

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Development and analysis of nutritive attributing patties prepared by inclusion of oyster mushroom (*Pleurotus ostreatus*)

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Abstract: The aim of this work was a trial to prepare oyster mushroom-based patties with different enrichments. Patties are prepared from rehydrated oyster mushroom, oats, corn starch and basic natural flavours and condiments Oyster mushroom was rehydrated and patties were prepared with different level of mushroom, (0, 25, 50 and 75%) The gross proximate analysis, of prepared oyster mushroom patties were determined using appropriate methods. Samples were sensory evaluated for attributes such as appearance, colour, aroma, flavour, texture, taste, and overall acceptability Results of sensory evaluation indicates that sample treatment 3 (T3) had a golden brown appearance and very much pleasant smell and very nice compact and fine (chewy) texture. According to the proximate analysis of Sample T3 test results contains 272.44 / cal around 6.1 gm of protein, 56.6 gm of carbohydrates, 4.41 gm of total fat, sodium content is 42.8 mg 34.28%, Ash 4.22% and 2.1 gm of dietary fibre in 100 gm of patties sample which prove It is generally satisfactory in terms of nutrition value and organoleptic criteria.

Key words- nutritive attributes, oyster mushroom, mushroom patties

I. INTRODUCTION

Presently, consumers are very concern about their diet and the food they eat. With the demand for nutritious and healthy food products, the researches have to focus their creation towards utilization of plant sources such as soybean, chick pea, and Mushroom in preparing meat like product with high nutritional value and quality and at in the same time with low price [1]. In order to address the above concerns, consumers are looking for products with reduced salt, fat and sugar contents as well As free and/or low in synthetic antioxidants. However, they are not willing to sacrifice the sensory quality of these foods [2].

Mushrooms are rich in bioactive nutrients and have a long history of medicinal use [3][4]. In addition to the physiological benefits of mushroom dietary fibres, the desirable function properties, such as providing texture, gelling, thickening, emulsification, and stabilisation in dietary fibres enriched foods, are also beneficial (Nelson [5][6]. Mushroom cultivation is currently taking place in many parts of the world. Commercial mushroom cultivation began in India. Mushrooms have the ability to transform nutritionally insignificant substances into high protein food. It was also emphasised (Bahl, 2000) that they are a more valuable source of protein in terms of area (Bahl, 2000) [7].

Several studies on the chemical composition and nutritional quality of edible mushrooms from various countries have been conducted [8][9] Mushrooms are consumed as meat substitutes and flavouring. Edible mushrooms are low in fat and calories, high in vitamins B and C, have more protein than any other plant-based food, and are a good source of mineral nutrients. [10]. Hamburger is a traditional American dish. Hamburger was further described as a century-old food and comfort food that people enjoy because of the variety provided by the use of various toppings and condiments [11].

In this context, the study aimed to trial to develop oyster mushroom-based patties with different enrichments (0, 25, 50 and 75%) Gross chemical composition, physical properties and organoleptic properties were analysed and determined by using, appropriate methods.

II. Materials and Methods

Materials

Oats, corn flour, onion powder, garlic powder, red chilli powder, Indian spice blend (garam masala), salt, and mustard oil were purchased from a local market in Vadodara, Gujarat, India.

Methods

1.1 Rehydration of mushrooms

After taking 25 gm of dried oyster mushroom, oyster Mushrooms were cleaned and blanched in a cauldron at 80-100 degrees Celsius for 3 to 5 minutes. Blanching slows or stops enzyme action, which can result in flavour, colour, and texture loss. After the balancing process, the rehydrated oyster mushroom was removed from the cauldron and the total net weight of the oyster mushroom was measured on a weighing scale. From 25gm of dried oyster mushroom, approximately 150 gm of rehydrated oyster mushroom was obtained.

1.2 Preparation of mushroom patties

Rehydrated oyster mushroom was chopped with knife into small pieces. Patties were prepared using the formula shown in **table 1**. Indian spice blend mixture (black pepper 10%, cardamom 10%, cassia 10%, cloves 10%, caraway 10%, mace 10%, Nutmeg 10%, cassia leaf 10%, dry ginger 10% and anisar 10%); rehydrated oyster mushroom, oats, cornstarch, onion powder, garlic powder, chilli powder, salt were minced in mixer grinder for 30 seconds. Four 100 gm patties with treatment (0.25, 50, and 75%) were shaped into the proper serving size.

