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MEDICAL PROPERTIES OF HYPSIZYGUS ULMARIUS (BULL.)

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ABSTRACT

Mushrooms have been used traditionally by ancient people as a source of foods and in their religious activities. Ethnomycology of mushrooms have been reported in many countries including India. Many species of mushrooms provide an excellent source of natural compounds that are useful for the treatment of many diseases. Among these mushrooms, *Hypsizygus ulmaris* (Bull.), is used in many purpose due to it is flavor, texture , nutritional content and medicinal properties. Different types of *Hypsizygus ulmarius* (Bull.) extracts have been showed their activity against bacteria, diabetes, inflammation, tumor and it also provide a good source of antioxidants. The objective of this paper is to provide a review on medical properties *of Hypsizygus Ulmarius* (Bull.) that have been studied.

KEYWORDS: *Hypsizygus ulmarius* (Bull.), antibacterial, antidiabetic, anti-inflammatory, antitumour, antioxidant.

INTRODUCTION

Edible mushrooms are saprophytic macrofungi which belong to class Basidiomycetes. Mushrooms have been used and consumed by ancient people. Traditional knowledgement about mushroom benefits have been transmitted from one generation to another one orally. It has been mention in ancient texts like Vedas. Roman and Chines, think that mushroom have a power for life and strength and it is the God Osiris gift for them. In ancient days in India, China and Iran, people used mushrooms in their religion activities.[1,2,3,4] Ethnomycology of edible and medicinal mushrooms have been reported in many countries like India and China.[5,6]

Mushrooms are described as highly tasty and nutritional foods by many populations around

the world.[7] Mushrooms nutritionally contain carbohydrate, protein, vitamins, essential oil, fibers, unsaturated fatty acid , enzymes and minerals. They considered as a good source for many bioactive compounds that used for medical purpose (therapeutic applications).[8,9,10,11,12,13,14]

Number of mushrooms is approximately 14.000 species and only 14.000 species are described. Among this 14.000 species only around 2000 species are safe to consumed and 650 species contain medical properties.

In past thousands years ago various types of mushrooms were recognized by human beings edible and non-edible. They are also identified as a source of food and medical treatment purpose. It is used in traditional treatments in many countries such as Mexico, Japan, China, Africa, Korea and in Central and North American countries. They used them as anti-inflammatory, blood coagulant, wound healing, analgesic agents.[6,15,16,17]

Mushrooms until today still under interested conditions particulary as a source of food and due to their nutritional value they play an important role in commerce for many countries around the world.[18] Also, due to their medical properties many researchers still investigate their medical properties to treat a lot of diseases such as microbes infection, cancer, high cholesterol, oxidant, diabetes, low immune response and inflammatory reactions.[19,20,21,22]

Among the several numbers of edible mushrooms *Pleurotus* (Fr.) genes is known worldwide due to it is properties. *Pleurotus* (Fr.) was first cultivated during the first world war in Germany and Kaufer was the first person who documented the cultivation.[23] Now, many *Pleurotus* (Fr.) species are cultivated around the world because of their short life cycle, rich in mineral content and medical compounds and dose not required high technology and expenses.[24]

Hypsizygus ulmarius (Bull.), commonly called as "Elm oyster" or "Blue oyster" is similar to Oyster mushroom, but differ in morphology and biological efficiency. It is a novel species with very large fruiting body, blue coloured pinheads becoming light white on maturity, high yield repeatable with meaty flavor and attractive keeping quality. This new mushroom variety has attractive shape and fleshy with excellent taste.[25] This mushroom is one of the important edible mushrooms in the world and it is a popular fungus cultivated in Japan, China and other Asian countries.[26]

It is used for various purpose due to its remarkable flavor, texture , nutritional content and medicinal properties. Nutritionally, this mushroom contains 23.6% protein, 2.2% fat, 52.4% carbohydrates and 12.9% fiber on dry weight basis. Medically may be considered as good source of phytochemicals that can be used in pharmaceutical medical and food additives. It is known for anti-tumor,cholesterol controlling and cardiovascular properties.[27,28]

Taxonomy of *Hypsizygus ulmarius* (Bull.)

It is placed in

Phylum: Basidiomycota

Class: Basidiomycates

Subclass: Agaricomycatideae

Order: Agaricales

Family: Tricholomataceae.[29]

MEDICAL PROPERTIES OF *HYPSIZYGUS ULMARIUS* (BULL.)

Pharamacological research on *Hypsizygus ulmarius* (Bull.) are summarized.

Antibacterial activity

Due to the increasing in numbers of drug resistant bacteria , many researchers try to find new types of antibiotics which have effect on bacteria and also save for human health.

