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MUSHROOMS AS AN EFFECTIVE CONTROL OF COCCIDIOSIS IN BRIOLERS

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ABSTRACT
Coccidiosis is the most important protozoan disease affecting the poultry industry worldwide having the greatest economic impact on poultry production costing about 800 million $ worldwide annually. The incidence of coccidiosis in chickens has been the subject of intense study and there are more recorded details on their life cycle, physiology, pathology, and prophylactic and therapeutic control than on those of similar other parasites. Although a lot of research efforts have been allocated towards molecular techniques, but their practical use is not available. Control of poultry coccidiosis is presently based on managerial skills and the use of prophylactic coccidiostat drugs. But, the continuous use and misuse of anticoccidial drugs have led to the emergence of drug-resistant strains. Furthermore, drug residue in the poultry products is also un-desirable for the consumer. Therefore, there is need to find out the safe alternatives for the control of avian coccidiosis. Mushrooms are rich sources of natural antibiotics, and therefore mushrooms extracts have been investigated for their antimicrobial activity .They are recognized as an important source of biologically active compounds of medicinal value. In this context, use of medicinal Mushrooms could prove a potential alternative for control of coccidiosis. Thus further research need to be carried out in this direction so as to explore new medicinal mushrooms for their potential in controlling these coccidian parasites .Thus the aim of this study is to evaluate the anticoccidial effects of bioactive compounds extracted from mushrooms against *Eimeria* infected broilers.

KEY WORDS: Broilers, Coccidiosis, Mushrooms.

INTRODUCTION

Coccidiosis is the most important protozoan disease affecting the poultry industry worldwide. It is a parasitic disease of poultry caused by microscopic protozoan-type parasite called *Eimeria.* On the basis of affecting organs, the disease is classified as intestinal coccidiosis affecting the small intestine and caecal coccidiosis affecting the large intestine (caeca). At least nine species of *Eimeria* are known to occur in poultry (Jordan and Pattison, 1996). Most *Eimeria* species affect birds between 3 and 18 weeks of age and can cause high mortality in young chicks (McDougald, and Mattiello, 1997). In general, the losses caused by coccidiosis without including the sub clinical coccidiosis are estimated to be 2 billion USD throughout the world (O'Lorcain *et al.*, 1996). Coccidiosis is characterized by dysentery, enteritis, emaciation, drooping wings, poor growth and low production. In all parts of the world where confinement rearing is practiced, coccidiosis represents a major disease problem demanding attention of poultry producers, feed manufactures and poultry disease experts. The economic importance of the disease is due to its high rate of morbidity and mortality in young birds, reduced feed conversion efficiency and egg production in sub-clinical cases. It is considered to be a disease of poor management. The continuous use of anticoccidial drugs have led to the emergence of drug-resistant strains. Furthermore, drug residue in the poultry products is also un-desirable for the consumer. Therefore, there is need to find out the safe alternatives for the control of avian coccidiosis. In this context, a number of mushrooms and bioactive compounds have been found to be effective for a broad range of parasites such as protozoa, arthropods and helminths. Mushrooms also have high medicinal value and thus can be used for control of poultry coccidiosis. This study will greatly help to develop safe control strategy against coccidiosis.

SIGNIFICANCE OF STUDY

The present review is aimed to summarize the therapeutic importance of various mushrooms and explore further research in various areas in order to develop a new generation of modern drugs.

MUSHROOMS AS THEURAPUTIC AGENTS

Mushrooms have been known for their nutritional and culinary values and used as medicines and tonics by humans for ages. The use of mushrooms as medicine was mentioned by Berkeley (1857), who reported that *Calvatia gigantea* (against puffball) and *C. caelata* can be used in burnt cases due to their anesthetic nature. Mushrooms represent a major and as yet, largely untapped source of potent new pharmaceutical products. Out of approximately 15000 known species, 2000 are safe for human consumption and 650 of these possess medicinal properties. Compounds and complex substances with antimicrobial, antiviral, antitumor, antiallergic, immunomodulating, anti-inflammatory, hypoglycemic, hepato-protective and central activities are covered, focusing on the review of recent literature. Some of the medicinal values associated with mushrooms must have arisen from superstitious beliefs and myths; they have provided information for curiosity research studies (Table 1). Research has shown that some of these claims are not mere myth but are authentic (May et. al., 1998; Jonathan and Fasidi, 2003). Benedict and Brady (1972), tested the

activities of some selected mushroom metabolites on some bacteria and reported that the best inhibitory responses were seen against gram positive organisms including acid fast bacterium and pathogenic strains of yeast.

