Mushrooms as Therapeutic Adjuvant of Cancer Therapies

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Mushrooms may act as a potentiator of host defense mechanisms and decrease adverse events in patients with cancer undergoing conventional therapies.

cancer mushroom

1.The Role of Mushroom Compounds Used as an Adjuvant to Conventional Cancer Therapies in alleviating Adverse Events

Although the role of mushroom active substances in mitigating the adverse effects of conventional cancer therapies is still unclear, some studies have suggested that in breast cancer patients [1] and in advanced hepatocellular cancer patients the oral administration of *Agaricus sylvaticus* [2] extract and *Coriolus versicolor* respectively, ameliorated the appetite and gastrointestinal symptoms such as diarrhea, constipation, nausea, and vomiting. The attenuation of conventional therapy adverse effects, such loss of appetite and alopecia were also observed using *Agaricus blazei Murill Kyowa* mushroom extracts in patients undergoing chemotherapy [3].

The use of *Antrodia cinnamomea* extracts as a chemotherapy adjuvant in patients with adenocarcinoma demonstrated that although gastrointestinal symptoms were more frequent, the intensity was lower compared to the untreated group [4].

In a preliminary study without a control group, Okuno et al. observed that during the first course of chemotherapy (without administration of *Lentinula edodes* mycelia extract) gastrointestinal cancer patients suffered from nausea and abdominal symptoms, and these adverse effects were not observed in the second course of chemotherapy, using *Lentinula edodes* mycelia extract combined with chemotherapy [5]. The use of *Lentinula edodes* mycelia extract in breast cancer patients [6][7] did not worsen or ameliorated the adverse events induced by the cancer conventional therapy.

2. Hematological Parameters Associated with the use of Mushroom Compounds as an Adjuvant in Conventional Cancer Therapies

The synergistic effects of mushrooms and cancer therapies in hematological parameters remain poorly described. In patients with breast cancer and advanced gastrointestinal cancer, no changes in hematological parameters were observed before and after the use of *Lentinula edodes* mycelia extracts [6][8]. Additionally, in breast cancer patients undergoing chemotherapy, Valadares et al. observed an increase in red blood cell count, hematocrit averages and corpuscular hemoglobin concentration . In a study involving adenocarcinoma patients, it was observed that the synergistic effect of chemotherapy and *Antrodia cinnamomea* extracts caused a decrease in the number of platelets [4].

3. Immunological Parameters Associated with the use of Mushroom Compounds as an Adjuvant in Conventional Cancer Therapies

In breast cancer patients undergoing chemotherapy, it has been observed that the administration of *Lentinula edodes* mycelia extracts can improve immune function [7] and prevent the reduction of natural killer (NK) cells activity [2]. Using a similar extract in advanced gastrointestinal cancer patients undergoing chemotherapy, Okuno et al [8] observed that the production of IFN-γ by $CD4^+$ T, $CD8^+$ T and $CD56^+$ tend to increase.

According to Ahn et al., extracts of *Agaricus blazei Murill* can improve the activity of NK cells in gynecological cancer patients undergoing chemotherapy [3]. A clinical trial suggested that *Coriolus versicolor* extracts lead to a decrease in interleukin (IL) 17F and monocyte chemoattractant protein-1 (MCP-1) levels and to an increase in prolactin and TNF-related apoptosis-inducing ligand (TRAIL) R1 levels in patients with hepatocellular carcinoma .

4. Quality of Life Associated with the use of Mushroom Compounds/Extracts as an Adjuvant in Conventional Cancer Therapies

In patients with advanced hepatocellular carcinoma, it was observed that the use of *Coriolus versicolor* extracts as an adjuvant in conventional therapy improved the quality of life of cancer patients. Patients treated with *Coriolus versicolor* experienced better physical, emotional, cognitive, and social functioning compared to the untreated group. The treated group patients also reported less pain compared to the untreated group . Through the application of an EORTC QLQ-30 modified questionnaire to cancer patients undergoing chemotherapy, Anh et al. observed that the use of *Agaricus blazei Murill Kyowa* extracts improved physical and mental conditions, in particular, emotional conditions, and general body strength [3]. Suzuki et al. reported that the use of Lentinula edodes mycelia extract as adjuvant significantly increased the quality of life and vitality of breast cancer patients undergoing postoperative hormone therapy, between week 4 to week 8 of treatment [7]. In a study of patients with advanced adenocarcinoma cancer, Tsai et al. observed that only sleep was significantly improved with *Antrodia cinnamomea* treatment combined with chemotherapy [4]. In breast cancer patients undergoing endocrine therapy, it was observed an improvement in physical function, and global quality of life. Fatigue, loss of appetite, and

anxiety were also significantly improved in patients treated with the mushroom extracts in comparison to the control group [9].

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