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RESEARCH ARTICLE

ANALYSIS RESULTS REGARDING VITAMIN D2 AND D3 IN COMMERCIALLY AVAILABLE DRIED WOOD EAR MUSHROOMS

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ABSTRACT

In our previous paper (2025: Akitaka Kojima & Naomi Katayama), we reported, based on analytical values obtained from the Japan Food Research Laboratories, that wood ear mushrooms are an effective food source for calcium and vitamin D intake. However, the vitamin D value for cultivated wood ear mushrooms obtained from the Japan Food Research Laboratories in the previous report was shown as the sum of vitamin D2 and vitamin D3. Therefore, we again requested the Japan Food Research Laboratories to confirm the vitamin D2 and D3 values in past wood ear mushroom analyses. As a result, dried wood ear mushrooms from China (commercially available dried wood ear mushrooms purchased at the supermarket AEON) had a vitamin D2 value of 83.5 μg/100g and a vitamin D3 value of less than 3 μg/100g. Furthermore, finely powdered dried wood ear mushrooms from China, ground using a grinder (Iwatani Millser), showed a vitamin D2 value of 93.3 μg/100g and a vitamin D3 value of less than 3 μg/100g. Coarse powder showed a vitamin D2 value of 106 μg/100g and a vitamin D3 value of less than 10 μg/100g. similarly, dried wood mushroom ears from China, after being cooked (boiled for 2 hours), showed a vitamin D2 value of 6.3 μg/100g and a vitamin D3 value of less than 0.7 μg/100g. From these results, it was found that the vitamin D contained in wood ear mushrooms is mainly vitamin D2, and that it is highly likely that more vitamin D2 can be obtained through ultraviolet irradiation.

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INTRODUCTION

Vitamin D exists primarily in two forms: vitamin D2, found in plant-based foods, and vitamin D3, found in animal-based foods. The majority of vitamin D in the human body is vitamin D3, with only a small amount of D2. In addition to dietary intake, vitamin D3 is produced in the body from provitamin D3, an intermediate in the cholesterol production process in the skin, when exposed to sunlight (ultraviolet rays, UV-B). blood, where they are first metabolized into 25-(OH) hydroxyvitamin D, and then the majority enters the bloodstream. The 25-(OH) hydroxyvitamin D circulating in the blood is further metabolized in the kidneys to become 1,25-(OH) 2-dihydroxyvitamin D (active vitamin D) [1,2]. This activated vitamin D actually promotes the absorption of calcium and phosphorus from the intestines, thereby accelerating bone mineralization and fulfilling its role as vitamin D[1,2]. Vitamin D plays a role in the proper absorption of calcium and phosphorus from the intestines. When vitamin D levels are low and blood calcium levels drop, the secretion of parathyroid hormone increases, leading to calcium absorption from the bones[1,2]. Vitamin D is released, making bones brittle and leading to osteoporosis (low bone density) and fractures. Furthermore, vitamin D acts on skeletal muscles and is thought to be involved in physical function, thus helping to prevent falls in the elderly[1,2]. Therefore, this study focused on wood ear mushrooms, a food rich in calcium and vitamin D, and aimed to clarify analytical values as a first step in considering their effective use, in order to explore their potential applications as "food for the elderly," "food for the caregiving industry," "disaster relief food," and "space food."

METHODS

Regarding the vitamin D content (total of vitamin D2 and vitamin D3) of commercially available dried wood ear mushrooms from China (purchased at AEON supermarket), as reported in our previous paper (2025: Akitaka Kojima & Naomi Katayama) [3,4], we requested the Japan Food Analysis Center to analyze the vitamin D content again, separating it into vitamin D2 and vitamin D3. similarly, we ground commercially available dried wood ear mushrooms from China (purchased at AEON supermarket) into fine and coarse powder using a grinder (Iwatani Co., Ltd.: Millser), and then requested

the Japan Food Analysis Center to analyze the vitamin D content again, separating it into vitamin D2 and vitamin D3. 106%/100g, 10mg of vitamin D3.

RESULTS

For each type of wood ear mushroom, the vitamin D content, separated into vitamin D2 and vitamin D3, was obtained from the Japan Food Research Laboratories. (See Table 1)

Table 1. For each type of wood ear mushroom, the vitamin D content, Separate from the Japan food Research laboratories

Sample name	Vitamin D levels (total value published in the previous paper)	vitamin D2	vitamin D3	Analysis method
Dried wood ear mushrooms (from China)	83.5μg/100g	83. 5 μg/100g	Less than 3 μg/100g	high performance liquid chromatography
Boiled wood ear mushrooms (2 hours)	6.3 μg/100g	6.3 μg/100g	Less than 0.7 μg/100g	high performance liquid chromatography
Wood ear mushroom powder	93.3 μg/100g	93.3 μg/100g	Less than 3 μg/100g	high performance liquid chromatography
Wood ear mushroom coarse powder	106μg/100g	106μg/100g	Less than 10 μg/100g	high performance liquid chromatography

It has become clear that the total value reported in the previous paper is the vitamin D2 value reported in this paper. This study showed that commercially available wood ear mushrooms from China contain very little vitamin D3.

DISCUSSION

This analysis shows that wood ear mushrooms are rich in vitamin D2 and may be beneficial for preventing or treating osteoporosis in the elderly. However, since the vitamin D2 content can decrease depending on the cooking method, it is recommended to use them in powder form. Because consuming them with protein can help strengthen muscles in patients with osteoporosis, it is necessary to devise recipes that allow them to be consumed with foods that have an amino acid score of 100, such as milk, eggs, soybeans, fish, and beef. The JPOS (Japanese population-based osteoporosis study) research cohort investigated vitamin D sufficiency (measured by 25(H)D levels) in 1,211 women aged 50 and older and reported that 90% were deficient. Almost all women were vitamin D deficient. Vitamin D deficiency has been reported to lead to weakened immunity, increased risk of cancer, and potential risk factors for acute respiratory infections such as influenza. Therefore, since vitamin D is only an important nutrient not for bone health but also for immunity, it should be actively obtained from food. (Activated vitamin D drugs have been shown to be safe for long-term use and to have fracture-preventing effects. They increase bone density by promoting calcium absorption in the intestines, promoting calcification in bones, and inhibiting bone resorption.) However, vitamin D is fat-soluble, and there is a possibility of excessive intake. In particular, the effects of activated vitamin D drugs are enhanced when dehydrated, so caution is necessary. I still believe it's best to obtain the 9.0 μg/day recommended by the 2025 edition of the Dietary Reference Intakes for Japanese from food sources.

In the future, to increase the vitamin D2 content of wood ear mushrooms, we will irradiate them with ultraviolet light to increase the amount of vitamin D2. I'm thinking of developing a product using wood ear mushrooms that allows you to ingest vitamin D2. To facilitate the absorption of more vitamin D during the cooking process, it is necessary to devise recipes that use oil dishes or soups that are consumed completely[5,6,7]. Given the reported effects of vitamin D in preventing COVID-19 infection and its immune-enhancing effects when taken with vitamin A, it is necessary to introduce recipes that allow for more efficient intake of fat-soluble vitamins through diet[8].

CONCLUSION

In our previous report, we requested the Japan Food Research Laboratories to analyze commercially available Chinese wood ear mushrooms for vitamin D, and we have now resubmitted the analysis to obtain values for vitamin D2 and vitamin D3. The results showed that the majority was vitamin D2. Since sun-drying and UV irradiation are expected to increase the amount of vitamin D2, we plan to request the Japan Food Research Laboratories to analyze the vitamin D2 and vitamin D3 levels of domestically produced wood ear mushrooms in the future.

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