RESEARCH ARTICLE — FOOD SCIENCE RESEARCH JOURNAL — Volume 3 | Issue 1 | April, 2012| 5-8

Nutritional evaluation of sweet and salty biscuits prepared by dried oyster mushroom powder

ANU KUNDAL

The study was conducted on sweet and salty biscuit prepared by oyster mushroom powder obtained from different drying method. The most acceptable sweet and salty biscuits prepared by using mushroom powder prepared from mushroom grown on wheat straw analyzed for different nutritional parameters. The moisture, crude protein, ash, crude fibre,crude fat, and energy content of moisture content of control sweet and salty biscuits ranged from 2.53 to 2.61 per cent, 5.99 to 7.10 per cent, 0.68 to 1.01 per cent, 0.78 to 1.38 per cent, 31.62 to 31.76 per cent, 528.28 to 542.57 (kcal/day), respectively. Total sugar, reducing sugar, and non reducing sugar of control and supplemented sweet and salty biscuits were found in the range of 27.12 to 27.38 per cent, 0.31 to 0.34 per cent, 26.78 to 27.10 per cent. ADF, NDF and pectin content were found in the range of 18.78 to 21.16, 46.26 to 51.01 and 2.98 to 3.12 per cent, respectively. B–carotene content of mushroom powder supplemented sweet and salty biscuits were in the range of 1.98 to 4.12 mg/100g. Calcium, iron and zinc content of control and supplemented sweet and salty biscuits ranged from 54.96 to 58.25 , 6.15 to 8.30 , 2.84 to 3.98 mg/100 g, respectively. *In vitro,* availability of calcium ,Iron and zinc were varied from 51.25 to 54.98 , 51.03 to 52.63, 53.81 to 56.21 per cent, respectively. Polyphenols and Phytic acid of control and mushroom powder supplemented sweet and salty biscuits varied from 290.00 to 293.06, 294.01 to 294.53 mg/100g , respectively.

How to cite this article **:** Kundal, Anu (2012). Nutritional evaluation of sweet and salty biscuits prepared by dried oyster mushroom powder *Food Sci. Res. J.,* **3**(1): 5-8.

Key Words **:** Sweet and salty biscuits, Oyster mushroom powder, ADF, NDF, Crude protein, Polyphenol, Phytic acid, Calcium

INTRODUCTION

Mushroom is one of the most important sources of vegetable protein combating the growing shortage of protein in India especially in vegetarian population, FAO has recommended it as a supplementary food item in context of world protein shortage for the growing populations of the developing countries. It is a low calorie food which contains high content of mineral, protein (rich in all essential amino acids) and vitamins, due to low cholesterol, high fibre content, low fat and carbohydrates (Bano *et al.,* 1992). These are highly suitable for the people suffering from atherosclerosis, hyperacidity, cancer, constipation and diabetes. Mushroom also known as 'wonder vegetables' have a unique growth pattern and are as such a synonym for quick growth and multiplication.

ADDRESS FOR CORRESPONDENCE

ANU KUNDAL, Department of Food and Nutrition, I.C. College of Home Science, C.C.S. Haryana Agricultural University, HISAR (HARYANA) INDIA

Oyster mushroom is the third largest cultivated mushroom in the world and contributes approximately 16 per cent to the total world mushroom production (Upadhayay and Verma, 2000). They are highly perishable because of high moisture content (85-95%) delicate in nature and cannot be stored for more than 24-28 hr. at ambient temperature. In the peak period of harvesting due to gluts in the market, their preservation into more stable product is essential. This technology of the dehydration will not only be a good source of income generation but will also strengthen food and nutritional security. Such dried mushroom powders are good source of energy, good quality protein, minerals and vitamins which can be incorporated in various day to day food items meant for vulnerable groups like pregnant and lactating women and growing children especially in rural areas where people do not consume fresh mushroom.

