Nutritional Value, Antioxidant Activity And Sensory Evaluation Of Edible Mushroom (Pleurotus Ostreatus) As A Supplementation To Create Healthier Meat Products

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Research Journal Specific Education
Faculty of Specific Education
Mansoura University

ISSUE NO. 73 JANUARY , 2023

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Abstract:

This study assess the chemical composition, antioxidant activity, minerals, and vitamins in mushroom to identify the nutritional value for this strain of edible mushroom.

Results revealed that protein content was 14.6% , fiber was 3.91% , carbohydrates were 70.4% , and the fat was 2% . Percentage of (DPPH)of extracts was increased with increasing concentration, so antioxidant activities were as follows 46.32 , 53.42 and 58.18 % respectively. Results showed high amount of k , Fe and Ca which were (2547.85 , 60.88 and 26.68 mg/100 g) respectively , while few amount of Mn and Cu was also observed in the extract. (1.25&1.35 mg/100 g). Moderate amount of Na, Mg & Zn was observed in extract. Results showed high amount of (B3) 98.43mg/100 g, moderate amount of (Vit.C) 31.32 mg/100 g and low amount of (B1) & (B2) which were (1.94 and 3.65 mg/100 g) respectively. Sensory evaluation of two different samples of burger (control) and anther one supplementation with Mushroom which has a higher value than control group in the term of color and appearance and near from control for other parameters(Odor, Texture, Taste and Overall acceptability).

In conclusion Pleurotus ostreatus is minimal in calories, fat, and Na and have a good antioxidant activities; it is a well-known valuable functional food ingredient. They provide essential nutrients like riboflavin, potassium, niacin, Ascorbic acid ,proteins, carbohydrate and fiber when they

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are placed next to one another to supplement different processed products such as (Burger)to create healthier and cheaper meat product.

Key words: Functional food, meat product, Burger, radical scavenging activity, edible mushroom.

Introduction

Diet has been demonstrated to be a factor in the majority of chronic diseases. In order to prevent certain disorders, eating may therefore be crucial. When considering the prevention of certain disorders, functional foods come into play. Functional foods may help lower the risk of chronic diseases since they contain antioxidants, minerals, vitamins, omega-3 fatty acids, and even dietary fiber.(Lobo et al., 2010). Many of these bioactive substances can be found in plants, edible fungus, and marine animal oils.(Lordan et al., 2011). Thus, we need functional ingredients from both plant and animal sources (Dorman et al., 2000).

A number of biological effects of eating foods high in polyphenols have been identified in studies (Urquiaga and Leighton, 2000; Pandey and Rizvi, 2009).

Potentially reducing the risk of chronic diseases like cancer and diabetes is one benefit of these phenolic compounds. (Aguilera et al.,2016).

Numerous mushroom species fall under the category of "functional foods," which are becoming increasingly significant in both food technology and nutrition. (Zawadzka et al., 2022)

An edible fungus called *Pleurotus ostreatus* contains a variety of beneficial components, such as beta-glucans. They are soluble fibers that are produced by various bacteria, plants, and fungi in their cell walls. They can reduce blood pressure, the risk of heart attacks, and several metabolic processes like lipid and glucose metabolism. It can also be used in diets to control body weight (Food) (Irfan et al., 2022)

Over 50,000 distinct types of mushrooms, including moulds and yeasts, have been consumed for thousands of years throughout the world; however, only about 20 species are suitable for human consumption

(MCCONNELL,2020), Mushrooms are rich in vitamin D, antioxidants, and phenolic compounds. These antioxidants are associated with anti-cancer, anti-diabetic, lowering the risk of cardiovascular diseases, and other health benefits. (Kaur,2021).

