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Standardization and evaluation of mushroom noodles

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Abstract
Now-a-days snack foods are common all over the world. They are the preferred food of children, women, and people who are highly mobilised. The majority of the snacks are high in carbohydrates and low in protein. As a result, attempts were made to include the essential protein in snacks. The aim of this study was to see how different formulations of mushroom noodles could be produced by combining different percentages of oyster mushroom powder. The results found that 5% of mushroom powder incorporation had good acceptability in all sensory characteristics.

Keywords: Oyster mushroom powder, noodles, sensory evaluation

Introduction
In many Asian countries, noodles are one of the most popular foods. Instant noodles have become a globally recognised snack, and their popularity is on the rise. Many researchers are looking into the possibility of fortifying noodle as a public health intervention to improve nutritional characteristics. Taste, nutrition, ease, protection, longer shelf life, and an affordable price have all contributed to the noodle's popularity (Pakhare *et al*. 2018) [1]. Color, flavour, and texture, as well as cooking consistency, rehydration rates during final preparation, and the presence or absence of rancid taste after prolonged storage are all necessary quality factors for instant noodles (Gulia *et al*. 2014) [2].
For times, mushroom fruiting bodies have been used in cooking, food flavouring ingredients, and traditional Chinese medicine. Mushrooms contain high-quality digestible protein (10–40% dry mass), B vitamins, vitamin C, and essential minerals (Tepsongkroh *et al*. 2020 [3]; Bach *et al*. 2017) [4]. The majority of mushroom species are high in lysine, a protein that is lacking in wheat flour (Tepsongkroh *et al*. 2020) [3]. Edible mushrooms have a variety of health benefits, including antitumor activity due to their -D-glucan content (Bach *et al*. 2017[4]; Seghchi *et al*. 2001) [5]; anti-diabetic due to bioactive components that lower blood glucose; and anti-cardiovascular and anti-atherosclerotic effects due to a variety of antioxidant components (including phenolics and ergothioneine) (Radzki *et al*. 2019 [6]; Sabino Ferrari *et al*. 2021) [7]. Oyster mushrooms (*Pleurotus species*) are among the many edible mushrooms that have been commercialised and eaten. They not only have a great taste, but also has a lot of healthy nutrients like proteins, carbohydrates, vitamins, and minerals (Nordiana *et al*. 2019) [8]. As a result, combining mushroom powder and wheat flour in noodles formulations can help to improve nutritional benefits including taste, flavour, and product appeal.

Materials and Methods
Procurement of Raw Materials
Fresh oyster mushroom was procured from the mushroom centre (Department of Plant Pathology, PJTSAU), Rajendranagar. Commercially available wheat flour and rice flour (RNR 15048) were procured from local market of Hyderabad for product development.

Drying of oyster mushroom (Pleurotus Ostreatus)
The fresh mushrooms were cleaned and chopped into small pieces with knife and blanched in hot water at 100°C for three minutes. Then water was drained and mushrooms were spread in trays and dried in hot air oven for 48 hours up to 8-9% moisture level at 50±2°C. The dried mushrooms were ground into powder in a mixer, after they had cooled to room temperature. Then the powder was sieved with a 400-micron and packaged in polythene bags and stored at room temperature for further use in the preparation of noodles.

Noodle's preparation

Noodle dough was prepared by blending the ingredients (Rice flour (RNR 15048) 20g; Salt 2.6g; Wheat flour (80, 78, 75, 73, 72, 70g); Mushroom powder (0, 2, 5,7, 8, 10g) as wheat flour replacement as per trial was mixed gently by adding water to obtain a dough upto clean up stage. Dough was covered and kept for 20 min for uniform hydration and equilibrium. Dough (100 g) was sheeted manually 5 times to develop elasticity. Noodles were prepared using sheeting and noodle-making machine from imperia (India). Each noodle strand was 1.5 ×1.5 mm (thickness × width). The noodles were steamed for 5 minutes. The samples were kept in a tray drier for 8 hr at 50°C prior to packing in plastic bags.

Standardization of Noodles

Noodles were standardised by using different combinations of wheat flour, mushroom powder, and rice flour. While, the rice flour (RNR 15048) was kept constant. The details are presented in Table 1

Table 1: Formulations of oyster mushroom noodles

Formulations	Oyster mushroom powder (g)	Wheat flour (g)	Rice flour (g)
Control	0	80	20
F1	2	78	20
F2	5	75	20
F3	7	73	20
F4	8	72	20
F5	10	70	20

Sensory evaluation

Sensory evaluation of the prepared mushroom noodles was conducted by coding each formulation with three-digit numbers and providing water to rinse their mouths so that the taste of one product does not interfere with the taste of the others. Sensory evaluation was carried out at PG & RC, PJTSAU by 35 semi-trained and trained panellists. The mushroom noodles were scored using 9 point hedonic scale (Peryam, 1998) [9]. i.e.,1-9 (9 - I like extremely,8 - I like very much,7- I like moderately,6 - I like slightly, 5- I neither like nor dislike, 4- I dislike slightly, 3-I dislike moderately, 2- I dislike very much, 1- I dislike extremely).

