

Bioflavonoids of Mushroom: A potent Anticlastrogen



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Submission: 📅 December 06, 2018; Published: 📅 January 23, 2019

Abstract

A clastogen is a process in which breakage of chromosomes had done by oxidation. Carcinogenesis can be induced by this form of mutagenesis, as cells may become cancerous that are not killed by the clastogenic effect. In this review study we can find out the anticlastogenic effect of different flavonoids from different types of edible mushroom. By the help of review study, we can suggest that most of the mushrooms showed antioxidant and antimicrobial activities in several ways. By the help of antioxidant nature of mushroom, we can inhibit the oxidation process in mammalian cell in vivo condition. From the above research prospect, we get some statistical value which shows the chromosome aberration from that result we can suggest how much capability has a mushroom as anticlastogenic on mammalian cell. Though we can suggest mushroom as a possible medicine for cancer cell or oxidative cell of mammalian.

Keywords: Edible mushroom extract; Antioxidant activity; Clastogenic effect on Mammalian Cel

Introduction

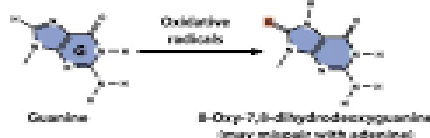
A clastogen is a process in which breakage of chromosomes had done by oxidation. Carcinogenesis can be induced by this form of mutagenesis, as cells may become cancerous that are not killed by the clastogenic effect. Discovered clastogens include acridine yellow, benzene, arsenic, ethylene oxide, phosphine and mimosine. Influence of naturally occurring chemical compounds that are dietary components of humans is much interesting for scientists. Polyphenols are of plant origin that are biologically active and

are classified as non-nutrients. The widespread polyphenolic compounds throughout the world has stimulated interest in possibility of its use in chemoprevention of carcinogenesis and its related phenomenon. Polyphenols consist bioflavonoid with intriguing and varied therapeutic and chemo-protective activities generally Figure 1. However, many flavonoids have also been shown to be genotoxic in variety of prokaryotic, eukaryotic and in vivo system.

Chemically induced mutagens

• Oxidative reactions

- Reactive forms of oxygen
- Causes transversions
 - G pairs with A



• Intercalating agents

- Insert themselves into DNA
- distorts molecule
- Often causes frameshift mutations



Figure 1: Chemically induced mutagens.

National scenario

In a study by [1], clastogenic activity of chromium compounds though it was mildly clastogenic can be inhibited by dietary administration of black tea infusion was found to be significantly. In this review they have showed the antioxidation nature of tea extract on mammalian cell in vivo condition [1,2].

The northeast region of India is a great source of large numbers of edible and non-edible mushroom species specially Nagaland state in northeast region in India. In a study by a company a total of 15 species of mushrooms were collected. Four species which belong to family Agaricaceae, two belong to Tricholomataceae and rest belong to Boletaceae, Cantherallaceae, Russulaceae, Sarcoscyphaceae, Auriculariaceae, Polyporaceae, Schizophyllaceae, Pleurotaceae and Lyophyllaceae. The documentation of wild edible mushrooms is very scanty in Northeast India [3,4].

Mushrooms have a long tradition of use in many Asian countries and have been used as food and medicines. They are flavorful food full of proteins, Vitamin B, many other minerals and have almost all essential amino acids. Hypertension, hypercholesterolemia and cancer diseases can be inhibited by mushroom. A wide variety of pathological damage such as carcinogenesis and rheumatoid arthritis can be caused by oxygen-derived free radicals. Protein hydrolyzates, phenolic compounds, and some amino acids, present in different foods, were found to have antioxidant properties. Phenols are important plant constituents because of their scavenging ability due to the presence of hydroxyl groups [5]. A few types of mushrooms are found in South India region showed the antioxidative and antitumor activities. Examples of mushrooms are *Phellinus rimosus*, *Ganoderma lucidum*, *Pleurotus pulmonaris*, and *Pleurotus florida* [6,7].

Considering less than 25 species of mushrooms among all which exist, are widely accepted as a food source. Mushrooms are found in diet of various Naga tribes in North East India. Fresh mushrooms are used generally but dried mushrooms can also be consumed during off seasons. These mushrooms show different biological activities like anticarcinogenic, anticholesterol and immunostimulating activities [8-10].

Mushrooms are nutritionally functional food and have activities as non-toxic medicine for ailments for a cancer, heart ailments, diabetes, high blood pressure, renal failure etc. *Auricularia auricular* (Hook) Underw, belongs to the family Auriculariaceae, is an edible mushroom commonly called tree-ear or wood ear which is distributed worldwide. Polysaccharides of *auricularia* sp have stimulatory effect on the human immune system. The production of interferon and interleukins that stops the proliferation of cancer cells, they have also been found to have anti-tumour, cardiovascular hypocholesterolemia, anti-viral, anti-bacterial and anti-parasitic effects [11,12].