Table 1. Compounds showing antimicrobial activity

MUSHROOMS	BIOACTIVE COMPOUNDS	BIOACTIVITY	REFERENCE
Agaricus campestris	Lectins	Hypoglycemic	Ahmad *et al*., 1984
Grifola frondosa	MD-fraction, ergosterol	Antioxidant	Wang *et al*., 1995 and 1996
Coprinus atramentarius	Illudin c2 and Illudin c3	Antimicrobial	Lee *et al*,1996
***Mycena* sp.**	Strobilurin M,Tetrachloropyrocatechol	Antifungul, Antibacterial	Daferner *et al*,1998
Lentinus edodes	Lentinan	Antiviral	Mizuno,2000
Ganoderma lucidum	Ganoderan	Antiviral	Wasser,2005

Global applications of mushrooms

Liu *et al*. (2006), studied the protective effect of orally administered hot-water extract from a Chinese herbal medicine, *Cordyceps sinensis* (CS), in mice suffering from bone marrow and intestinal injuries after total-body irradiation. The results showed that CS increased the median time to death from 13 to 20 days after 8 Gy TBI and from 9 to 18 days after 10 Gy TBI. Although CS treated mice receiving 10 Gy TBI survived intestinal injury, most died from bone marrow failure, as shown by severe marrow hypoplasia in mice dying between 18 and 24 days. At lower TBI doses of 5.5 and 6.5 Gy, CS protected against bone marrow death, an effect that was confirmed by the finding that white blood cell counts recovered more rapidly. *In vitro*, CS reduced the levels of free radical species (ROS) within cells.

Ogbe *et al.* (2008), evaluated the immune enhancing effect of a wild Ganoderma mushroom (*Ganoderma lucidum*) to infectious bursal disease vaccine. The results showed that in both qualitative and quantitative Agar gel precipitation test, there was positive response in all the vaccinated groups at 6 weeks of age. Enzyme-Linked Immunosorbent Assay revealed seroconversion at 4 weeks of age in the vaccinated birds. The study highlighted the benefits of wild *Ganoderma lucidum* in enhancing immune response of chickens to infectious bursal disease vaccination.

Ogbe *et al.* (2009), evaluated the proximate, chemical composition of a wild mushroom, *Ganoderma* sp. and its effect on growth of pullets. The results showed that supplementation with mushroom resulted in better feed efficiency and the effect is dose dependent. It was concluded that this mushroom can be a valuable source of feed supplement to improve performance and health.

Kumar *et al*. (2010), studied the antibacterial, anthelmintic and antioxidant activity of a macrolichen *Parmotrema pseudotinctorum* (des. Abb.) Hale (Parmeliaceae) collected from forest area of Bhadra wildlife sanctuary. The extract exhibited marked antibacterial activity. The minimum inhibitory concentration of the extract was found to be lesser in case of Gram negative bacteria than Gram positive bacteria. The lichen extract exhibited a dose dependent inhibition of spontaneous motility.

Lindequist *et al.*, (2005) describes the pharmacologically active compounds isolated from mushrooms. These compounds and complex substances were reported to possess antimicrobial, antiviral, antitumor, antiallergic,

immunomodulating, anti-inflammatory, antiatherogenic, hypoglycemic, hepatoprotective and central activities. Chen *et al.,* (2006) studied the Anti-Aromatase Activity of Phytochemicals in White Button Mushrooms (*Agaricus bisporus*) White button mushrooms (*Agaricus bisporous*) are a potential breast cancer chemopreventive agent, as they suppress aromatase activity and estrogen biosynthesis.

Zarzosa *et al.,* (2011) evaluvate and test the antibacterial and cytotoxic activity from basidiocarp extracts of the edible mushroom *Lactarius indigo against diarrheagenic Escherichia coli strains (EIEC, EPEC, ETEC-LT and ETEC-ST), Pseudomonas aeruginosa, Enterobacter cloacae, Staphylococcus aureus and Salmonella enteric.* Results showed that L. indigo basidiocarps contain substances with antibacterial and cytotoxic activities.

Jonathan *et al.,* (2010) test the Invitro antagonistic effect of the ethanol, methanol and distilled water extracts of the fruit bodies of three Ganoderma species namely *G. lucidium, G. applanatum and G. australe* against some disease causing microorganisms. Both crude and pure extracts of these *Ganoderma* species exhibited various degree of inhibition against the test organisms

CONCLUSION

The research reports summarized in this profile highlight the medical importance of mushrooms as antimicrobial, antibacterial, antifungal, antitumor, antidiabetic etc. However, the screening of mushrooms from different ecological and geographical regions of the world still needs to be screened for the presence of pharmacologically active compounds.

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