Results and Discussion

Composition of oyster mushroom powder

The proximate of oyster mushroom powder was analysed using standard procedure and found that moisture 8.18g/100g, protein 52.22g/100g, fat 2.33g/100g, ash 8.07g/100g, crude fiber 14.52g/100g and carbohydrate 24.74g/100g.

Product Development: Noodles were standardised by using different formulation as depicted in Table 1

Sensory acceptance

The sensory scores of developed mushroom noodles with varying amounts of Mushroom powder, Rice flour (RNR 15048) and Wheat flour were shown in the Figure 1. The sensory scores of 5% oyster mushroom noodles with regard to colour, flavour, appearance, taste, texture and overall acceptability was 8.086, 7.857, 8.086, 7.914, 7.886 and 7.971 respectively, followed by 7% oyster mushroom powder as shown in Figure 1. The sensory scores of 7% oyster mushroom powder incorporated noodles with regard to colour, flavour, appearance, taste, texture and overall acceptability was 7.886, 7.771, 8.00, 7.771, 7.714 and 7.829. While, 10% oyster mushroom powder incorporated noodles showed lowest sensory scores in all sensory characteristics compare to other formations. Parvin *et al*., 2020 [10] observed that, noodles prepared with 5% mushroom powder was better than 0%, 8%, and 10% mushroom fortified noodles and also had a good taste without odd flavours. Wahyono *et al*., 2018 [11] also observed that oyster mushroom powder can be done at the level of 5% for noodles without compromising on colour, taste, aroma and texture.

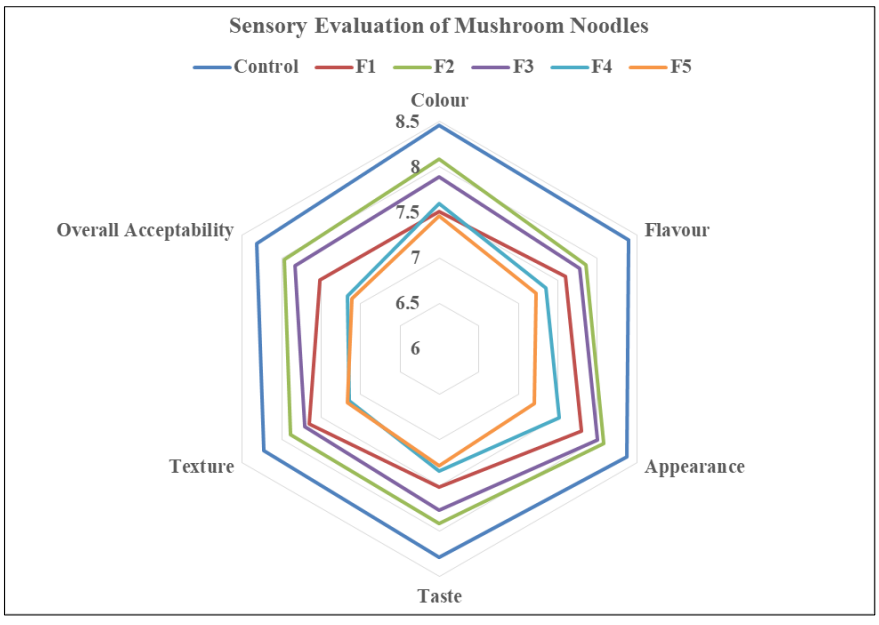

Fig 1: Sensory scores of mushroom noodles

Conclusion

When compared with commercially available noodles in the market, F2 formulation with 5% Oyster mushroom powder was accepted. Preference for all the parameters like (colour, flavour, taste, texture, appearance and overall acceptability) decreased with increasing mushroom powder concentration in the formulation.

The formulations developed showed that mushroom noodles with 5% oyster mushroom powder incorporation was found highly acceptable followed by one with 7%. The lowest acceptability was found 10% oyster mushroom powder incorporated noodles. The acceptability order for the developed noodles was in the order of 5% >7% > 2% > 8% and >10%. Protein enriched mushroom noodles can be a promising solution to PEM for the lower income groups.

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