Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 1s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Naturally multiplying the effect of vitamin D in white mushrooms and studying its effect on intestinal microbiota and individual health

Suhad Kareem Rahi Al-Magsoosi[1], Omar Almuharib[2], Hussien, S.A.[3], Anees H. Essa[4]

[1]Food Science Department- College of Agriculture - Wasit University- Iraq

[*2,3,4] Food Science Department - College of Agriculture – University of Anbar-Iraq

[1]Email ID: SKareem@uowasit.edu.iq

[*2]Email ID: omarnews87@uoanbar.edu.iq

[3]Email ID: sahuseen@uoanbar.edu.iq

[4]Email ID: @uoanbar.edu.iq

***Corresponding Author:**

Email ID: omarnews87@uoanbar.edu.iq

Cite this paper as: Suhad Kareem Rahi Al-Magsoosi, Omar Almuharib, Hussien, S.A., Anees H. Essa, (2025) Naturally multiplying the effect of vitamin D in white mushrooms and studying its effect on intestinal microbiota and individual health. *Journal of Neonatal Surgery*, 14 (1s), 720-726.

ABSTRACT

Mushrooms naturally contain vitamin D2, and exposure to UV light can enhance the amounts of vitamin D2 in mushrooms. It is crucial to acknowledge that vitamin D2 is less physiologically potent than vitamin D3 and may not offer the same advantages as vitamin D3 pills or foods containing vitamin D3. In addition, ultraviolet (UV) radiation can also lead to the deterioration of other advantageous chemicals found in mushrooms. Thus, we advise avoiding subjecting mushrooms to ultraviolet (UV) radiation for the purpose of obtaining vitamin D3 supplements. Approach The procedure entails choosing freshly harvested mushrooms from the market and quantifying their vitamin D concentration in 122-gram increments. Remove the caps and halve the mushrooms lengthwise. Once the mushrooms have been divided lengthwise, position them with the gills facing upwards on metal trays. In this orientation, the nostrils are directed upwards. Retrieve the trays and enclose the mushroom pieces in wrapping to prevent moisture accumulation. Solar exposure during the hours of 10 a.m. and 6 p.m. might result in harm. On the second day, the trays weighing 122 grammes had a vitamin D concentration. To increase the concentration, the trays were exposed to sunlight again, this time without being covered. Both males and females were seen to have an increase in vitamin D levels as a result of consuming genetically engineered mushrooms. Prior to meal consumption, the mean concentration of vitamin D3 in males was 13.4 mg/100 ml. However, after ingesting the modified food, it rose by 32 mg/100 ml. This implies that diet has a crucial impact on substantially increasing the concentration of vitamin D in the body. The initial concentration of vitamin D in women was 12.2 mg/100 ml. However, after consuming the modified diet for an entire month, the concentration climbed to 38.6 mg/100 ml. This demonstrates that the modified diet had a substantial impact on boosting the concentration of vitamin D in both genders. an edible resource. The study investigated the impact of vitamin D intake on the bacteria count in adult individuals of both genders. In men, the overall microbial count reduced dramatically to 10,000 cells/ml of culture media following ingestion, in contrast to the initial count of 13,233 cells/ml. After intake, the overall microbial count in women reduced to 12,000 cells/mL, as opposed to the initial level of 20,000 cells/ml.

Keywords: *white mushrooms, D3, Ca, microbiota*

1. INTRODUCTION

Vitamin D is essential for maintaining robust bone health and a strong immune system. [1] Fatty fish, beef liver, and egg yolks all contain a compound that is synthesised by the body upon exposure to sunshine. [2] Calcium is necessary for the maintenance of strong bones and teeth, whereas vitamin D facilitates its absorption [3]. Additionally, it enhances the body's immune system, allowing it to effectively fight against diseases. [4] Osteoporosis, a condition characterised by the weakening and fragility of bones, is among the several outcomes of insufficient vitamin D levels. Furthermore, the act of lowering the immune system might diminish the body's ability to combat diseases. [6] Certain persons who are in good health may have a higher vulnerability to vitamin D deficiency compared to others. This includes those with darker complexion or those who

