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Studies on sensory quality of cookies enriched with mushroom powder

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ABSTRACT

The cookies were enriched with mushroom powder by replacing refined wheat flour (*maida*) at 0, 5, 10 and 15% and evaluated for sensory quality characteristics. It was observed that the cookies enriched with 10% of mushroom powder scored highest for all sensory quality attributes as compared to other enrichment levels. It can be concluded that the addition of mushroom powder in cookies up to 10% improved the sensory quality attributes.

Key words : Cookies, Mushroom powder, Sensory quality attributes

INTRODUCTION

Baking technique is probably the earliest and oldest of all other techniques and is still going steady over food processing field. Bakery products have played a key role in the development of mankind, being a principal source of convenience, variety and a healthy nutrition component to modern lifestyles. Biscuits, cookies and crackers represent the largest category of snack items among the baked foods in India.

Cookies, the high end version of biscuits have been a popular product the world over with its rich eating qualities and it has made its presence in the Indian market as an organized industry product. While the Indian biscuit market is dominated by low cost variants like glucose biscuits, substantial demand does exist for specialty biscuits like cookies. Cookies are generally circular in outline and flat in profile (flat cakes). Unlike the crackers and biscuits, cookies are very sweet and high in fat content and delicate among baked goods. Cookies have a much longer shelf-life than bread and cake or rather the rest of the processed foods.

Mushrooms are highly palatable and excellent source of several essential amino acids, water soluble vitamins and minerals (Manzi *et al.*, 2001) and contain considerable amount of dietary fibre and are low in calories (less than

30 cal per 100g) and have traces of sugar and no cholesterol (Oei, 1992).

Cookies, pasta, whole wheat bread among other bakery items can be easily enriched with other food sources (Giuntini *et al.*, 2003). Cookies being a delicacy, yet a greatly consumed snack food have been the lowest to be utilized for new product developments. Enrichment of foods with supplements like protein and vitamins is of current interest because of nutritional awareness of consumers. The incorporation of mushrooms into existing food items is as yet an untouched area of research. Therefore, the present study was undertaken to develop a novel variety of cookies enriched with addition of mushroom powder.

MATERIALS AND METHODS

The dried white button mushrooms (*Agaricus bisporus*) and good quality raw materials like refined soft wheat flour (*maida*), hydrogenated fat, sugar, fresh eggs, baking powder etc. were purchased from local market and cookies were prepared by taking suitable ingredients levels as detailed in Table 1.

The mixing of the ingredients was done in three steps for preparation of the dough in order to prepare typical, full calorie crispy cookies with enrichment of mushroom

powder in different proportions such as 100:0, 95:5, 90:10 and 85:15. The sugar (powdered), lecithin (soya) and baking soda were creamed together with shortening. The liquid ingredients, eggs, water and papain were incorporated and remaining dry ingredients such as flour, baking powder, salt and mushroom powder were mixed with these ingredients and blended in a mixer and kneaded by a hand dough mixer. The dough was maintained at an almost constant temperature (36-41°C) by controlling the temperature of water added to the dough. The dough pH was 6.0- 6.3 (Campbell *et al.*, 1994). The baking was carried out at 150°C temperature for the period of 20 min. in Bajaj make portable baking oven. The baked cookies were cooled at room temperature and packed in low density polyethylene bags (200 gauge).

Sensory evaluation:

The cookies were prepared by using four different compositions with varying proportions of mushroom powder. The cookies prepared were then analyzed for the various sensory quality attributes like color, flavour, appearance, taste, texture and overall acceptability by a semi-trained panel of 10 judges on a 9-point Hedonic scale (1- extremely dislike, 9- extremely like) in accordance with

methods suggested by Amerine *et al.* (1965). The scores obtained were then statistically analyzed as per the methods given by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The data on sensory scores as shown in Table 2 indicated that there were no considerable differences for colour, flavour, appearance and overall acceptability between the control cookies and those prepared with 5% and 10% replacement levels of mushroom powder, respectively. The cookies prepared with 15% replacement scored minimum lower in almost all the quality parameters with respect to the control and rest of the cookies. The formulations with 5% and 10% incorporation had higher acceptance values than the cookies prepared with 15% addition. The cookies with 5% addition had scored maximum values for appearance and overall acceptability than the control one. This showed that replacement of *maida* with mushroom powder at 10% did not affect the sensory parameters of the cookies. However, further replacement adversely affected the acceptability of the cookies. The similar findings with respect to the sensory scores are also reported by Larrea *et al.* (2005) on