METHODOLOGY

On the basis of acceptability and physico-chemical

properties, blanched and oven dried mushroom powder prepared from mushroom grown in wheat straw were incorporated in sweet and salty biscuits at 0, 5, 10 and 15 per cent levels.

Table A. Sweet and salty biscuit

Ingredients	Control	Sample-I	Sample-II	Sample-III
Refined wheat flour	100 g	95 g	90 g	85 g
Sugar	25 g	25 g	25 g	25 g
Salt	3.5 g	3.5 g	3.5 g	3.5 g
Mushroom powder	-	5 g	10 g	15 g
Cumin seeds	1.5 g	1.5 g	1.5 g	1.5 g
Ammonia powder	5 g	5 g	5 g	5 g
Sodium bicarbonate	a pinch	a pinch	a pinch	a pinch
Ajwain	5 g	5 g	5 g	5 g
Milk	40 ml	40 ml	40 ml	40 ml

Method :

Cream ghee, sugar and milk.
Added cumin seeds, salt to creamed sugar.
Added ammonia powder and sodium bicarbonate to the creamed mixture.
Folded maida in above mixture.
Rolled on the board and were cut into small pieces.
Baked at 160^0C till brown

OBSERVATIONS AND ASSESSMENT

Moisture contents of control sweet and salty biscuits were 2.53, per cent. Moisture content of sweet and salty biscuits made by supplementation at 5 and 10 per cent level of mushroom powder varied from 2.57 to 2.61 per cent, respectively. However, non-significant differences were observed in moisture content of control and supplemented sweet and salty biscuits. Crude fat content ranged from 31.62 to 31.76 per cent in control and supplemented sweet and salty biscuits. Control biscuits exhibited significantly higher value of crude fat content as compared to crude fat content of 10 per cent of level of mushroom powder. It might be due to low fat content present in mushroom powder as compared to wheat flour. Ash and crude fiber content of control and supplemented sweet and salty biscuits ranged from 0.68 to 1.01 , 0.78 to 1.38 per cent, respectively (Table 1). Higher ash and crude fiber contents were observed in supplemented biscuits as compared to control biscuits. Crude protein contents of control and supplemented biscuits ranged from 5.99 to 7.10 per cent. Significant higher protein content was observed in supplemented sweet and salty biscuits as compared to crude protein content of control sweet and salty biscuits. Similar trend was also observed in crude protein content of control and supplemented sweet and salty biscuits. The protein content in supplemented biscuits was significantly increased as the level of supplementation increased. Other workers also reported similar increase in protein contents of biscuits on supplementation of soybean and fenugreek (Dhingra, 2001; Hooda, 2002).

Sugars and dietary fibre:

Control and supplemented sweet and salty biscuits were evaluated for total, reducing and non-reducing sugars on dry weight basis.

Total, reducing and non-reducing sugars of control

Table 1. Proximate composition of mushroom powder supplemented sweet and salty biscuits

Supplementation level Sweet and salty biscuit	Moisture (%)	Crude protein (%)	Ash (%)	Crude fiber (%)	Crude fat (%)	Energy (Kcal/100g)
Control (W)	2.53±0.13	5.99±0.03	0.68±0.04	0.78±0.02	31.76±0.05	542.57±0.73
RWF: M (95:5)	2.57±0.08	6.49±0.07	0.75±0.02	1.11±0.10	31.71±0.03	540.36±0.30
RWF:M (90:10)	2.61±0.10	7.10±0.05	1.01±0.05	1.38±0.10	31.62±0.02	528.28±0.06
C.D. (P=0.05)	0.20	0.21	0.06	0.30	0.08	1.25

Values are mean ±SE of three replicates
W= Wheat flour RWF = Refined wheat flour M= Mushroom powder

Table 2. Total sugars and dietary fiber contents of mushroom powder supplemented sweet and salty biscuit