live in regions with little exposure to sunshine. The user's text is enclosed in tags. Vitamin D supplementation may be necessary in some circumstances to achieve therapeutic levels. This phenomenon takes place by a mechanism called heat isomerisation. Vitamin D3 is absorbed by the circulation and then transported to the liver, where it undergoes a transformation into calcitriol, its active form. Calcitriol, a distinct form of vitamin D, is primarily accountable for the bulk of vitamin D's physiological impacts [9]. [10] It enhances the immune system and assists in the control of calcium and phosphorus intake, which are essential for maintaining healthy bones. Calcitriol production is regulated by the body's vitamin D needs [11], which occur when there is a lack of calcium or phosphate in the blood. [12] Vitamin D can be obtained by dietary sources and supplements. WithinIn such conditions, the gastrointestinal system assimilates vitamin D, which is then metabolised by the liver into calcitriol. The typical acceptable range for vitamin D concentrations in the bloodstream is commonly regarded as being between 20 and 50 nanogrammes per millilitre (ng/mL), or 50 and 125 nanomoles per litre (nmol/L). Nevertheless, the ideal range may vary depending on the source, and several specialists suggest levels that are closer to 30–60 ng/L. The user's text is enclosed in tags. Various factors contribute to low levels of vitamin D in the human body, including as Insufficient exposure to sunlight: Exposure to sunlight stimulates the production of vitamin D in the skin. Insufficient exposure to sunshine can lead to inadequate vitamin D levels in those who spend the most of their time indoors or protect their skin while outdoors. Nutritional insufficiencies: Vitamin D is present in specific foods such as fatty fish and fortified dairy products. Insufficient consumption of these items in one's diet may result in a deficiency of vitamin D.

2. MATERIAL AND METHODS

7-hydrocholestrol levels were shown to increase in gills after being exposed to UV light (820-513 nm). Vitamin D from 132 IU to 46,222 IU in two days, with daily exposure averaging 8 hours.

2.1 Procedure

By choosing mushrooms that are fresh and intended for sale, the amount of Vitamin D in mushrooms, calculated in units of 122 grammes, Remove the caps and halve the mushrooms lengthwise. Once mushrooms are halved longitudinally, they are placed in an inverted position on metallic trays. In this orientation, the nostrils are directed upwards. Retrieve the trays and enclose the mushroom pieces in wrapping to prevent moisture. The detrimental consequences of sun exposure occurring between 10 a.m. to 6 p.m. The concentration of Vitamin D in 122 grammes On the second day, once again, expose the trays to sunlight without covering them. The user's text is "[13]".

2.2 Experiment sample

The experiment was conducted on a sample size of twenty individuals, consisting of an equal number of males and females, with 10 participants of each gender. Prior to commencing the experiment, the participants' vitamin D levels were assessed. Subsequently, each participant was administered a daily dose of 100 mg of pre-prepared mushrooms for a duration of one month, with the aim of comprehensively observing the impact it had on them.

2.3 Total count of microbiota

The stool samples are collected in a container that is clean and free from contamination. Subsequently, a serial dilution is performed by transferring 1 gramme of the stool sample into a tube containing 9 ml of sterile saline solution. Following that, we perform a series of dilutions on this sample and subsequently transfer 1 ml of either the fourth or fifth dilution onto a plate. Subsequently, transfer the culture media into a petri dish and disperse it uniformly throughout the medium by moving it in two diametrically different directions. The equation then computes the overall quantity..