Table 1: Composition of dough with varying proportions of ingredients for preparation of mushroom cookies

Ingredients	Proportions of mushroom powder			
	100:0	95:5	90:10	85:15
Wheat flour (g)	172	163.4	154.8	146.2
Sugar (g)	103.76	103.56	103.56	103.56
Shortening (g)	71.56	71.56	71.56	71.56
Mushroom powder (g)	-	8.6	17.2	25.8
Water (ml)	35.72	35.72	35.72	35.72
Eggs, whole (ml)	11.92	11.92	11.92	11.92
Common salt (g)	1.2	1.2	1.2	1.2
Vanilla flavour (ml)	1.2	1.2	1.2	1.2
Lecithin (soya) (g)	0.2	0.2	0.2	0.2
Baking soda (g)	0.7	0.7	0.7	0.7
Baking powder (g)	1.5	1.5	1.5	1.5
Papain (ppm)	-	2	2	2

Table 2 : Sensory evaluation of cookies enriched with different levels of mushroom powder*

Sensory quality parameters	Score for enrichment levels			
	100:0	95:5	90:10	85:15
Color	6.42 ± 1.13	6.42 ± 0.98	6.71 ± 1.11	5.71 ± 0.95
Flavour	6.57 ± 1.39	6.00 ± 1.82	6.57 ± 0.78	4.85 ± 1.67
Appearance	5.71 ± 1.34	5.85 ± 1.49	5.71 ± 1.25	5.14 ± 0.89
Texture	5.14 ± 1.34	6.00 ± 1.41	6.00 ± 1.41	4.28 ± 1.70
Taste	6.71 ± 1.11	6.57 ± 0.97	6.57 ± 0.78	4.42 ± 1.71
Overall acceptability	6.77 ± 1.21	6.85 ± 1.27	6.28 ± 1.11	4.71 ± 1.49

*The scores are expressed as Mean ± S.D of ten determinations

Table 3 : p-values for sensory characteristics of cookies prepared with different levels of mushroom powder*

Proportions of <i>maida</i> and mushroom powder	Sensory parameters					
	Colour	Flavour	Texture	Appearance	Taste	Overall acceptability
100:0	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
95:5	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
90:10	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
85:15	<0.0001	0.0003	0.0006	<0.0001	0.0005	0.0002

* All values have been analyzed by raw data analysis

incorporation of extruded orange pulp into cookies and Ezeagu *et al.* (2002) on incorporation of *mucuna* flour in biscuits. Gandhi *et al.* (2001) and Awasthi *et al.* (2000) also evaluated the effects of incorporation of defatted soy flour and liquid dairy by-products on the overall acceptability of soy-fortified biscuits, respectively.

The data obtained with respect to various sensory quality attributes were subjected to statistical analysis on a random basis in order to optimize the levels of replacement of *maida* with mushroom powder for preparation of cookies in terms of acceptability of the cookie samples produced, in terms of sensory parameters. The results obtained are presented in Table 3. The p-values (<0.01) indicated that the scores for all the sensory characteristics of the cookies were significant. The statistical analysis of the sensory evaluation also suggested that all the four products have considerable acceptability amongst the taste panel. The results were similar to those reported by Campbell *et al.* (1994) while studying the statistical analysis of oatmeal cookies substituted with calorie sparing ingredients.

Conclusion:

The mushrooms cookies prepared by replacing *maida* with 5% mushroom powder were found superior in all the sensory qualities followed by 10% replacement. However, further addition was noted certain disagreeable effects on the almost all quality parameters of the cookies, which could be reduced by addition of various modifiers and additives in order to get excellent quality cookies. Use of enzyme *papain* was found to bring about desirable changes in dough quality on addition of mushroom powder.

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