Mushrooms have been consumed for thousands of years for their nutritional and medicinal properties because of the presence of essential fatty acids, proteins, vitamins, and minerals and low calories because of low fat and proteins (Valverde et al., 2015; Maftoun et al., 2015). Leucine, lysine, isoleucine, valine, methionine, phenylalanine, threonine, and tryptophan are among the essential amino acids found in mushrooms. Mushrooms include polyunsaturated fatty acids, linoleic acid, -linoleic acid, omega-3, 6, and 9 essential fatty acids (Reis et al., 2012). Thiamine, riboflavin, pyridoxine, cyanocobalamin, pantothenic acid, niacin, folic acid, vitamin C, vitamin A (retinoic acid), vitamin D (cholecalciferol), vitamin E (tocopherol), and vitamin K are water-soluble and fat-soluble vitamins (phylloquinone) (Reis et al., 2012). Mushrooms include the following minerals: Ca, P, Na, K, Cl , Mg, Mn, S, Fe, Cu, I, Zn, F, Cr, Se, Mo, and Si (Reis et al., 2012). Due to the abundance of unsaturated fatty acids, vitamins, and minerals found in mushrooms, a variety of nutraceuticals can be derived from them. These bioactive substances found in mushrooms have additive and synergistic effects, thus they can be consumed directly in food (Ferreira et al., 2009; Barros et al., 2009). The claimed therapeutic effects have anticancer and immunomodulatingactions(Ferreira et al., 2009), inhibition of platelet aggregation (Hyun et al., 2006), reduction of blood cholesterol concentrations (Jeong et al., 2010), lowering of blood glucose levels with heart disease prevention or relief (Jeong et al., 2010), as well as antibacterial activity (Baross et al., 2007). Some of these therapeutic qualities are ascribed to bioactive substances with antioxidant activity, like phenolic compounds and the amino acid ergothioneine, which contains sulphur(Nachimuthu et al., 2019; Friedman, 2015; & Martin, 2010). The particular function of ergothioneine in the human body is unknown, however it is present in high concentrations in red blood cells, semen, kidneys, and liver. Due to unique ergothioneine transporters found in

numerous tissues, it is thought to play a vital role in human health. (Cheah et al., 2017; Halliwell et al., 2018).Ergothioneine interacts with other cellular defense systems during oxidative stress, which is known to have an antioxidant effect and assist maintain glutathione levels (Halliwell et al., 2018). Grieve and Shah, (2003) suggested that oxidative stress in cells and tissues is caused by an increase in the 21 production of oxygen species or a decrease in the antioxidant defense capability.

A study by Cayan et al. (2020) has demonstrated the presence of the 16 most prevalent phenolic compounds in 26 different types of mushrooms. Gallic acid, fumaric acid, protocatechuic acid, and trans-cinnamic acid were the most frequently discovered and quantified phenolic chemicals. Catechin hydrate, p-hydroxy benzoic acid, caffeic acid, vanillin, 6,7-dihydroxy coumarin, 2,4-dihydroxy benzoic acid, p-coumaric acid, ferulic acid, coumarin, trans- 2-hydroxy cinnamic acid, ellagic acid, and rosmarinic acid were among the other polyphenols discovered. 48 These phenolic chemicals are responsible for the bioactivity of mushrooms. Anti-inflammatory, antibacterial, anti-carcinogenic, anti-mutagenic, and other bioactive qualities are a few examples. Gallic acid (3,4,5-trihydroxy benzoic acid) is a trihydroxy benzoic acid that is also utilised as a preservative in food and drinks as well as the skin and leather industries (Fernandes and Salgado, 2016).

Pleurotus ostreatus (*Oyster mushrooms*) is a popular variety of consuming mushroom among people. The basidiomycetes family of mushrooms includes white oyster mushrooms. In the forest, oyster mushrooms are a naturally occurring saprophyte plant that feeds on the remains of organic materials and lives on softwoods (Rambey et al.,2020).One of the most significant edible mushrooms in terms of nutrition, health, and the environment is the oyster mushroom, *Pleurotus spp*(Hassan & Ibrahim, 2022). The fruiting bodies of this fungus are categorised as high-protein foods with high levels of the majority of mineral salts and vitamins (Oloke, 2017).

The fruit bodies are regarded as a nutritious, balanced food that is recommended for the majority of ailments at the moment on a health level. (Bilal, 2010). In terms of the environment, oyster mushrooms are grown on soil that is primarily made up of agricultural waste, such as the leftovers from the majority of agricultural products. This practicehelps to biologically clean these wastes, which raises their market value (Masevhe et al.,2016&Picornell-Buendía et al., 2016), As a result, this mushroom's output increased globally to overtake A. bisporus as the second-most productive and popular mushroom(Naim et al.,2020 & Royse, 2014).

There are more than 700 different species and subspecies of *Pleurotus*. because it is simple to grow, produces a lot, and is nutrient-dense (Yin, 2021), It was discovered that *Pleurotus* species contained a wide variety of substances, including terpenoids, steroids, phenolic acid derivatives, polyyne, and polysaccharides, all of which have a wide range of biological effects, including antibacterial, anti-nematode, anti-inflammatory, anti-tumor, antioxidation, and immunoregulatory properties (Corrêa et al., 2016).