Total number = number of colonies * reciprocal of dilution cell/ml

3. RESULT AND DISCUSSION

Individuals of both genders who reported ingesting genetically altered mushrooms had notably elevated levels of vitamin D (refer to Table 1). Prior to consuming the modified food, the mean vitamin D3 concentration in men was 13.4 mg/100 ml. However, after consuming the modified diet, the mean vitamin D3 concentration increased to 32 mg/100 ml. These findings indicate that nutrition plays a crucial role in increasing blood vitamin D levels. Following one month of adhering to the modified diet, the concentration of vitamin D in women's blood increased from 12.2 mg/100 ml to 38.6 mg/100 ml. This demonstrates that the dietary regimen had a significant impact on increasing vitamin D levels in both males and females. Means of sustenance refer to the resources or methods that individuals or communities rely on to support their basic needs and maintain their livelihoods. They consist of several vital components, including B vitamins, selenium, and potassium. The user's text is a reference to a specific source or citation. Specific chemicals present in particular mushrooms, such as shiitake and maitake, may possess medicinal properties. Vitamin D3, a form of vitamin D, is synthesised by the body when the skin is exposed to sunshine. Additionally, many foods and dietary supplements also contain this vitamin. Vitamin D [15] is essential for bone health because it facilitates calcium absorption. It is dependent on the immune system and has the potential to mitigate the occurrence of illnesses such as cancer and heart disease. Mushrooms do contain vitamin D3, but, they are not a very reliable source. The major source is still receiving sunlight or consuming a supplement [2]. UV light only increases the vitamin D level in a tiny portion of mushrooms.

Table 1: Effect of consuming modified mushrooms on vitamin D levels

Dependent Variable: concentration of D3

gender	type of nutrition	Mean	Std. Deviation
male	before	13.40	1.140
	after	32.00	5.099
	Total	22.70	10.404
female	before	12.20	.837
	after	38.60	6.348
	Total	25.40	14.554
Total	before	12.80	1.135
	after	35.30	6.447
	Total	24.05	12.390

Table 2 presents the analysis of variance for the impact of the modified mushroom diet on D3 levels in both males and females. Upon examining the table, it is evident that there are no noteworthy disparities between the genders, namely men and women. However, there were notable disparities seen in the impact of the meal type before and after the alteration. Regarding the correlation between the kind of food and gender, there were no notable disparities, as seen in Figure 1. Vitamin D3 is crucial for preserving bone health in both males and females. The user's text is "[5]". Sufficient quantities of vitamin D3 are crucial for the body to assimilate calcium and stimulate bone development. The user's text is "[6]." Research has established a correlation between insufficient levels of vitamin D3 and a heightened susceptibility to osteoporosis and fractures in both males and females. Vitamin D3 has been discovered to have a role in regulating testosterone levels in males, specifically in relation to reproductive health. Insufficient amounts of vitamin D3 have been linked to lower testosterone levels, resulting in diminished muscle mass, heightened body fat, and impaired fertility. Vitamin D3 may have a function in preserving bone health in women during and after menopause. Additional investigation is required to validate the preventative impact of vitamin D3 on certain forms of cancer, such as breast cancer, as shown by several studies. Both men and women may obtain sufficient quantities of vitamin D3 through sun exposure, certain meals, and supplementation. [3] Nevertheless, persons with greater amounts of melanin in their skin, elderly folks, and those who predominantly stay inside may have an increased susceptibility to vitamin D insufficiency and may require supplementation to get sufficient levels.

Table 2 ANOVA table effect of consuming modified mushrooms on vitamin D levels

Dependent Variable: concentration of D3

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2643.750[a]	3	881.250	51.611	.000
Intercept	11568.050	1	11568.050	677.485	.000
gender	36.450	1	36.450	2.135	.163
type	2531.250	1	2531.250	148.243	.000
gender * type	76.050	1	76.050	4.454	.051
Error	273.200	16	17.075		
Total	14485.000	20			
Corrected Total	2916.950	19			

a. R Squared = .906 (Adjusted R Squared = .889)

