

Emergence of Allium Cepa as Antitubercular Agent

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Abstract

Tuberculosis (TB) is the main cause of morbidity in modern era and a latent infection affecting nearly one third of world's population including forty percent from India. There is an urgent need to explore the effective and promising new anti-tubercular drugs to combat against Tuberculosis. Nature provides diverse secondary metabolites with anti-tubercular activity in medicinal plants. Among them Allium cepa (onion), contains various constituents like quercetin, fructose, quercetin-3-glucoside, isorhamnetin-4-glucoside, xylose, galactose, glucose, mannose, organosulfur compounds, allylsulfides, flavonoids, flavenols, S-alk(en)yl cysteine sulfoxides, cycloalliin, selenium, thiosulfinates, and sulfur and seleno compounds that have proved to have protective role in tuberculosis. Allium cepa (onion) possesses antibiotic activity against both Gram-positive and Gram-negative bacteria and can be used to prevent tuberculosis most effectively.

Index terms—

1 I. Introduction

Tuberculosis (TB) has emerged as one of the most serious and devastating that contributes the great loss of life and has been growing on pandemic rate. Medicinal plants have been used from long back the centuries and thus have shown very promising results. They have been used as pure as a raw material and thus have been elucidated. Out of the numerous plants, a small fraction has been screened out for their therapeutic efficacy. India has a rich culture with widespread use of herbal drugs for their elucidation of the mechanistic role that proves to be effective. The increase in the resistance of MDR and XDR further warrants the urge for the discovery of new drug that can be effectively screened out for the benefit of the mankind.

The issue of multidrug resistance has been increasing at an alarming rate. Mutation either at the genetic level or the transcriptional level leads to various deregulations that have been associated with the concept of multi drug resistance. The inculcation of the chemotherapy in the management of MDR-TB ensures the high risk of toxicity that is posing more dangerous to the mankind.

The second line drugs used to treat TB has been associated with great probability of drug resistance. This led to various devastations that further poses damage to the health of an individual. The WHO recommends the use of herbs in order to combat the various types of resistance so that therapeutic effect can be attained without compromising the quality of the life care of the patient. The worldwide research conducted on a number of plants gave very promising results and thus can be explored to attain the therapeutic benefits.

Allium cepa (onion) has been used in India from long centuries before and is almost exclusively used throughout the world. Research conducted on various studies suggest the use of Allium cepa as antimicrobial, anti-cancer, antioxidant, antidiabetic, antihypercholesterolemic, anti hyperglycemic, anti mutagenic, cicatrizant effects, hemostatic, osteoclastic and anti-cardiovascular effects and thus gave very effective results. The effect of Allium cepa against gram positive and gram negative microorganisms like Escherichia, Salmonella, Staphylococcus, Streptococcus, Klebsiella, Proteus, Bacillus, clostridium, Helicobacter pylori and even acid-fast bacilli (AFB) have shown their utmost important role.

The use of onion as promising medicinal plants has been further demonstrated in various Ayurveda and Greek system of medicine. The presence of various constituents in the onion makes it an effective therapeutic target

for a wide array of diseases. However, the much research has been further needed to exploit the further hidden mechanism and modulatory role of pathways by which *Allium cepa* shows the promising role.

The use of herbal drugs in India has been traced back long before the centuries and thus they have been used on a large demand. The use of MDR resistance has been growing and thus there is an urge for all the researchers to combat the disease by discovering new therapeutic targets. The various research has been carried through out the world to study the effect of *Allium cepa* to assess itsbeneficial role. The promising result given by *Allium sativum*necessitates the further exploitation of the effect of *Allium cepa* that can be extrapolated if possible for the benefit of mankind.

2 II. Pathophysiology of Tuberculosis

M. tuberculosis requires the presence of oxygen to grow. It does not require the presence of any bacteriological stain due to high lipid content in its wall, and thus is never considered as Gram-positive nor Gram-negative; hence Ziehl-Neelsen staining, or acidfast staining, is used extensively and too a wide extent. The mycobacteria do not seem to fit the Gram-positive category from an empirical standpoint i.e., they do not retain the crystal violet stain, they are classified as acidfast Gram-positive bacteria due to their lack of an outer cell membrane.

M. tuberculosis replicates in every 15-20 hours, which is extremely at a slow rate compared to other bacteria, which tend to have rapid division times measured in minutes. Specifically, *M. tuberculosis* blocks the bridging molecule, early endosomalautoantigen 1 (EEA1); however, this blockade does not prevent fusion of vesicles filled with nutrients. Consequently, the bacteria rapidly multiply unchecked within the macrophage. The bacteria also carried the *UreC* gene, which prevents the acidification of the phagosome. The bacteria also evade macrophage-killing by causing the neutralization of reactive nitrogen intermediates.

3 III. Promising Role of Herbal Drugs

Rifambicin, ethambutol, isoniazid and pyrazinamide has been used as the current therapy for TB but the emergence of problem of multiple drug resistant (MDR) and (XDR) strains of mycobacterium is very used to with these drugs and poses a serious problem. The presence of "cross resistance" cause no single drug or combination therapy was able to control TB to a maximal account and such drug resistance is developed only against purified chemical compounds and has given successful results. The purified compounds cause the existence of resistance in pathogens and thus have proved to be effective against such diseases. Mycobacteriae are having self regulation to digest the drug by altering their receptor structure in response to the chemical structure of the drug. Thus the Mycobacteriae adapt at a very less rate and develop resistance against the new and modern drugs. The existence of herbal drug whether in the form of extract or decoction used against any pathogen will not cause the occurrence of drug resistance and thus can be eventually used in the therapy as an antitubercular drug. Hence an effective and appropriate drug therapy as an anti tuberculosis drug need to be evaluated and thus can be used to overcome the problem of cross resistance and can be used for the benefit.

4 IV. Discussion

The appearance of tuberculosis not only in India but in whole world is increasing at an alarming rate. The appearance of various resistant strains like MDR and XDR further mandates the exploration of new and promising therapy for the beneficial effect and in reducing the various mortalities and morbidities. Thus, urgent need of various studies are the need of the day to assess isolates/strains of *M. tuberculosis* as well as fractions of crude extract/ purified/semi-purified principle in order to evaluate their therapeutic role and thus serve the effect for the health status of the mankind.

5 V. Conclusion

The side effects associated with the allopathic drugs have remarkdly necessities the need of herbal drugs. The various side effects and serious morbidities associated with allopathic drugs further necessitates the need of the day to explore various effective and safe therapies that can be used as a promising agent . In the present review, authors have tried to make a complete description of *allium cepa* asantitubercular drugs around the globe. The various constituents present in plants makes them as an effective antitubercular drug. The discovery of new drugs has finally begin to emerge, the standard of care for tuberculosis might become possible soon Although the prevalence of TB in the society exists from long back centuries, still new and promising research needs to be evaluated out for the benefit of the society and improving the status of the healthcare.

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