One of the *Pleurotus* species' active ingredients, polysaccharides, in particular, demonstrated antioxidant, anti-aging, anti-inflammatory, immunomodulatory, anti-tumor, antibacterial, anti-obesity, hypolipidemic, and hypoglycemic properties(Wang et al., 2020 & Barbosa et al., 2020). About 20 different species of *Pleurotus spp*. have received the majority of attention in recent years regarding the chemical components and biological functions of polysaccharides.

(Irfan et al., 2022) reported that the oyster mushroom (*P. ostreatus*) has various health benefits. With the assistance of its numerous bioactive components and extracts, it demonstrates therapeutic and medicinal activities. It's also referred to as "Green Medicine." It demonstrates a variety of anti-cancer properties while also addressing a wide range of cardio-metabolic parameters. In order to obtain more precise results, additional clinical trials with a well-controlled study design are required.

The present study aimed to determine the nutritional value and antioxidant activity of ethanol extracts from the fruiting part of dried mushroom(*Pleurotus ostreatus*) and supplementation with it to create healthier meat product.

Materials and Methods

Plant material

The Fruiting bodies of Mushroom (*Pleurotus ostreatus*) were purchased from the local market in Giza, Egypt. Fruiting bodies s were washed with clean water and air-dried. Dried Fruiting bodies were crushed by an electrical grinder to make powder. The powder was then stored in an exceedingly clean, dried and covered plastic container at room temperature until used.

Preparation of extracts

A hundred grams of Fruiting bodies powder was added to 900 ml of 90% ethanol to prepare the extract. The obtained concentrates were reconstituted in ethanol (1:10 w/v), respectively. The mixtures were covered and shaken every 30 minutes for six hours, then left to stand for 48 hours for extraction. Then, the mixture was filtered through filter paper and 200 mL of 90% ethanol was added. The extraction methods were repeated twice. The obtained extract was then evaporated at (50°C) using a rotary evaporator, and also the resulting crude extracts were dried using a desiccant. Dried extract was collected, weighed and stored frozen at (-20°C) until used for the analysis (Eze et al., 2013).

Preparation of Burger

The Control burger contain 10% Soy , 80 %Meat , 10 % the other ingredients as (Onion, Rusk , Skim Milk , Salt and Seasoning) were mixed well. To produce the supplemented Mushroom burger replace 10% of Mushroom (100 g) with10% of Soy and add the same other ingredients . The products was then store in refrigerator tell freezing and became solid .The supplemented Mushroom burger with (10% Soy) were evaluated sensory compared to the control sample. All the ingredients are presented in table 1 .

Table (1): Composition of control Burger and 10%Mushroom replaced with soy diets (g /1000g)

Ingredient	Percent %	Control	Mushroom
Meat	80	800	800
Soy	10	100	-
Mushroom	10	-	100
Onion	5	50	50
Rusk	1	10	10
Skim Milk	1	10	10
Salt	1.7	17	17
Seasoning	1.3	13	13

Methods

All chemical analysis of extracts was done in the Food Safety and Quality Control Lab, in the Faculty of Agriculture, Cairo University, Giza, Egypt.

Chemical composition of Fruiting bodies powder of Mushroom

Determination of moisture, proteins, fats, ash, crude fiber contents in extracts was according to AOAC. (2016). Protein content was determined by Kjeldahl, using a factor of 6.25, carbohydrates were calculated by difference:

Total carbohydrates = 100 - (g protein+ g fat +g ash + g fiber).

DPPH Radical-Scavenging Activity

Sample of Fruiting bodies powder of Mushroom(0.1 g) was prepared in 50ml methanol. An aliquot of the extract was added to DPPH radical (100 µl, 0.2 mM) dissolved in methanol. The mixture was stirred and left to stand for 15 min in dark. Then the absorbance was measured at 517 nm against a blank. Percentage scavenging effect was calculated as: [(A0 – A1) / A0] × 100 where: A0 is the absorbance of the control (without sample) and A1 is the absorbance in the presence of the sample (Brand-Williams, et al., 1995).

Minerals.

