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Nutritional content of different pretreated mushroom (*Pleurotus florida*) powders

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■ **ABSTRACT :** Experiments were carried out to develop mushroom powder using oyster mushroom (*Pleurotus florida*) with three different treatments. Products were kept in pet jar during storage. Physico-chemical parameters like moisture, ash, fat, protein, crude fibre, sugar, carbohydrates, energy, fatty acids, minerals, vitamins etc. were evaluated. Investigation for organoleptic evaluation of the products was also performed during storage. On the basis of the experimental data it may be concluded that blanched mushroom powder samples contains minimum moisture, due to rapture of cells during blanching process. In most cases, values like ash, protein, fat, carbohydrates, sugar, energy and mostly vitamins; KMS treated samples were found superior over control and blanched samples. During organoleptic evaluation KMS treated mushroom powder sample got better score over other samples.

■ **KEY WORDS :** Mushroom powder, Nutritional content, KMS, Sensory evaluation

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Mushroom is a soft delicate white fruit-body of the fleshy fungi. The microscopic fine thread-like body called mycelium is the real fungus which grows on the substratum or under the surface of soil. When matured, the mycelia come together in a very compact form and sprout and spread as umbrella like structure (Chung *et al*., 1981). According to Chamberlain *et al*. (1998), mushroom is the fleshy, spore-bearing fruiting body of a fungus, typically produced above the ground on soil or on its food source, mostly in forests. It is perhaps the most well-known and documented edible forest product. As a group, mushrooms also contain some unsaturated fatty acids; provide several of the B vitamins, and vitamin D. Some even contain significant vitamin C, as well as the minerals potassium, phosphorus, calcium, and magnesium (Park, 2001). Mushroom generally consists of approximately 90 per cent water content. Due to the most perishable nature of mushrooms, processing is needed to extend the shelf-life for off-season commercial use (Devece *et al*., 1999). Thus, the application of drying technique is one method to widen the usage of PSC powder. Interestingly, they are rich in crude fibre and protein. They also contain low fat, low calories and essential vitamins and possess multi-functional medicinal properties (Manzi *et al*., 2001).

■ METHODOLOGY

The experiment was conducted at Food Analysis Laboratory of Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut.

Raw materials:

Fresh mushrooms (*Pleurotus florida*) were procured from the Mushroom Production Unit of SVP University of Agriculture and technology and used for the present investigation.

Sample preparation:

Powder samples were prepared by pre-treating the mushrooms (control, KMS and blanching) then drying them in hot air oven at 50°C followed by pulverizing them in to grinder then sieving. The obtained powders were packed in air tight PET jars and sealed until further use. All the samples were stored at room temperature.

Nutritional analyses:

Proximate composition analyses were conducted using methods given by AOAC (1990) for moisture, ash, protein, fat and carbohydrate.

Energy content:

Energy content (kcal) of the sample was obtained by calculation described by Pearson (1976).

Energy = 4x [Protein (%)+ Carbohydrate (%)]+[9x Fat (%)]

Mineral content:

Inductively coupled plasma-mass spectrometry (ICP-MS) was used for determination of total element concentration (mass fraction) in powder samples.

Vitamins:

Determination of various vitamins was done by methods given by AACC (1995).

Sensory evaluation:

Dehydrated product should have a typical taste, flavour and texture. To test these organoleptic characteristics, sensory evaluation was done on the basis of 9 points hedonic scale. The sensory evaluation was carried out for colour, aroma, texture, taste and overall acceptability.

RESULTS AND DISCUSSION

The proximate compositions of mushroom powder samples are presented in Table 1. Moisture (%) of samples ranged from 3.96 per cent to 4.00 per cent

Table 1: Proximate composition of mushroom powder samples (n=3)