1.3 Cooking of burger patty

The sample of patties was weighed and measured before frying; four patties (0%, 25%, 50%, and 75% compositions) of mushroom content were deep fried in mustard oil at 175°C for 3 minutes, or until golden brown.

Table 1 recipe of oyster mushroom patties

III. Analysis

2.1 Sensory Analysis

A sensory panel of 4 Judges was constituted and trained to assess the sensory attributes of the burger samples. The samples were assessed for texture/mouth feel, taste, odour, colour, and general acceptability on a nine point hedonic scale of likes and dislikes, with (9) very good, (8) good, (7) medium, (6) fair, (5) poor, (4) very poor and (3) extremely poor.

After the tasting, panellists were asked to complete the sensory sheet. Analyses were performed on the majority of approved samples. The most acceptable sample was further proceeds for proximate analysis.

2.2 Proximate analysis

The following analyses were carried out on the burgers produced from the mushroom combinations: Carbohydrates, total fat, ash, dietary fibres were determined according to the methods described by A.O.A.C and Total protein content in samples were determined by using Kjeldahl method as described by A.O.A.C [12]

The following analyses were carried out on the burgers produced from The mushroom combinations: proximate analysis, Mineral element analysis, and Sensory analysis

2.3 Proximate Analysis

2.3.1 Moisture Content Determination

Moisture content was determined according to AOAC (1995). Stainless steel oven dishes were cleaned and dried in the oven at 100°C for 1 hour to achieve a constant weight. They were cooled in desiccators. About 2g of sample was placed in each dish and dried in the oven at 100°C under normal atmospheric pressure until constant weight was achieved. The dishes together with the samples were cooled in desiccators, and weighed.

$$\% \text{ moisture content} = \frac{W_2 - W_3}{W_2 - W_1} \times 100$$

$$W_2 - W_1$$

Where:

W1 = weight of dish

W2 = weight of dish + sample before drying

W3 = weight of dish + sample after drying

2.3.2 Ash Determination

Ash determination was carried out according to AOAC (1995) method. About 2g of sample was placed in silica dish which has been ignited, cooled and weighed. The dish and sample were ignited first gently and then at 500 – 550°C in a muffle furnace for 3 hours, until a white or grey ash was obtained. The dish and content were cooled in desiccators and weighed.

$$\% \text{ Ash} = \frac{W_3 - W_1}{W_2 - W_1} \times 100$$

$$W_2 - W_1$$

Where: W1 = weight of dish

W2 = weight of dish + sample before ashing

W3 = weight of dish + sample after ashing

2.3.3 Crude Protein Determination

Crude protein was determined using the Kjeldahl method (AOAC, 1995). The sample was digested first, distilled and titrated. Two gram of sample was placed in the Kjeldahl flask. Anhydrous sodium sulphate (5g or 4 tablets of Kjeldahl catalyst) was added to the flask. About 25 ml of concentrated sulphuric acid was added with few boiling chips. The flask was heated in the fume chamber until the sample solution became clear. The sample solution was allowed to cool to room temperature, then transferred into a 250 ml volumetric flask and made up to volume with distilled water. About 5ml of 2% boric acid solution with few drops of methyl red indicator were introduced into a distillate collector (100ml conical flask). The conical flask was placed under the condenser. Then 5ml of the sample digest was pipette into the apparatus, and washed down with distilled water. 5ml of 60% sodium hydroxide solution was added to the digest. The sample was heated until 100ml of distillate was collected in the receiving flask. The content of the receiving flask was titrated with 0.049M sulphuric acid to a pink coloured end point. A blank with filter paper was subjected to the same procedure.

$$\% \text{ total N} = \frac{(\text{titre-Blank}) \times \text{Normality of acid} \times \text{N}_2}{\text{Weight of sample}}$$

$$\text{Crude protein} = \% \text{ total N} \times 6.25$$

2.3.4 Determination of Fat

The fat content was determined according to AOAC (1995) soxhlet extraction method. A 500 ml capacity round bottom flask was filled with 300 ml petroleum ether, and fixed to the soxhlet extractor. Then 2g of sample was placed in a labelled thimble. The extractor thimble was sealed with cotton wool. Heat was applied to reflux the apparatus for about six hours. The thimble was removed with care. The petroleum ether was recovered for reuse. When the Flask was free of ether it was removed and dried at 105°C for 1 hour in an oven. The flask was cooled in desiccators and weighed.