Calcium, magnesium, manganese, zinc, Iron ,Sodium, potassium and copper in ashed samples were determined by atomic absorption Spectrophotometry after mineralization by hydrochloric acid (M.F.A., 1982).

Determinations of Vitamin B complex

Vitamin B complex (B1, B2, B3, and C) contents were determined in Food Safety and Quality Control Lab, in the Faculty of Agriculture, Cairo University, Giza, Egypt according to A.O.A.C,(2016).

Sensory analysis

Sensory evaluation of burger was carried out by a 10 panelists of staff members from Department of Food Science, Faculty of Agriculture, Cairo University, Giza, Egypt. Samples of the burger were prepared one day earlier before the evaluation, packed in polypropylene bags and stored at 4°C. Panelists were supplied with cold tap water for cleansing the palate between samples. Each panelist was asked to evaluate burger samples, according to color, flavor, taste, texture and general appearance by using method (Wichchukit and O'Mahony , 2015) The scoring of sensory characteristics ranged from 1-20 degrees.

Statistical analysis

One-way ANOVA was used for the statistical analyses, which were performed in triplicates. The data were expressed as mean ± standard deviation with a p value confidence level of < 0.05.(Snedecor and Cochran, 1989)

Results and discussion

The Fruiting bodies powder of Mushroom (*Pleurotus ostreatus*) was analyzed chemically for moisture, protein, fiber, ash, total sugars and oil (dried weight) contents were determined according to the methods described by AOAC (2016).

Approximate chemical composition of dried Mushroom (*Pleurotus ostreatus*) Fruiting bodies powder of ethanolic extracts presented in table 2

Table (2): Approximate chemical composition of dried Mushroom (*Pleurotus ostreatus*) Fruiting bodies powder of ethanolic extracts

Compounds	Ethanol 90%
Ash	9.04±0.91
Fiber	3.91±0.26
Total Protein	14.6±0.8
Total lipids	2±0.4
*Carbohydrate	70.4±1.4

***Carbohydrate was calculated by difference.**

The findings in table 2 demonstrated that higher concentrations of total protein and ash were produced when ethanol was used for extraction. The values of these components in the ethanol extract were (14.6 and 9.04 g/100 g, respectively). The ethanol extract showed less total lipids overall as well. The ethanol extract's carbohydrate content was (70.4).

P. ostreatus are increasingly recognised as valuable and respected functional food ingredients because of their ability to be cholesterol-free and low in calories, carbohydrates, fat, and sodium. They contain crucial nutrients when paired with riboflavin, selenium, potassium, niacin, proteins, and fiber (Sahoo et al.,2022).

According to (Akyüz &Kirbağ, 2010) the *P. ostreatus* mushroom contains 4.1 g of dietary fiber per 100 g of edible sections, which is closest to our findings (3.910.26%).

Our resulted with in rang of protein content of mushrooms 14.6±0.8 % (Manikandan, 2020) which demonstrated that Depending on the species, mushrooms' protein content ranged from 12% to 35%. Bilal, (2010) indicated in their research paper that the protein from oyster mushrooms is highly digestible, ranging from 72% to 83%.Because they include several essential amino acids that are found in animal proteins, mushrooms are highly vital for vegetarians.

P. ostreatus mushrooms have relatively little fat (Akyüz, &Kirbağ, 2010) compared to protein and carbs. (Bilal et al., 2010), Unsaturated fatty acids make up the majority of the mushroom's fat portion. Akyüz, &Kirbağ, (2010)have reported that oleic acid is the main monounsaturated fatty acid and linoleic acid the main polyunsaturated fatty acid in *P. ostreatus*. Based on the report of Akyüz, &Kirbağ, (2010), *P. ostreatus* contains 100 g of dried fruit bodies with fat contents varying from 0.2 g to 8 g which is inconsistent with our results (2±0.4%).

According to Jacinto-Azevedo et al. (2021), the percentages of moisture, proteins, carbohydrates, fats, and fiber in *Pleurotus ostreatus* were 90.7, 18.3, 71.25, 2.58, 7.82, and 14.31, respectively.

Mushrooms have 85-95% moisture, 35-70% carbohydrates, 15-34.7% protein, 10% fat, 6-10.9% minerals, 3-8% nucleic acids, and vitamins like niacin 60.6-73.3 mg(%), thiamine 1.4-2.2 mg(%), riboflavin 6.7-9.0 mg(%), biotin, pantothenic acid 21.1-33.3 mg(%), ascorbic acid 92-144 mg(%), and folic acid 1.2–1.4 mg/100 g in dry weight basis (Assemie and Abaya 2022).