Parameters	Treatments					
	Control		KMS		Blanched	
Moisture (%)	4.00	±0.16	4.00	±0.16	3.96	±0.16
Ash (%)	1.60	±0.06	1.61	±0.06	1.61	±0.06
Fat (%)	1.90	±0.08	1.90	±0.08	1.89	±0.08
Protein (%)	13.70	±0.55	13.71	±0.55	13.68	±0.55
Crude fibre (%)	12.00	±0.48	11.98	±0.48	11.98	±0.48
Sugar (%)	0.40	±0.02	0.39	±0.02	0.38	±0.02
Carbohydrates (%)	73.00	±2.92	73.67	±2.95	73.33	±2.93
Energy (kcal)	363.90	±14.56	366.62	±14.66	365.05	±14.60
SFA (%)	0.30	±0.02	0.29	±0.02	0.29	±0.01
PUFA (%)	0.80	±0.03	0.79	±0.03	0.78	±0.03
MUFA (%)	0.20	±0.01	0.21	±0.01	0.21	±0.01
Copper (mg/kg)	4.00	±0.16	4.10	±0.16	4.05	±0.16
Iron (mg/kg)	390.00	±15.60	391.00	±15.64	390.50	±15.62
Zinc (mg/kg)	29.00	±1.16	30.00	±1.20	29.50	±1.18
Calcium (mg/kg)	340.00	±13.60	341.00	±13.64	341.33	±13.65
Sodium (mg/kg)	50.00	±2.00	51.00	±2.04	51.33	±2.05
Magnesium (mg/kg)	38.00	±1.52	37.00	±1.48	37.67	±1.51
Vitamin A (IU/kg)	9.00	±3.60	9.10	±3.64	8.80	±3.52
Vitamin B1 (mg/kg)	4.00	±0.16	4.05	±0.16	3.97	±0.16
Vitamin B2 (mg/kg)	2.00	±0.08	2.00	±0.08	1.98	±0.08
Vitamin B3 (mg/kg)	65.00	±2.60	66.00	±2.64	64.00	±2.56
Vitamin B5 (mg/kg)	10.00	±0.40	10.33	±0.41	9.67	±0.39
Vitamin B6 (mg/kg)	3.00	±0.12	3.67	±0.15	2.67	±0.11
Vitamin B9 (µg/kg)	0.044	±0.002	0.046	±0.002	0.043	±0.002

depending upon the treatments, control and KMS treated samples showed similar moisture percentage. Ash (%) ranged from 1.60 per cent to 1.61 per cent; highest value was observed for KMS treated and blanched samples and the lowest for control samples. Fat (%) ranged from 1.89 per cent to 1.90 per cent; highest value was observed for control and KMS treated samples and the lowest for blanched samples; similar pattern was reported by Verma and Singh (2017). Protein (%) ranged from 13.68 per cent to 13.71 per cent; highest value was observed for KMS treated samples followed by control and blanched samples; Singh and Thakur (2016) also reported similar trends. Almost all the parameters were found better in case of KMS treated samples except saturated fatty acid (SFA) and poly unsaturated fatty acids (PUFA), where control samples shows higher values than rest other samples.

The sensory data for change in colour score of mushroom powders are presented in Fig. 1. The highest score for colour was awarded to sample treated with KMS (8.58, like extremely), followed by blanched sample (8.48, like very much) and minimum colour score was awarded to control sample (8.39, like very much). Continuous decrement was observed in the colour scores for all samples during storage and after 120 days of storage highest colour score was found for KMS treated samples (8.29, like very much) and lowest for control samples (8.09, like very much).

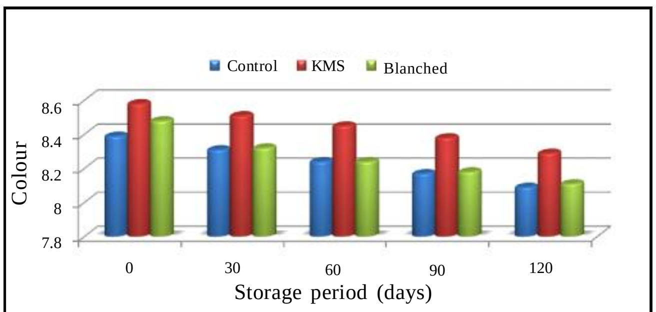

Fig. 1 : Changes in colour values of mushroom powders during storage

The sensory data for change in texture score of mushroom powders are presented in Fig.2. The highest score for texture was awarded to sample treated with KMS (8.12, like very much), followed by blanched sample (8.11, like very much) and minimum texture score was awarded to control sample (8.08, like very much). Continuous decrement was observed in scores for all samples during storage and after 120 days of storage highest texture score was found for control and blanched samples (7.81, like very much) and lowest for KMS treated samples (7.76, like very much).