$$\% \text{ fat} = \frac{\text{Weight of fat}}{\text{Weight of sample}} \times 100$$

2.3.5 Determination of Carbohydrates

Carbohydrate was determined by difference, according to AOAC (1995) Method, as follows:

$$\% \text{ carbohydrate} = 100 - (\% \text{ moisture} + \% \text{ fat} + \% \text{ ash} + \% \text{ protein})$$

2.3.6 Calories equation

The Atwater general factor system

The system is based on the heats of combustion of protein, fat and carbohydrate, which are corrected for losses in digestion, absorption and urinary excretion of urea. It uses a single factor for each of the energy-yielding substrates (protein, fat, carbohydrate), regardless of the food in which it is found. The energy values are 17 kJ/g (4.0 kcal/g) for protein, 37 kJ/g (9.0 kcal/g) for fat and 17 kJ/g (4.0 kcal/g) for carbohydrates.[13] The Atwater general system also includes alcohol with a rounded value of 29 kJ/g (7.0 kcal/g) or an unrounded value of 6.9 kcal/g (Atwater and Benedict, 1902). As originally described by Atwater, carbohydrate is determined by difference, and thus includes fibre. The Atwater system has been widely used, in part because of its obvious simplicity.

2.3.7 Determination of Total Dietary Fiber

Total Dietary Fiber was determined by difference, according to AOAC 1996. Into separate 250 mL beakers. Add 25 mL H₂O to each beaker; sonicate or gently stir suspensions until test portions are thoroughly wet, Scrape down any particles on inside wall of beaker with rubber and rinse walls with 1–2 mL H₂O. Cover Beakers with Al foil and let stand 90 min without stir ring in 37°C incubator or water bath. Add 100 mL 95% ethanol to each beaker and let stand 1h at room temperature (25° ± 2°C). Collect residue under vacuum in pre weighed crucible containing filter aid. If and when filtration becomes very slow, use closed-end Luer needle, or any small pointed object, to gently scratch matted test portion without disturbing filter aid. Wash residue 2' with 20 mL 78% ethanol, 2' with 10 mL 95% ethanol, and 1' with 10 mL acetone. Perform final rinsing with acetone in fume hood, collecting acetone wash in separate filtering flask for proper disposal. Dry crucible containing residue 32h at 105°C. Cool crucibles 32 h in desiccators and weigh to nearest 0.1 mg. Ash residue from one duplicate 5 h at 525°C. Cool Crucible 32h in desiccators and weigh to nearest 0.1 mg. Analyze residue from remaining duplicate for crude protein by Kjeldahl nitrogen determination, 960.52, using %N ' 6.25.

Calculations

Calculate TDF (%) as follows:

$$\text{TDF, \%} = 100 \times \frac{W_r - [(P + A) / 100] \times W_r}{W_s}$$

Where W_r = mg residue, P = % protein in

Residue, A = % ash in residue, and W_s = mg test portion.

3.1 Mineral Element Analysis

Determination of Sodium

The Volhard technique is used to determine the sodium chloride content. In a 300 mL Erlenmeyer flask, weigh 2.5-3.0 g of finely comminuted and completely mixed material. As a recovery, run a reagent blank and a previously analysed sample with each pair of samples. Add 25.0 mL of 0.1000 0.0005 N AgNO₃ solution to flask, swirl until sample and solution are in close contact, and then add 15 mL of conc. HNO₃. To the reagent blank, add a little quantity of lactose. Adding modest amounts of KMnO₄ until the solution is black for several minutes before clearing. Boil for approximately 5 minutes, cool to room temperature in the fume hood, rinse the neck of the flask, and dilute to roughly 150 mL with water. Stir in about 5 mL of diethyl ether (optional) and about 2 mL of ferric alum indicator to coagulate the precipitated AgCl. Titrate the surplus AgNO₃ with KSCN solution until it reaches a stable, salmon-colored end point.