Table (3) showed DPPH radical scavenging activity (%) in a dose-dependent manner presenting a maximum effect at 1.0% of the concentration of dried Mushroom (*Pleurotus ostreatus)*Fruiting bodies powder of ethanolic extracts.

Table (3): Radical scavenging activity % of dried Mushroom (*Pleurotus ostreatus*)Fruiting bodies powder of ethanolic extracts

Extractconc	**Ethanol90%**
0.2 %	46.32 ± 0.75
0.5%	53.42±1.32
1%	58.18±0.75

According to the information in Table 3, *Pleurotus ostreatus* in ethanol exhibited a significant DPPH. *Pleurotus ostreatus's* antioxidant activity rose in the test regimen in a concentration-dependent manner. The findings of (Mishra et al., 2022) who discovered that the ethanol extract had

50% free radical scavenging potential at a concentration of 1 mg/mL are similarly consistent with the rise in DPPH scavenging activity with increasing extract concentration. According to (Vamanu, et al., 2013)the EEPO considerably outperformed the ethanol extract of *Pleurotus ostreatus* mycelium in terms of antioxidant activity.

The outcomes were determined to be in agreement with those published by (Mihai, et al., 2022) who discovered that the three DPPH, ABTS, and FRAP assays were used to determine the antioxidant activity in fungal ethanolic extracts, and they provided a comparable ranking of antioxidant activity across the substrates tested, with the coconut coir substrate revealing the highest antioxidant capacity (T2). The highest values of scavenging ability on DPPH and ABTS free radicals were therefore demonstrated by this waste by-product employed as substrate for oyster cultivation, with a range of 44% to 65%. The FRAP assay results show that the extract of oyster fungi cultivated in the same substrate, represented by coconut coir, could be recognised as having the significantly highest lowering power inhibition.

Minerals content of dried Mushroom (*Pleurotus ostreatus*)Fruiting bodies powder of ethanolic extracts are presented in Table 4

Table 4: Minerals content of dried Mushroom (*Pleurotus ostreatus*)Fruiting bodies powder of ethanolic extracts

Minerals	**Contents (mg/100 g)**	****DRI per day Age 31->70 yrs**
K	2547.85 ±222.05	4.7*****
Ca	26.68 ± 5.81	1.200*****
Na	23.45 ± 4.41	1.5*****
Mg	14.95 ± 3.55	320- 420*****
Zn	10.06 ± 2.42	8-11 mg**
Fe	60.88 ± 4.12	8 mg (18 mg F 19- 50 yrs)**
Mn	1.25 ± 0.30	1.8- 2.3 mg**
Cu	1.35 ± 0.30	0.9 mg**

****** Berger et al ., 2022 * Del Valle et al ., 2011

According to Table 4, ethanolic *Pleurotus ostreatus* included high levels of **K**, **Fe**, and **Ca**, which were (2547.85, 60.88, and 26.68 mg/100 g) in that order, respectively. **Mn** and **Cu** levels were also found to be lower in the ethanol extract. (1.25&1.35 mg/100 g). In the ethanol extract, moderate amounts of **Na**, **Mg**, and **Zn** were found.

When compared to DRI, our results cover it and more, particularly for K, Ca, Na, Zn, and Fe.

By compensating for shortages and the consequent malnutrition, these elements can be advantageous to us. For example, Ca may be essential for bone health and growth, K and Na support the preservation of osmotic balance, Fe is required for the formation of haemoglobin, and Mg serves as an enzyme cofactor.

Accordingly, it was discovered by Sharifi-Rad et al. (2020) that *P. ostreatus* contains significant amounts of protein, carbohydrates, vitamin B1, B2, B12, C, D, E, and K, as well as minerals (potassium, iron, copper, zinc, and manganese) and dietary fiber

According to (Bilal et al., 2010), The principal constituents of the mineral elements found in high concentration in the mushroom fruiting bodies are K, P, Na, Ca, and Mg. Minor constituents include Cu, Zn, Fe, Mo, and Cd. P. ostreatus contains more Cu, Fe, K, Mg, P, Zn, and Na than other species which agree with our results.

The vitamin content (mainly vitamin B complex) of *P. ostreatus* mushroom is shown in (Table 5).

