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Biological Activities of *Laetiporus* Species as a Functional Food

Sevindik M*
Department of Food Processing, Osmaniye Korkut Ata University, Turkey

***Corresponding author:** Mustafa Sevindik, Department of Food Processing, Osmaniye Korkut Ata University, Bahçe Vocational School, Osmaniye, Turkey, Email: sevindik27@gmail.com

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Mini Review

In recent years, the increasing interest in human health, nutrition and prevention of diseases led to the popularity of functional foods among consumers. Several researchers attempt to obtain potential natural bioactive components from various natural sources using different methods [1-4]. Mushrooms, which are rich in organic and inorganic content, are also natural products that have various effects. As a result of metabolic and physiological processes, secondary metabolites produced continuously in organisms lead to various biological activities both for the organisms they are synthesized in and for other groups of living organisms that consume these natural products [5,6]. Mushrooms create a strong defense mechanism in their organism due to the secondary metabolites they synthesize. Furthermore, they have a high nutritional value and bioactive potential both in the defense mechanism and as nutrients in the organisms that consume these natural materials [7-9]. Cosmopolitan macro-mushrooms are considered to span 53-110 thousand species in nature [10]. Since ancient times, humans have collected and consumed several mushroom species that were available in their natural habitat as nutrients. In addition to their nutritional properties, natural mushrooms contain many various active biological compounds. Due to these properties, they are also considered important medical and pharmacological sources [11-13].

Previous studies reported various biological activities of mushroom species such as anti-inflammatory, DNA damage protective, antioxidant, anti-androgenic, antimicrobial, cytotoxic, ant-cancer, antiemetic, antiallergic, antiparasitic, sedative, anti-cholinesterase, hepatoprotective, and acute toxicity, anti-mutagenic, cardiovascular and anti-tumor effects [14-29].

The studies conducted on these living organism groups with pharmaceutical significance, are still very few and the knowledge on their chemical profiles and bioactivity potential is very limited. In the present paper, biological activity data for *Laetiporus* species, which exhibit cosmopolitan distribution in natural ecosystems, are presented.

Laetiporus species

Laetiporus name is a combination of two words "laeti" (Lat.) and "por" (Lat.) and refers to a hymenial layer and the size of the specifically shaped fruiting bodies [30]. The genus *Laetiporus* was described by Murrill (1904) and typified by *Agaricus speciosus* [=Polyporus sulphureus (Bull.) Fr.] as a monotypic genus [30,31]. It causes decay especially in oak (*Quercus* sp.) trees, hardwood and conifers. The mature mushroom is yellow-orange [32].

Figure 1: *Laetiporus sulphureus* (Bull.) Murrill.

Biological Activities

In previous studies conducted on *Laetiporus* species, several biological activity tests were conducted using different methods and solvents. These studies reported antioxidant, antimicrobial, anticancer, hepatoprotective, antiproliferative, antitumor, immune-stimulating, mutanase, enzymatic, anti-hypercholesterolemic, anti-inflammatory, DNA protective, anticoagulant, acetylcholinesterase inhibition activities, reverse transcriptase of HIV-virus inhibitors, anti-thrombin effects and hypoglycemic activities in *Laetiporus* species [33-71] (Table 1).

Laetiporus species	Biological Activity	Extraction
L. sulphureus	Antioxidant [33,35,38,39,41,43,44,46,51,55,59-61,69,70], Antimicrobial [33,36,38-41,44,45,50,52,53,55,61,70], Anticancer [34], Hepatoprotective [35], Antiproliferative [38,39,48,64,65,67,68], Antitumor [42,57], Immunostimulating Activity [42], Mutanase activity [47], Enzymatic activity [49], Anti-hypercholesterolemia [56], Anti-inflammatory [57, DNA protective activity [61], Anticoagulant [62], Acetylcholinesterase inhibition [69], Reverse transcriptase of HIV-virus inhibitors [71]	Ethanol [33,34,41,44,60,51,61,69], Aqueous [36], Cyclohexane [38], Dichloromethane [38,40,53,71], Methanol [38-41,44,55,60,70,71], Polysaccharidic extract [35,39,42,43,46-48], Acetone [40], Water [41], Strains [45,49], Hot water extract [46,56], Hydroalcoholic extract [52], Heptane [53], Diethylether [53], Chloroform [53,70], Ethyl acetate [53,59], Metabolites [57,64, 65,67,68], Crude extract [62]
L. sulphureus var. miniatus	Anti-inflammatory [37], Anti-oxidative [54], Anti-thrombin effects [54], Antiproliferative [54,66], Hypoglycemic [63]	Polysaccharidic extract [37,63], Hexane [54], Chloroform [54], Metabolites [66]
L. baudonii	Antimicrobial [58]	Dichlormethane [58], Methanol [58], Water [58]

Table 1: Biological Activity of *Laetiporus* species.

Conclusion

In addition to being a source of nutrients for human beings, mushrooms are also used in supplamentary and supportive therapies in medicine due to their carious biological profiles and pharmacological properties in their chemical profiles. In the current study, biological activities of *Laetiporus* species are presented. In this context, it was suggested that *Laetiporus* species could be used as supplementary agents in treatment of various diseases in addition to their nutritional properties and they would occupy an important place in the development of new pharmacological new agents due to their active components. The potential of *Laetiporus* species for use in design of modern medicines by determination of their phytochemical content and isolation of these compounds is noteworthy. Furthermore, it can be stipulated that the adverse effects of current medical drugs could be eliminated as a result of the above-mentioned designs. In conclusion, it was considered that the use of *Laetiporus* species in complementary medicine is very important and the mushrooms have a significant potential as important natural agents in development of pharmacological drugs.

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