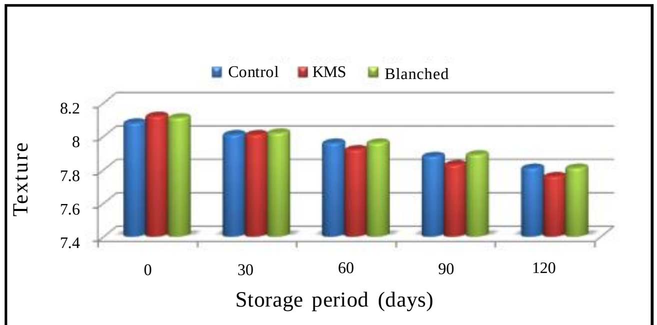

Fig. 2 : Changes in texture values of mushroom powders during storage

The sensory data for change in aroma score of mushroom powders are presented in Fig. 3. The highest score for aroma was awarded to sample treated with KMS (6.89, like moderately), followed by blanched sample (6.88, like moderately) and minimum texture score was awarded to control sample (6.72, like moderately). Continuous decrement was observed in scores for all samples during storage and after 120 days of storage highest aroma score was found for KMS treated samples followed by blanched and control samples.

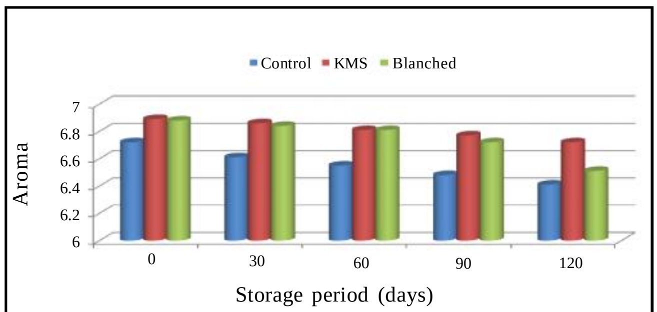

Fig. 3 : Changes in aroma values of mushroom powders during storage

The sensory data for change in taste score of mushroom powders are presented in Fig. 4. The highest score for taste was awarded to sample treated with KMS (6.88, like moderately), followed by blanched sample (6.79, like moderately) and minimum taste score was awarded to control sample (6.51, like moderately). Continuous decrement was observed in scores for all samples during storage and after 120 days of storage highest taste score was found for KMS treated samples followed by blanched samples and lowest for control samples.

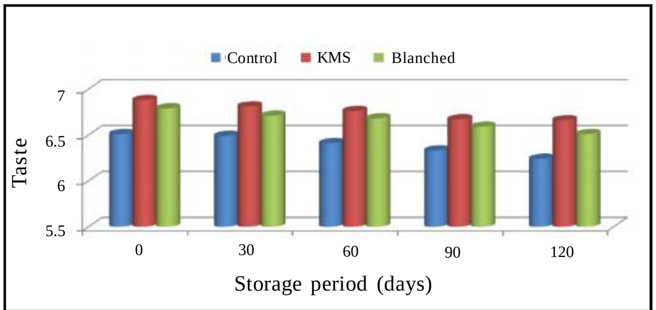

Fig. 4 : Changes in taste values of mushroom powders during storage

The sensory data for change in overall acceptability score of mushroom powders are presented in Fig. 5. The highest score for overall acceptability was awarded to sample treated with KMS (7.62, like very much), followed by blanched sample (7.57, like very much) and minimum overall acceptability score were awarded to control sample (7.43, like moderately). Continuous decrement was observed in scores for all samples during storage and after 120 days of storage highest overall acceptability score was found for KMS treated samples followed by blanched samples and lowest for control samples.

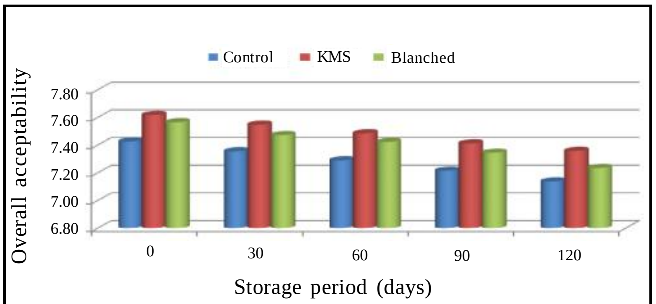

Fig. 5 : Changes in overall acceptabilitys values of mushroom powders during storage

Conclusion:

High quantity of nutritional contents was found in all mushroom powders; blanched mushroom powder samples contains minimum moisture, this may be due to rapture of cells during blanching process. In most cases, values like ash, protein, fat, carbohydrates, sugar, energy and mostly vitamins; KMS treated samples were found superior over control and blanched samples. There were no changes observed in mineral content of the samples during storage. In organoleptic evaluation KMS treated mushroom powder sample got better score over other samples.

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