Table 5: Vitamins content of dried Mushroom (*Pleurotus ostreatus*)Fruiting bodies powder of ethanolic extracts

Vitamins Contents	(mg/100g dried mushroom)	*DRI per day Age 31->70 yrs
Thiamin(B1)	1.94 ±0.036	1.1- 1.2 mg
Riboflavin(B2)	3.65±0.27	1.1-1.3 mg
Niacin (B٣)	98.43±7.55	11- 16 mg
Ascorbic acid(C)	31.32±2.56	75- 90 mg

***** Berger et al ., 2022

Trace elements are essential for human health, which having important physiological effect on different organs and cellular mechanisms. Mushrooms fruit bodies are rich in vitamins, mainly vitamin-B3, vitamin-B2, vitamin- B1 and (Ascorbic acid).

The results for B_ complex were greater above the suggested levels for thiamine and riboflavin, and the highest percentage for niacin was observed, which was 9 times the DRI. Despite the fact that it was not in the required levels, ascorbic acid

Our findings were in line with those of (wang et al., 2000), who discovered that group B vitamins are abundant, particularly thamine, riboflavin, pyridoxine, pantotene acid, nicotinic acid, nicotinamid, folic acid, and cobalamin, as well as additional vitamins including ergosterol, biotin, phytochinon, and tocopherols (Mattiala et al. 2001). With respect to thiamine content, mushrooms are a bridge between yeast and other food products of vegetal origin. *P. ostreatus*contains more folacine, vitamin B1, vitamin B3 but less vitamin B12 than other mushroom species.

P. ostreatus includes a lot of dietary fiber, potassium, iron, copper, zinc, manganese, and other minerals, as well as the vitamins B1, B2, B12, C, D, E, and K. (Sharifi-Rad et al., 2020)

(Akyüz &Kirbağ 2010 & Bilal et al., 2010 & Gupta et al., 2019) asserted that mushroom fruit bodies contain large levels of vitamins, including vitamins B (thiamine, riboflavin, pyridoxine, pantothenic acid, nicotinic acid, nicotinamide, folic acid, and cobalamin), C, and D2. Numerous studies showed that P. ostreatus mushroom is low in vitamin B12, high in vitamin C, and high in vitamin B2 and rich in folacin, vitamin B1, and vitamin B3.

Mushrooms have a 6–10.9% of minerals, 3-8% of nucleic acids, and vitamins like niacin (60–73.3 mg%), thiamine (1.4–2.2 mg%), riboflavin (6.3–9.0 mg%), biotin, pantothenic acid (21.1–33.3 mg%), ascorbic acid (92–144 mg (Assemie and Abaya 2022).

Sensory evaluation of control Burger and 10%Mushroom replaced With Soy diets (g /1000g) is shown in (Table 6).

Table (6): Sensory evaluation of control Burger and 10%Mushroom replaced With Soy diets (g /1000g)

	Taste	Color	Odor	Texture	Appearance	Overall acceptability
CON (T1)	17±2.16	15.83±2.11	14.83±2.26	18±1.52	18±1.29	17.83±1.77
MSH(T2)	16.16±2.26	18.16±2.85	13±1.63	16.83±1.77	19±1.15	16.5±3.14

Data in Table (6) showed the sensory evaluation of control Burger and 10%Mushroom replace with soy diets (g/1000g) .The organoleptic characteristics are the primary indicator of food quality from the consumer's perspective. In order to identify the most acceptable Burger compositions, sensory evaluation was carried out. The first things that catch our attention are color and flavor, followed by additional factors. The results of the acceptability test were similar for the two treatments, with T1 (control) scoring higher than the other treatments for "Taste." The value of (T2) is greater than that of the other treatments in terms of "Color." The findings show that (T1) has a value that is generally more acceptable than the other treatments.

In this respect (Mihai, et al., 2022) mentioned that the acceptability test revealed similar results for the three treatments, with little significant differences. For “Taste”, T2 (11.867) obtained a significantly higher score than the other two treatments, T3 was the lowest one. Regarding the “Color”, there are no significant differences. For the “Texture” attribute, T2 (11.967) shows a higher value than the other treatments. The lowest value of “Appearance” (11.133) was expressed for T1, grown on pine sawdust. The overall acceptability positioned the mushrooms grown in coconut coir (T2) as the product of preference. On the contrary, the mushrooms grown on pine sawdust showed the lowest score, although there are no significant differences between the three treatments.