Mushrooms possess several types of natural antifungal and antibacterial compounds to survive in their natural environment. They are rich in antibacterial compounds. Many of the externalized secondary metabolites (extracellular secretions by the mycelium) are known to combat bacteria.[30,31,32] Several active compounds extracted from mushroom revealed antibacterial activity, namely against *Staphylococcus aureus*, *Bacillus subtilis* and *Escherichia coli*.[33]

The effect of aqueous extract from fruiting body of *Hypsizygus ulmarius* on five oral bacteria isolates have been studied. *Hypsizygus ulmarius* showed a good inhibition effect against bacterial isolates number 1 and 2 from above five oral bacterial isolates and no significant effect against the rest of three bacterial isolates.[34]

Antidiabetic properties

Diabetes mellitus is one of the most common disease that infect people around the world. This disease is caused by a defect of β cells of islets of langerhans of the pancreas to produce

insulin that control blood sugar.[35,36] Approximately 150 million people around the world suffering from diabetes mellitus and it is expected that the number will be increase to 300 million in 2025 and 439 million in 2030.[37,38] The effect of aqueous extract of fruiting body, mycelia and culture filterate of *Hypsizygus ulmarius* at two different doses on Streptozotocin-Nicotinamide induced diabetic male Sprague Dawley rat for 30 days has been studied.

Treatment of diabetic rats with two different doses of water extracts (50 mg and 100 mg /kg/body weight twice a day) showed a significant decreased in in the level of glucose and increase the level of insulin and protein in serum of induced diabetic rats in compare to non-treated induced diabetic rats.

Also, water extract showed a reduced effect on activities of marker enzymes Aspartate Aminotransferase, Alanine Aminotransferase and alkaline phosphatase in serum , liver and kidney and on activities of glyconeogenic enzymes, glucose-6-phosphatase and fructose, 1,6-diphospatase, in liver and kidney in induced diabetic rats when compared to non-treated induced diabetic rats. Activity of glycolytic enzymes, Hexokinase and phosphogluco-isomerase, were increased when diabetic induced mice treated with aqueous extract of *Hypsizygus ulmaris* in compare with non-treated induced diabetic rats.[39]

Anti-inflammatory and antitumor activity

Inflammation disease is a group of disorders which are characterized by abnormal inflammatory response.[40] It has been proved over the last years that the inflammation play an important role in many disease such as cancer and other diseases.[41,42,43]

Cancer is a disease that characterized by irregular proliferation of cells. it is a terrible disease and it is the second killer disease around the world. There are more than 100 types of cancer in the world.[44,45,46,47,48]

Many mushrooms have been studied for their therapeutic properties such as anticancer, anti-inflammatory, anti-viral, anti-oxidant and as immunomodulating.[49,50,51,52]

The effect of aqueous ethanolic extracts of both fruiting body and mycelia of *Hypsizygus ulmarius* on induced inflammatory mice at different doses (250, 500 and 1000 mk/kg)were reported. both chronic and acute inflammation were induced in the right hind paw of experimental mice. A decrease in paw thickness of chronic and acute inflammation were showed. The mycelial extract show a higher effect than fruiting body(both in1000mg/kg

dose), in which the percentage of inhibition were 63% and 52% in acute inflammation and 55% and 42% in chronic inflammation, respectively.

Also, a strong antitumor effect of both fruiting body and mycelia of *Hypsizygus ulmarius* ethanolic extracts on Dalton's Lymphoma Ascites induced solid tumor in grain region of male mice at different doses (250,500 and 1000mg/kg) have been reported. The extracts showed a preventative and curative antitumor effect in a dose dependent manner. The aqueous ethanolic extract of mycelia show a higher antitumor effect in compare to fruiting body extract. Percentage of inhibition were 78% and 66 % in preventative effect and 85% and 78% in curative effect at a dose of 1000 mg/kg, respectively.[28]

Effect of purified exoploysaccharide extracted from mycelia of *Hypsizygus ulmarius* on MCF breast cancer have been studied. Concentration of ethanolic polysaccharide extract was 1mg/ml. Purified extract showed a high anticancer activity against MCF breast cancer and percent of viability of cancer cells was 47.63%.[53]

Antioxidant properties

Oxidative stress is an event occur as a reason of imbalance between formation and removal of reactive micro molecules. These reactive micro molecules are produced in mammals cells when respond to exogenous damage of cells and may be lead to disease such as cancer, diabetes, cardiovascular disease and many others disorders.[54,55] A number of studies reports that mushrooms have antioxidant properties.[56]

The effect of aqueous ethanolic extracts from fruiting body and mycelia of *Hypsizygus ulmarius*, Purified exopolysaccharide ethanol extract and methanol extract from mycelia of *Hypsizygus ulmarius* as antioxidant have been reported. Extracts showed a good antioxidant properties using different tests such as free radical scavenging activity, Hydroxyl radical scavenging activity, ABTS radical – scavenging activity,reducing power, chelating effect on ferrous ion, Inhibition of lipid peroxidation and phenol estimation).[57,28,53]

CONCLUSION

Hypsizygus ulmarius is a world known mushroom. This species provide an excellent sources of natural products that can be used for the treatment of many diseases. Among researches that focus on the study of this mushroom, it has been provide that *Hypsizygus ulmarius* contain pharmacological compounds that can be used as antibacterial, antidiabetic,

antiinflammarory, anticancer and antioxidant.

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