Procedure

$$\text{Percent NaCl} = \frac{25.0 \text{ mL} - (\text{mL KSCN}) (R)](N \text{ AgNO}_3)(5.85)}{\text{Sample Weight}}$$

Where R = ratio of $\frac{\text{mL AgNO}_3}{\text{mL KSCN}}$

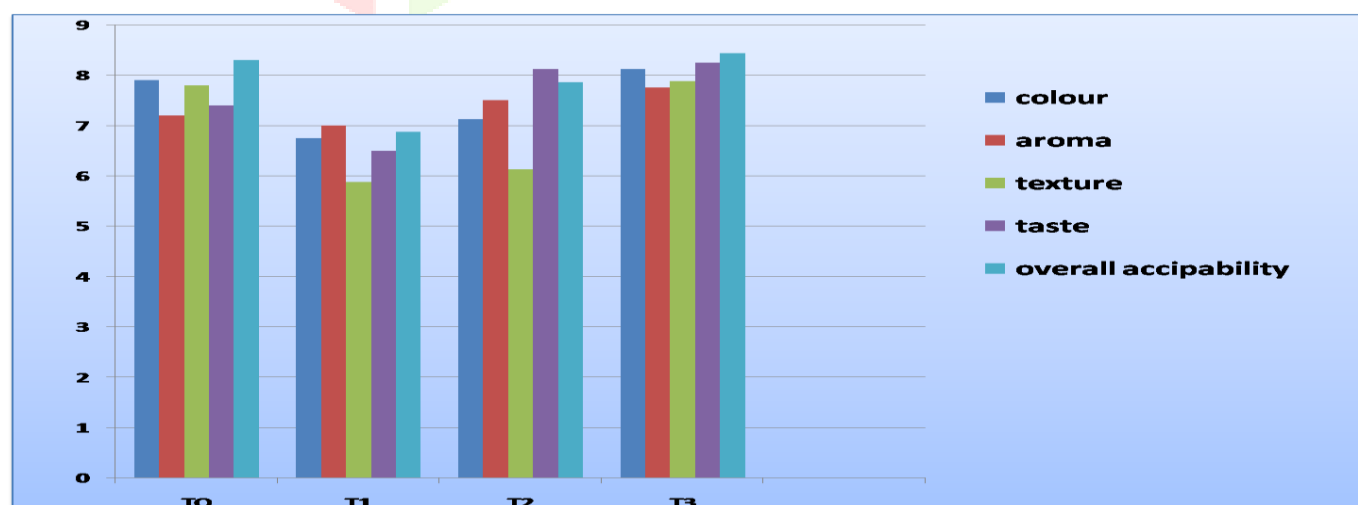
IV .Results and Discussion

Ingredients (%)	Treatment 0 (control)	Treatment 1	Treatment 2	Treatment 3
Oyster mushroom	0	25	50	75
Oats	36.5	24	30	10
Corn starch	36.5	24	10	5
Onion powder	6.25	6.25	2	2
Garlic powder	6.25	6.25	2	2
Indian spice blend	6.25	6.25	2	2
Salt	2	2	2	2
Mustard oil	1L	1L	1L	1L
Volume of patties	100 gm	100 gm	100gm	100gm

Table 1 Compositions of ingredients for of oyster mushroom patties

The variable enrichment of oyster mushroom utilised and blended with other raw materials is shown by the compositions. The control sample contains 0 gm of mushroom, while the other treatments have varying levels of mushroom and other ingredients. The basic flavours shown in a table indicate that treatment 1 has a similar ratio to treatment 0, while treatments 2 and 3 have the same contents of ingredients except for mushroom, oats, and corn starch.

Sensory evolution



Graph 1. organoleptic properties of oyster mushroom based burger patties inclusion with different level of mushroom contents

The Treatment 3 (T3) indicates that the 75g mushroom burger patty was generally approved in terms of appearance; colour, aroma, taste, texture, and general acceptability. 75g of oyster mushroom were comparable to control.

The data in graph 1 reflect the sensory progression of different burger patties inclusions of samples (T0, T1, T2, T3). The score sheets were collected during the sensory evaluation of the Oyster-Mushroom Burger Patties. The responses were totalled and summarised. The data was analysed in order to establish the level of acceptance of Oyster Mushroom Burger Patty in terms of sensory attributes. Treatment 3 indicates the overall acceptability in all the parameters of sensory evolution. T3 were almost comparable with T0 (control). This means that the burger patty with 75 g (T3) of oyster mushroom were comparable to control.

Proximate Analysis

Table 2

Sr.N	Test	Results
1	Calories	272.44 / cal
2	Protein	6.1 gm
3	Carbohydrates	56.6 gm
4	Total fat	4.41 gm
5	Sodium	42.8 mg
6	Moisture	34.28%
7	Ash	4.22%
8	Dietary fibre	2.1 gm

Table 2. According to the proximate analysis of Sample T3 test results contains 272.44 / cal around 6.1 gm of protein, 56.6 gm of carbohydrates, 4.41 gm of total fat, sodium content is 42.8 mg 34.28%, Ash 4.22% and 2.1 gm of dietary fibre in 100 gm of patties sample.