Conclusion

Edible mushroom *Pleurotus ostreatus*, a well-known useful functional food ingredient, is low in calories, fat, and sodium and has strong

antioxidant properties. When they are positioned adjacent to one another, they supply vital nutrients like riboflavin, potassium, niacin, ascorbic acid, proteins, carbohydrates, and fiber to enrich various processed items like (Burger) to create healthier and less expensive meat products. More research is needed to discover more benefits and make the consumer aware of this functional food and its health benefits.

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القيمة الغذائية والنشاط المضاد للأكسدة والتقييم الحسي للفطر المحاري (*Pleurotus ostreatus*) الصالح للأكل كمكمل لإنتاج منتجات لحوم صحية.

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الملخص العربي:

سعت الدراسة الحالية إلى تقييم التركيب الكيميائي ، والنشاط المضاد للأكسدة ، والمعادن ، والفيتامينات من أجل تحديد القيمة الغذائية لعينة من الفطر المحاري Pleurotus ostreatus الصالح للأكل.

أظهرت النتائج أن محتوى البروتين كان ١٤,٦٪ ، محتوى الألياف كان ٣,٩١٪ ، الكربوهيدرات ٧٠,٤٪ ، محتوى الدهن كان ٢٪. وحدثت زيادة في نسبة النشاط المضاد للشقوق الحرة للمستخلص الإيثانولي للفطر المجفف مع زيادة تركيز المستخلص(٠,٢ ، ٠,٥ ، ١٪) لذلك كان النشاط المضاد للأكسدة كما يلي(٤٦,٣٢ ,٥٣,٤٢ ,٥٨,١٨ ٪)على التوالي. كما أظهرت النتائج احتواء المشروم المحارى على كمية عالية من البوتاسيوم والحديد والكالسيوم والتي كانت (٢٥٤٧,٨٥ و ٦٠,٨٨ و ٢٦,٦٨ مجم / ١٠٠ جم) بالترتيب ، بينما لوحظ وجود كمية أقل من المنجنيز والنحاس في المستخلص الإيثانولى للفطر المحارى (١,٢٥ & ١,٣٥ مجم / ١٠٠ جرام). لوحظ وجود كمية متوسطة من الصوديوم والمغنيسيوم والزنك في المستخلص الايثانولى. وأوضحت النتائج احتواء الفطر المحاري على كمية عالية من النياسين (B3) 98.43مجم / ١٠٠ جم ، وكمية معتدلة من حمض الأسكوربيك (C) 31.32مجم / ١٠٠ جم وكمية منخفضة من الثيامين (B1) والريبوفلافين (B2)والتي كانت (١,٩٤ و ٣,٦٥ مجم / ١٠٠ جم)على التوالى. وبعد عمل التقييم الحسي لعينتين مختلفتين من الهامبرجر الصحي ، أحدهما مدعم بفول الصويا (المجموعة الضابطة) والأخرى مدعم بالفطرالمحارى Pleurotus ostreatus المجفف الذي حصل على قيمة أعلى من المجموعة الضابطة من حيث اللون والمظهر وأقترب الهامبرجر المدعم بالمشروم المحارى من المجموعة الضابطة بالنسبة للنتائج الخاصة ب (الرائحة ، الملمس ، الطعم القبول العام).

التوصية: المشروم المحاريPleurotus ostreatus قليل السعرات الحرارية والدهون والصوديوم وله نشاط جيد كمضاد للأكسدة.وبذلك نستطيع ان نقول أنه عنصر غذائي وظيفي ذو قيمة غذائية عالية حيث وفر العناصر الغذائية الأساسية مثل البروتينات ،الدهون ،الكربوهيدرات ،الألياف، الريبوفلافين ،البوتاسيوم ،النياسين ،حمض الأسكوربيك عند وضعها بجانب بعضها البعض لتدعيم المنتجات المصنعة المختلفة مثل (البرجر) لإنتاج منتجات لحوم صحية ومنخفضة التكلفة.

الكلمات الدالة : طعام وظيفي ، منتجات اللحوم ، برجر ، نشاط مضاد للأكسدة ، فطر صالح للأكل.

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** زميل تعليمي تخصص تغذية وعلوم الأطعمة بالهيئة العامة للمستشفيات والمعاهد التعليمية - مستشفى الجلاء التعليمي