(2.37µg). In protein content highest content in strain CI-4 (0.19 mg/g) while lowest in strain CI-14 (0.06 mg/g) respectively. The carbohydrates content was highest in strain CI-13 (1.27 mg/g) while minimum for strain CI-4 (0.86 mg/g) on fresh weight basis of milky mushroom.

Introduction

This looks for new crop as source of food and nutrition. In this context, mushrooms find a favour which can be grown even by landless people, that too on waste material and could be a source for proteineous food. Use of mushrooms as food and nutriceuticals have been known since time immemorial, as is evident from the description in old epics Vedas and Bible. Mushrooms provide a rich addition to the diet in the form of protein (12-35%), carbohydrates (26-82%), valuable salts, minerals and vitamins. As food, the nutritional value of mushrooms lies between meat and vegetables. Among sterols, ergosterol is abundant and cholesterol is absent. On dry weight basis mushrooms contains 19-35 per cent protein having 70-90 per cent digestibility. Mushrooms due to high quality and quantity of protein have been recognized by FAO as the food contributing to protein nutrition of the country depending largely on cereals. They are also good source of vitamins and minerals, especially those of B complex group but are relatively poor in fat

soluble vitamins, A, D, E and K. Among B complex vitamins, mushrooms are especially rich in thiamine (B1), riboflavin (B2), niacin and biotin (Chang and Miles, 1989). Folic acid and vitamin B12 which are generally absent in plant food present in mushrooms. Mushrooms are also contains vitamin C and minerals like potassium, phosphorus, magnesium, sodium, calcium, zinc and iron in significant quantities.

The extractable products from medicinal mushrooms, designed to supplement the human diet not as regular food, but as the enhancement of health and fitness, can be classified into the category of dietary supplements/mushroom nutriceuticals (Chang and Buswell, 1996). There is an old Chinese saying which states that "Medicines and Foods have a common origin".

Materials and Methods

The biochemical analysis of five different strains of *Calocybe indica* (milky mushroom) were conduct by following methods-

Phenol estimation: To estimate total phenol content the standard folin-reagent method given by Sharma *et al.,* (2002) was used. For this 1.0 g fresh sample taken and crushed in 50% methanol then centrifuged at 10000 g for 3 minutes. After that 100 µl supernatant taken and added to 900 µl of distilled water and re-centrifuged (add charcoal if the supernatant is not clear). 500 µl Folin-reagent was added (1:1 Folin reagent: Distilled Water) with 1.0 ml 20% Na_2CO_3 and mixed thoroughly and 10 ml distilled water was added and incubated for 20 minutes at room temperature, colour will changed to blue then absorbance (OD) taken at 725 nm. Standard curve of cinnamic acid was prepared and the value was expressed in terms of µg of total phenol equivalent to µg of cinnamic acid.

Protein estimation: Protein content was determined by Lowry's method for that we take 500 mg of fresh mushroom sample and crushed in 12 ml buffer than centrifuged at 10000 g for 3 minutes. After that 0.1 ml supernatant was taken and make up volume up to 1 ml than add 5 ml of reagent C and incubate for 10 minutes. After that 0.5 ml of reagent D was added, mixed and incubate at room temperature in dark for 30 minutes, blue color was developed. Now absorbance was taken at 660 nm. Draw a standard graph using serum albumin protein expressed the amount of protein in mg/ g or 100 g of sample.

Carbohydrate estimation: Total carbohydrate was estimated by using Anthrone method for that 100 mg of fresh mushroom sample was taken in boiling tubes and hydrolyzed with 5 ml of 2.5N HCl in boiling water bath for 3 hours. After that it was left to cool and neutralized with sodium carbonate until the effervescence ceases. Make up volume up to 100 ml with distilled water and centrifuged at 10000 g for 3 minutes. After that 1 ml of supernatant was taken and 4 ml of anthrone reagent was added and heated for 8 minutes in boiling water bath and cooled it rapidly. The absorbance of green to dark green color at 630 nm was taken. Standard glucose solution was used for draw curve amount of carbohydrate represented in mg/g of sample.

Results and Discussion

Nutraceuticals analysis means study of biochemical properties and estimation of nutritive value. The data of comparative biochemical analysis of five strains (CI-4, CI-13, CI-14, CI-15 and CI-18) of milky mushroom (*Calocybe indica*) for their three important biochemical properties are given in table 1. The present investigation for the phenols, the results showed that highest phenol content was present in strain CI-4 and

that was 13.42 µg/g of fresh mushroom sample. The strain CI-15 was found second highest in phenol content with 7.70µg/ g sample followed by CI-13 (3.73µg/ g), CI-18 (3.15 µg/ g) and CI- 14 (2.25µg/ g) respectively. The present investigation for proteins the result showed that higher amount of protein was found in strain CI-4 that was 0.19 mg/ g of fresh mushroom sample. Strain CI-18 was found second highest in total protein content with 0.14 mg/ g of fresh mushroom sample. Other strains CI-15, CI-13 and CI-14 were estimated for protein content and those were found to be 0.12 mg/ g, 0.09 mg/ g and 0.06 mg/ g respectively.

Table.1 Nutriceuticals of five strains of milky mushroom (*Calocybe indica*)

Strains	Nutriceuticals Parameters		
	Total phenol(µg/g)	**Total protein(mg/g)**	**Total Carbohydrate(mg/g)**
CI-4	13.42	0.19	0.86
CI-13	3.73	0.09	1.27
CI-14	2.37	0.06	0.91
CI-15	7.70	0.12	1.21
CI-18	3.15	0.14	1.25
SEM	2.25	0.01	0.49
CD (@ 5%)	4.72	0.37	2.21
CV	20.29	6.45	24.62

For the quantity of carbohydrate, the result revealed that the highest total carbohydrate content was observed in strain CI-13 with 1.27 mg/ g of fresh mushroom sample followed by strain CI-18 (1.25 mg /g fresh sample). Lowest carbohydrate content (0.86 mg/ g) was estimated from strain CI-4. The results are significantly for the phenols and proteins, the strain CI-4 is much better than other strains while for the carbohydrate significantly strain CI-13 is better than other strains of *Calocybe indica*.

Three important biochemical properties of milky mushroom strains were evaluated viz. estimation of total phenol, estimation of total protein and estimation of total carbohydrate. Maximum content of total phenol was obtained from strain CI-4 (13.42 µg) but CI-14 had minimum (2.37µg). Highest protein content was present in strain CI-4 (0.19 mg/g) while minimum in strain CI-14 (0.06 mg/g) but the total carbohydrate content was maximum in strain CI-13 (1.27 mg/g) and minimum for strain CI-4 (0.86 mg/g fresh weight of milky mushroom).

In conclusion, the present piece of work concluded that the milky mushroom strain CI-4 showed highest protein and phenol content so it was best nutritious among above five strains and it might be recommended for mushroom growers. It will help for selection of the best nutritious strain to supply good quality and quantity protein for mushroom consumers which help to overcome problem of malnutrition.

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