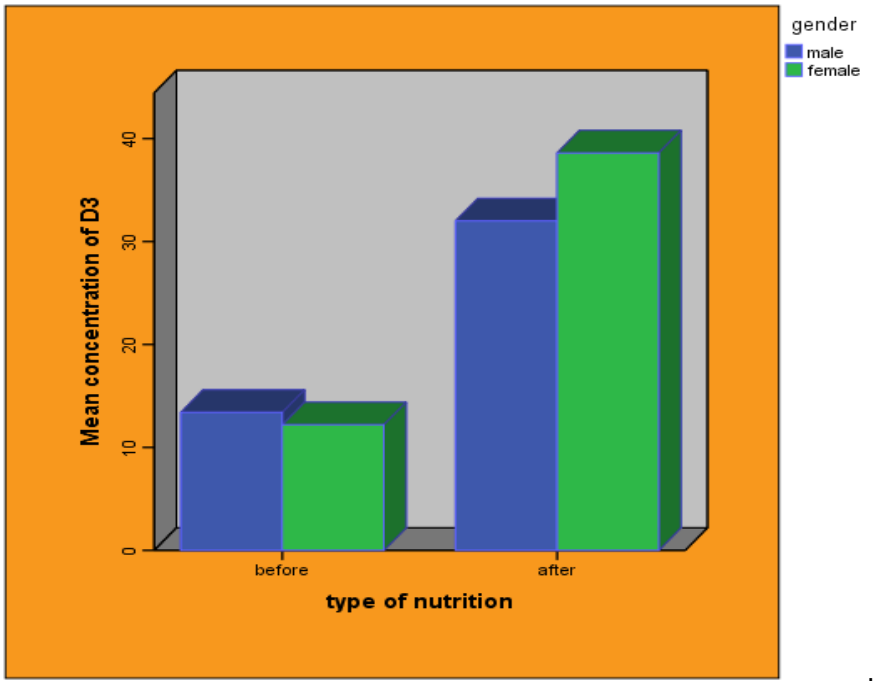

figure1 effect of consuming modified mushrooms on vitamin D levels

Table 3 displays the impact of consuming modified mushrooms on the calcium percentage in males and females. Prior to consumption, the calcium percentage in men was 7.8 mg / 100 ml, which increased to 9.4 mg / 100 ml after consumption. Similarly, in women, the calcium percentage increased from 5.8 mg / 100 ml to 9 mg / 100 ml after consumption. This indicates that there was an increase in the calcium percentage for both sexes after consuming the modified mushrooms, as depicted in Figure 2. Calcium is a crucial mineral that is necessary for the proper maintenance of strong bones and teeth. It also plays a critical role in muscle and nerve function, blood clotting, and the release of hormones. Mushrooms are a rich source of calcium and serve as a viable substitute for vegetarians and vegans who may not consume dairy products, which are conventionally abundant in calcium. The user's text is "[9]". White button mushrooms, portobello, shiitake, and oyster mushrooms are all excellent calcium-rich options. It should be emphasised that the bioavailability of calcium from mushrooms may be lower compared to other sources, such as dairy products. [10] Certain varieties of mushrooms have elevated concentrations of oxalates, which possess the ability to impede the absorption of calcium. In addition, the calcium content of mushrooms might be influenced by the cooking methods employed. For instance, boiling mushrooms can lead to a substantial reduction in calcium levels.11 In order to maintain sufficient calcium consumption, it is advisable to include a diverse range of calcium-rich foods, such as leafy greens, almonds, fortified goods, and mushrooms. It is crucial to get advice from a healthcare expert or trained nutritionist to ascertain the suitable calcium consumption considering characteristics such as age, gender, and other individual variables.

Table 3 effect of consuming modified mushrooms on Ca levels

Dependent Variable: concentration of Ca

gender	type of nutrition	Mean	Std. Deviation
male	before	7.80	.837
	after	9.40	.548
	Total	8.60	1.075
female	before	5.80	1.924
	after	9.00	.707
	Total	7.40	2.171

Total	**before**	**6.80**	**1.751**
	after	**9.20**	**.632**
	Total	**8.00**	**1.777**