Besides, the increase in carbohydrates content could be an attribute to increase in fibre. The result due to rehydration method of oyster mushroom remains constant on protein, fat, ash and carbohydrate or nutritional contents. Results shows that oyster mushroom are suitable for preparation of patties because it indicates that about 75/100g of raw mushroom was use to develop a patties.

the terms texture, rheology, consistency, and viscosity are often used interchangeably, despite the fact that they describe properties that are somewhat different. In practice the term texture is used primarily with reference to solid or semi-solid foods; however, most fruits and vegetables are viscoelastic, implying that they exhibit combined properties of ideal liquids, which demonstrate only viscosity (flow), and ideal solids, which exhibit only elasticity (deformation).

V. Conclusion

The aim of this work to Development and analysis of nutritive attributing patties prepared by inclusion of oyster mushroom (*Pleurotus ostreatus*) patties were prepared with different level of mushroom, (0, 25, 50 and 75%) The gross proximate analysis, of prepared oyster mushroom patties were determined to the proximate analysis of Sample T3 test results contains 272.44 / cal around 6.1 gm of protein, 56.6 gm of carbohydrates, 4.41 gm of total fat, sodium content is 42.8 mg 34.28%, Ash 4.22% and 2.1 gm of dietary fibre in 100 gm of patties sample which prove It is generally satisfactory in terms of nutrition value and organoleptic criteria treatment 3 (T3) had a golden brown appearance and very much pleasant smell and very nice compact and fine (chewy) texture. Samples were sensory evaluated for attributes such as appearance, colour, aroma, flavour, texture, taste, and overall acceptability. the oyster mushroom patties was largely satisfactory, Oyster mushroom could be used as an alternate component to partially substitute Chicken or other animal meats in the preparation of patties.

VI. Reference

- [1]. Kumar M., and Sharma B. (2004). The storage stability and textural, physico-chemical and sensory quality of low-fat ground pork patties with carrageenan as fat replacer. *Inte. J. of Food Sci and Techn.*, 39, pp. 31-42.
- [2]. Tuorila, H., & Monteleone, E. (2009). Sensory food science in the changing society: Opportunities, needs, and challenges. *Trends in Food Science and Technology*, 20(2), 54–62. <https://doi.org/10.1016/j.tifs.2008.10.007>.
- [3]. Cheung P. C. K. (ed.) (2011). *Mushroom as functional foods*. John Wiley K Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA.
- [4]. Isildak O., Turkekul I., Elmastas M., and Tuzen M. (2004). Analysis of heavy metals in some wild-grown edible mushrooms from the middle black sea region, Turkey. *Food Chem.*, 86 (4), pp. 547-552.
- [5]. Nelson A. L. (2001). *High-Fiber Ingredients*. St. Paul, MN, Eagan, USA.
- [6]. Dreher M. L. (1987). *Handbook of Dietary Fiber: An Applied Approach*. Marcel Dekker, Inc., New York, USA.
- [7]. Bahl, N. (2000). *Handbook of Mushrooms* 4th ed., Vijay Prinlani for Oxford and IBH Pub. Co. Pvt. Ltd., Japath, New Delhi.

[8]. Al-Enazi, M. M., El-Bahrawy, A. Z. and El-Khateeb, M. A. 2012. In vivo Evaluation of the Proteins in the Cultivated Mushrooms. Journal of Nutrition and Food Sciences 2:1-5.

[9]. Ibrahim, R. D. and Hamed, R. T. 2002. Protein quality of four types of edible mushrooms found in Jordan. Plant Foods For Human Nutrition 57:1-11.

[10]. Bahl, N. (1998). Hand book on mushrooms.Oxford & IBH Publishing co Pvt Ltd. Pp.15-40.

[11]. A.O.A.C (2005). Official Methods of Analysis. Association of Official Analytical Chemists (18th Ed). Washington, D.C.

[12]. AOAC (1995). Official Methods of Analysis 16th ed, Assoc of Official Anal. Chem. Gaithersburg, Maryland, USA. Pp 1-64.

[13]. The Atwater general factor system W.O. (Atwater and Woods, 1896).

[14]. Bourne, M. C. (1982). Food Texture and Viscosity, 1st edition. Academic Press, New York.