Fungi, because of their variety and economic and environmental importance, have been occupying a prominent position in the biological world. The study of fungal biodiversity has been carried

out worldwide (Crous, 2006) and 1.5 million species have been reported so far (Hawksworth, 2004). About 50% of them have been characterized (Monoharachary et al., 2005). The total numbers of fungal species in India is 27,000 (Cowan, 2001; Chang and Miles, 2004). Mycology is an emerging area of Biotechnology and they are intimately related with our life (Monoharachary et al., 2005). Macrofungi are unique from fungal diversity point of view that grow prolifically and are found worldwide (Smith, 1963). Traditional mycological knowledge of most Indo-ethnic groups has proven to be extensive and profound, consuming nearly 283 species of wild mushrooms out of 2000 recorded world over (Purkayastha & Chandra, 1985). Wild edible Macrofungi collected from the forest by its tribes and sold in the local markets of the Khasi hills of Meghalaya, India have been documented for their traditional uses and ethnic relevance. In a review of 11 different identified species based on their morphology that belonged to 9 genera and 8 families, *Clavulina* spp was found to be the most abundantly available species whereas *Albatrellus* spp was rare in the local markets [13,14].

International scenario

Morchella conica Pers. Is a well known and extraordinary mushroom species found in mainly Turkey whose head is in conical shape and deep brown in color. The texture is sponge-like. It mainly grows in chalky soil in grassy woodlands. It can be found fresh and dried position. This mushroom shows the antioxidant and antimicrobial activity. Extract obtained with ethanol were investigated that the phenolic compounds and total flavonoid concentration of mushroom showed the antioxidant and antimicrobial nature. The antimicrobial activity of *M. conica* solvent extract was tested on some pieces of gram-positive bacteria, few species of gram-negative bacteria and also on one species of yeast. The *M. conica* solvent extract showed narrow antibacterial activity against microorganism. *Mariniluteicoccus flavus* is a Gram-positive, aerobic which is most affected by the solvent extract of *M. Conica* as antibacterial material [15-17].

Mushrooms are worldwide distributed especially in wild area it is also a popular dietary food in many countries. Mushrooms consist of phenolic compounds, polyketides, terpenes, steroids, carbohydrate and protein. In case of the antioxidant compounds, polyphenols have gained importance role due to their large array of biological actions. Polyphenols also showed free radical scavenging, metal chelation enzyme modulation activities and inhibition of LDL oxidation, among others. The term polyphenol refers to a complex group of compounds that includes in their structure an aromatic ring bearing one or more hydroxyl groups. They comprise simple phenols such as phenolic acids and derivatives, as well as complex structures such as flavones, flavonoids or anthocyanins, among others. Wild mushroom from the Turkey showed the antioxidant nature in this review they find out the mushroom extract by the help of methanol which showed the antioxidative nature. Methanolic extracts of mushroom were mixed with 0.95 ml of ferric TPTZ reagent which showed the antioxidant nature of mushroom [18,19].

Five species of edible mushrooms from the Malaysia also showed the antibacterial and cytotoxic activities. Radical scavenging, metal chelating, antibacterial and cytotoxic activities showed by five edible mushrooms (*H. tessulatus*, *P. eryngii*, *P. florida*, *A. polytricha* and *F. velutipes*) from Malaysia. Ethanol extract had done of dried powder of these five mushrooms. Radical scavenging and metal chelating assays were based on the measurement of 1,1-diphenyl-2-picrylhydrazyl (DPPH) and ferrozine absorbance at 517 and 562nm, respectively. Total phenolic and flavonoids content of mushroom can be determine by the spectrophotometric methods. Antibacterial activity can be measured by the help of Kirby-Bauer Susceptibility test. Cytotoxicity was assed using brine shrimp toxicity assay [20-22].

Mushrooms have been appreciated as sources of food nutrients and pharmacologically important compounds useful in medicine. Yet not all the medicinal properties of mushrooms have been exploited. The above statement is more pertinent to mushrooms that are indigenous to Nigeria. There are several mushrooms which showed the medicinal activity on different disease as *Pleurotus tuber-regium* used for headache, stomach pain fever, cold, constipation; *Lentinus squarulosus* for mumps, heart diseases; *Termitomyces microcarpus* for gonorrhoea; *Calvatia cyathiformis* for leucorrhoea, barrenness; *Ganoderma lucidum* for treating arthritis, neoplasia; *G. resinaceum* used for hyperglycemia, liver diseases (hepatoprotector); *G. applanatum* used as antioxidant and for diabetes [23-25].

Future research prospect

From the above study we can suggest that most of the mushrooms showed antioxidant and antimicrobial activities in several way. By the help of that antioxidant nature of mushroom we can inhibit the oxidation process in mammalian cell in vivo condition. At the very first report above showed how tea flavonoids worked as antioxidant compound against a known clastogen in vivo condition on Swiss male mice. Though we can give the mushrooms extract as phenolic compound or direct mushroom to mammalian against known clastogen to find out the inhibition power of mushroom extract or mushroom on mammalian cell [26,27]. In case of research prospect we should find out a very common mushroom or its extract which showed the antioxidant nature in any way either in vitro condition or any chemical reaction. Then the mushroom extract or mushroom directly introduce to mice daily wise for seven days. And another set of mice should introduce with a clastogen (potassium dichromate) for seven days. And another set of mice would introduce with both potassium dichromate and mushroom extract or mushroom. One set of mice wouls introduce nothing as blank. After the seven days the all mice should be killed to study the bone marrow chromosome aberration.

Conclusion

From the above research prospect, we will get some statistical value which shows the chromosome aberration from that result we can suggest how much capability has a mushroom as anticlastogen

on mammalian cell. Though we can suggest mushroom as a medicine for cancer cell or oxidative cell of mammalian.

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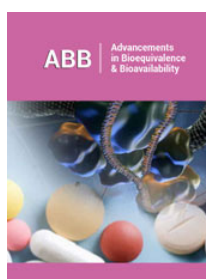
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