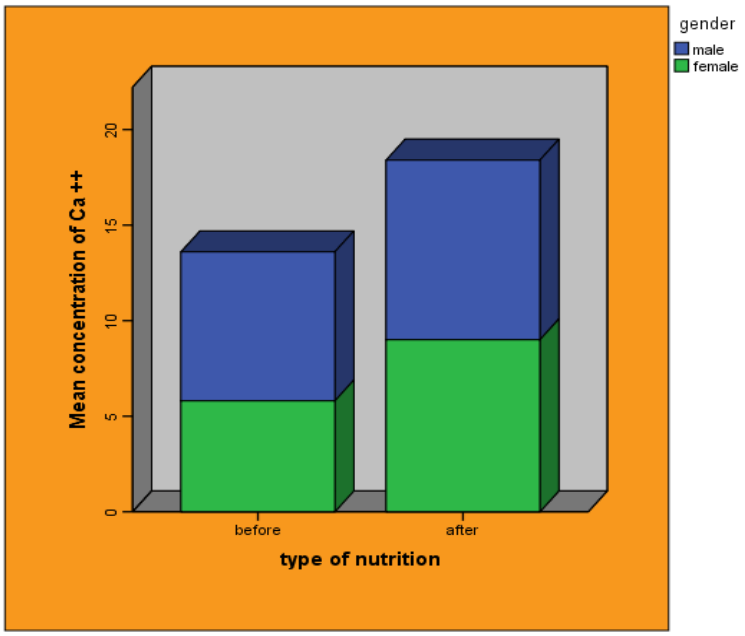

Figure2 effect of consuming modified mushrooms on Ca levels

Table 4 effect of consuming modified mushrooms on total count of microbiota

gender	type of consuming	Mean	Std. Deviation
male	**before consuming Vitamin D**	**13233.33**	**10038.094**
	after consuming Vitamin D	**10000.00**	**1000.000**
	Total	**11616.67**	**6621.304**
female	**before consuming Vitamin D**	**20000.00**	**2645.751**
	after consuming Vitamin D	**12000.00**	**1000.000**
	Total	**16000.00**	**4732.864**
Total	**before consuming Vitamin D**	**16616.67**	**7539.341**
	after consuming Vitamin D	**11000.00**	**1414.214**
	Total	**13808.33**	**5945.580**

Table 4 shows the effects of vitamin 3 axis consumption on the microbial count in adults of both sexes. For males, the total microbial count decreased significantly to 10,000 cells/ml of culture medium after consumption, compared to 13,233 cells/ml before. For women, the total microbial count decreased to 12,000 cells/mL after consumption, compared to 20,000 cells/mL before vitamin D. An essential component of the immune system, vitamin D lowers inflammation and boosts white blood cells. .[11] The immune system is able to respond quickly, which promotes and speeds up the healing process. Infections of the respiratory system, including asthma and the flu, are more common in those with low vitamin D levels. .[2] Vitamin D supplementation enhances the immune system's ability to ward off respiratory infections. People who are vitamin D deficient

are less likely to have respiratory infections, according to a 2019 study out of Queen Mary University in London, UK. Because of its powerful immune-system-boosting properties, vitamin D hastens the healing process after contracting COVID-19.

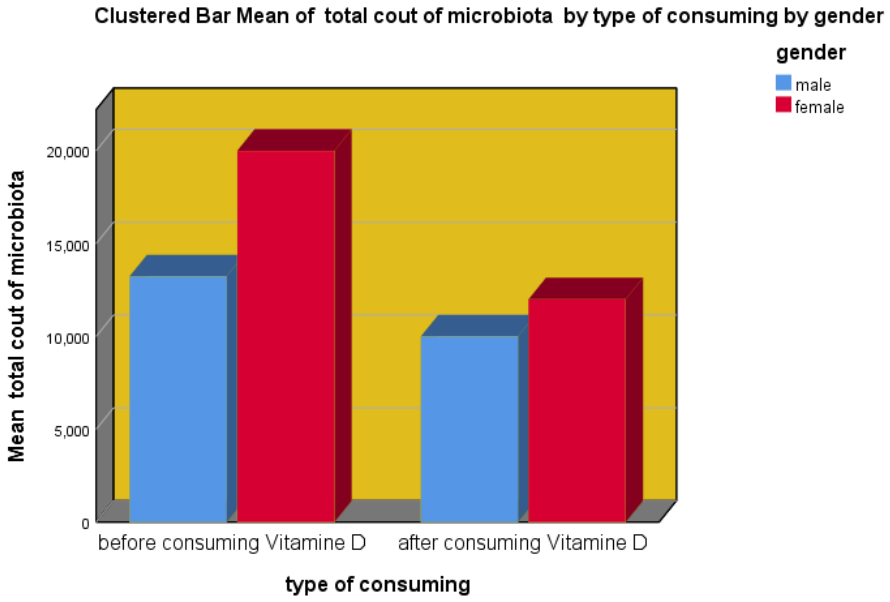

Figure 3 effect of consuming modified mushrooms on total count of microbiota

REFERENCES

[1] ZAJAC, Ian T., et al. The effects of vitamin d-enriched mushrooms and vitamin d3 on cognitive performance and mood in healthy elderly adults: A randomized, double-blinded, placebo-controlled trial. *Nutrients*, 2020, 12.12: 3847.