Supplementation level (%)	Sugar			Dietary fiber		
	Total (%)	Reducing (%)	Non-reducing (%)	ADF (%)	NDF (%)	Pectin (%)
Sweet and salty biscuit						
Control (W)	27.12±0.15	0.34±0.02	26.78±0.11	18.78±0.15	46.26±0.10	2.98±0.04
RWF:M (95:5)	27.25±0.10	0.31±0.06	26.94±0.21	20.19±0.16	48.94±0.12	3.01±0.05
RWF:M (90:10)	27.38±0.12	0.34±0.05	27.10±0.10	21.16±0.15	51.01±0.20	3.12±0.08
C.D. (P=0.05)	0.28	0.06	0.25	0.15	0.52	0.24

Values are mean ±SE of three replicates
W= Wheat flour RWF = Refined wheat flour M= Mushroom powder

biscuits (sweet and salty biscuits) 27.12, 0.34 and 26.78 per cent, respectively (Table 2). Similarly, addition of mushroom powder at 5 and 10 per cent level in both type of biscuits resulted non-significant changes in total, reducing and non-reducing sugars.

The values of ADF, NDF and pectin content of sweet and salty biscuit ranged from 18.78 to 21.16 (ADF), 46.26 to 51.01 (NDF) and 2.98 to 3.12 (pectin) per cent. Significant increase in dietary fiber components was observed in supplemented sweet and salty biscuits.

β-carotene :

Control and supplemented sweet and salty biscuits were in the range of 1.98 to 4.12 mg/100g (Table 3). Significant decrease was observed with the addition of supplementation in vitamin content of sweet and salty biscuits. Ascorbic acid could not be detected in the baked products because they might have lost during baking because of high temperature.

Table 3 . β-carotene and ascorbic acid content of mushroom (*Pleurotus florida*) powder supplemented sweet and salty biscuit

Supplementation level (%)	β-carotene (mg/100g)
Sweet and salty biscuit	
Control (W)	4.12±0.03
RWF:M (95:5)	3.43±0.05
RWF:M (90:10)	1.98±0.05
C.D. (P=0.05)	0.10

Values are mean ±SE of three replicates
W= Wheat flour RWF = Refined wheat flour M =Mushroom powder

Total and *in vitro* availability of minerals:

Control sweet and salty biscuits contained total calcium, iron and zinc 54.96, 6.15 and 2.84 mg/100g, respectively (Table 4). As the level of supplementation increased total calcium, iron and zinc content increased significantly with the increase of level of supplementation.

In sweet and salty biscuits *in vitro* availability of calcium, iron and zinc content were in the range of 51.25 to 54.98, 51.03 to 52 to 52.63 and 53.81 to 56.21 per cent. *In vitro* availability of calcium, iron and zinc of both type of control and supplemented biscuits was almost similar.

Antinutrients and *in vitro* protein digestibility :

The products developed with or without addition of mushroom powder were analyzed for antinutrient and *in vitro* protein digestibility.

Sweet and salty biscuits :

Polyphenols and phytic acid in control and supplemented biscuits sweet and salty biscuits were 290.00 to 293.06 and 294.01 to 294.53 mg/100g (in sweet and salty biscuits) (Table 5). Non-significant increase in antinutrients at 5 and 10 per cent