[2] LOŽNJAK, Petra; JAKOBSEN, Jette. Stability of vitamin D3 and vitamin D2 in oil, fish and mushrooms after household cooking. *Food chemistry*, 2018, 254: 144-149.

[3] STEPIEN, Magdalena, et al. Effect of supplementation with vitamin D2-enhanced mushrooms on vitamin D status in healthy adults. *Journal of nutritional science*, 2013, 2.

[4] STEPHENSEN, Charles B., et al. Ergocalciferol from mushrooms or supplements consumed with a standard meal increases 25-hydroxyergocalciferol but decreases 25-hydroxycholecalciferol in the serum of healthy adults. *The Journal of nutrition*, 2012, 142.7: 1246-1252.

[5] PINTO, Jorge Marques, et al. Assessing the impact of a mushroom-derived food ingredient on vitamin D levels in healthy volunteers. *Journal of the International Society of Sports Nutrition*, 2020, 17.1: 1-10.

[6] MUTO, Toshio; SUGAWARA, Ryozo; MIZOGUCHI, Katsuhiko. The House Fly Attractants in Mushrooms: Part II. Identification of the Fraction D3 and the Activities of Some Related Compounds. *Agricultural and Biological Chemistry*, 1968, 32.5: 624-627.

[7] DEZFOOLI, Neda Ansari, et al. Antibacterial activity and chemical compositions of Chamaemelum nobile essential oil/extracts against Psedomonas tolaasii, the causative agent of mushroom brown blotch. *Ann Biol Res*, 2012, 3: 2602-2608.

[8] HOPPLE JR, John S.; VILGALYS, Rytas. Phylogenetic relationships in the mushroom genus Coprinus and dark-spored allies based on sequence data from the nuclear gene coding for the large ribosomal subunit RNA: divergent domains, outgroups, and monophyly. *Molecular phylogenetics and evolution*, 1999, 13.1: 1-19.

[9] CASHMAN, Kevin D., et al. Effect of ultraviolet light–exposed mushrooms on vitamin D status: liquid chromatography–tandem mass spectrometry reanalysis of biobanked sera from a randomized controlled trial and a systematic review plus meta-analysis. *The Journal of nutrition*, 2016, 146.3: 565-575.

[10] SHANELY, R. Andrew, et al. Influence of vitamin D mushroom powder supplementation on exercise-induced muscle damage in vitamin D insufficient high school athletes. *Journal of sports sciences*, 2014, 32.7: 670-679.

[11] TIWARI, Abhay, et al. Deciphering the Potential of Pre and Pro-Vitamin D of Mushrooms against Mpro and PLpro Proteases of COVID-19: An In Silico Approach. *Molecules*, 2022, 27.17: 5620.

[12] JANG, Myoung-Jun, et al. Effects of oyster mushroom as a feed addictive in juvenile cherry salmon, Oncorhynchus masou masou. *한국버섯학회지*, 2010, 8.4: 173-173.

[13] PARK, Joonhan, et al. Novel and simple route to fabricate fully biocompatible plasmonic mushroom arrays adhered on silk biopolymer. *Nanoscale*, 2014, 7.2: 426-431.

[14] KALARAS, Michael D.; BEELMAN, Robert B. Vitamin D2 enrichment in fresh mushrooms using pulsed UV light. *Foodscience. Available online: psu. edu/directory/rbb6/VitaminDEnrichment. pdf*, 2008.

[15] KALARAS, Michael D.; BEELMAN, Robert B. Vitamin D2 enrichment in fresh mushrooms using pulsed UV light. *Foodscience. Available online: psu. edu/directory/rbb6/VitaminDEnrichment. pdf*, 2008.