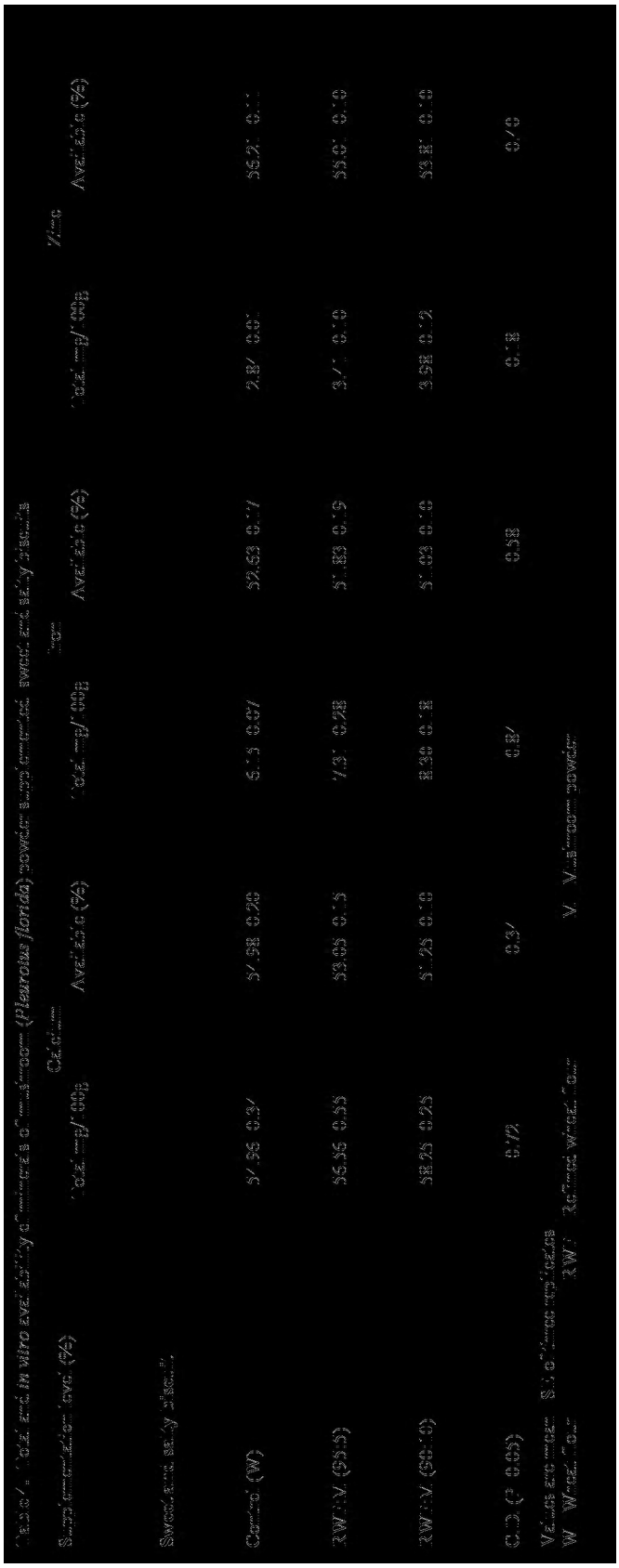

Table 5. Antinutrient and *in vitro* protein digestibility of mushroom powder supplemented sweet and salty biscuits

Supplementation level (%)	Polyphenols (mg/100g)	Phytic acid (mg/100g)	Protein digestibility (%)
Sweet and salty biscuit			
Control (W)	290.00±0.95	294.01±0.88	84.73±0.28
RWF:M (95:5)	292.10±0.58	294.24±0.53	82.05±0.15
RWF:M (90:10)	293.06±0.68	294.53±0.78	81.78±0.20
C.D. (P=0.05)	1.06	1.08	0.62

Values are mean ±SE of three replicates
W= Wheat flour RWF = Refined wheat flour M= Mushroom powder

level of supplementation in sweet and salty biscuits were observed. *In vitro* protein digestibility of control and supplemented at sweet and salty biscuits were found in the range of 81.78 to 84.73 per cent in sweet and salty biscuits.

LITERATURE CITED

Dhingra (2001). Physico-chemical functional and nutritional properties of cereal pulse blends in bread making quality. M.Sc. Thesis, C.C.S. Haryana Agricultural University, HISAR, HARYANA (India).

Hooda, S. (2002). Nutritional evaluation of fenugreek supplemented wheat products. M.Sc. Thesis, C.C.S. Haryana Agricultural University, HISAR, HARYANA (India).

Upadhyay, R.C. and Verma, R.N. (2000). Non conventional substrates for growing oyster mushroom. *Mushroom Res.,* **9**(1): 35-38.

Received : *29.09.2011;* **Revised:** *12.11.2011;* **Accepted :** *10.01.2012*