ANTIMICROBIAL STUDIES

INTRODUCTION AND REVIEW

From times immemorial man is trying to combat diseases. Medicine is the science and art of healing diseases. It seeks to save lives and relieve suffering. Man is solving his problems like diseases from times, by the utilization of natural surroundings around him mostly from plant products. 'Rigveda', 'Ayurveda' and 'Sushruta Samhita' says about the drugs used from plant products.

In fact despite of the advent of the Allopathic system of medicine is still the main source of relief from large number of ailments used by the majority of people of the Indian subcontinent.

It is being increasingly realized that the antibiotic drugs of microbial origin inspite of being extremely valuable cause the growing fear of emergence of resistant, strains of pathogenic microorganisms, allergic reactions and many side effects. A number of chronic diseases has no remedy in modern therapy. In this way the Ayurveda is strongly supported by its literature and practices in which plants are attributed to posses antibiotic activity. The higher plants now represent most potentially useful area for newer avenue of approach in the search for more efficacious 'antibiotics' obviously.
A very little knowledge is available about the antimicrobial activity of folklore medicines, even though the antibiotic substances present in indigenous plants played an important role in overcoming various health hazards in the remote past.

There is often a direct relationship between the folk uses of a plant and indication from scientific analysis of its active constituents. Data supporting such claims have been presented by Farnsworth et al. (1972). It is interesting that out of several plants reported as medicinal among Indian tribal societies showed positive activity in biological screening. During the last decade a lot of research activity in the evolution of new antimicrobes has been carried out. About one third of all pharmaceuticals are derived from plants and over 60% of the pharmaceutical preparation are plant based.

However, so for very few Indian indigenous plants have been investigated. The study on the antimicrobial agents of plant origin was undertaken by different worker using crude extracts of various plants, individual plants, plant parts, essential oils and by using chemical constituents isolated from a particular plant. Several individual research papers have been published on a number of screening studies.
Mostly workers have given their emphasis on antimicrobial studies of such plants.

Little et al. (1948) have screened the isolation and antifungal action of naturally occurring 2-methoxy-1,4-nepthoquinone. Klopping and Vanderkerk (1951) reported the antifungal agents from the bark of Populus candidans. Kessler (1955) worked on the ability of higher plants for the synthesis of antimicrobial substances.

Patel and Patel (1960) studied antibacterial and antifungal activities of the aqueous and alcoholic extracts of the pods Acacia rugata (Ritha) are observed antibacterial activity against gram(+) Gram(-) organisms and antifungal action against some fungi such as Trichophyton candida and Helminthosporium, associated with skin.

Bhatnagar et al. (1961, 1977) screened about 351 Indian medicinal plants for their antibacterial, antitubercular and antifungal action against bacteria and 4 fungal strains. Out of these considered plants only 66 plants were found to possess pronounced antibiotic activity. The screening of ethanol extracts of various species of plants against number of microorganisms was studied by Dhar et al. (1968), Jain and Agrawal (1976, 1978) and Rai and Upadhyay (1988), Bhakuni (1988, 1990) etc. Essential oil obtained
from various species representing different families of Angiosperms were tested against animal and plant fungi by Sharma and Singh (1979) and they found that oil obtained from *Trachyspermum ammi* showed complete inhibition of all the tested fungi.

Klopping and V.Kerk (1951) reported some antifungal agents from the bark of *Populus candicans*.

Evaluation of medicinal folklore for antimicrobial, antiviral, antiparasitic and pharmacological activities was carried out by Jain and Agrawal (1976) and Ikram and Inam (1980ab, and 1984).

Worthen et al. (1962) observed the antimicrobial activity of *Xanthium* sp. of family Asteraceae.

The extracts of some medicinal plants were also tested against the spore germination in some of the fungi by Bhowmick and Vardhan (1981). Excellent inhibitory effect volatile constituents from *Allium sativum*, *Allium cepa* and *Asparagus racemous* was noticed by Singh and Deshmukh (1984) in some fungi. Xanthanin an antimicrobial agent was isolated from *Xanthium pennsylvanicum* by Little et al. (1950).

Lucas et al. (1951) had reported that the leaves of *Ptelea trifolia* contained substances active against *Mycobacterium tuberculosis* (in vivo). Large
scale screening for antimicrobial agents from higher plants was carried out by Mitchel et al. (1978). Fong et al. (1972) screened out biological activities of 600. Plant extracts and concluded that the activity is due to phenolic compounds.

Kurup (1956) screened about 30 important medicinal plants used in Ayurvedic system of medicine. Some genera of cruciferae. Liliaceae and Tropaelaceae were examined by Rudat (1957) for the antibacterial activity. Godbole and Pendse (1960) selected specific parts of about 11 plant species were examined for their antimicrobial activity against Micrococcus pyogenes, Bacillus typhosus and Vibrio cholerae and it was found that extracts of Emblica officinalis, Terminalia chebula and Terminalia belerica were active.

Smith and Roir (1977), tested antimicrobial activity of the dried powder and methanol extracts of various parts of 57 ornamental plants against some micro-organisms. They found that 19 plants were active against at least one of the test organisms.

Recently Ieven et al. (1979) selected about 100 species of plants belonging to 43 families and evaluated them for antimicrobial, antiviral, antiparasistic and pharmacological activities. They found that mostly
plants were exhibited antibacterial and antifungal activity.

More than 2000 plant products have been screened for biological activities by Dhar et al. (1968-1988) and Bhakuni (1990).

Studies on the antimicrobial properties of essential oils of certain indigenous medicinal plants have also been done by a number of workers. Research show that the plant constituents like hydrocarbons, alkaloids (Grover and Rao 1977), phytosterols glycosides (Grover and Rao, 1988) alkanols essential oils (Sreelaxmi and Rao 1988 and 1991) and a number of other phytochemicals were reported to show strong antimicrobial activity.

Medicagenic acid from various alfa-alfa cultivars has been shown to be inhibitory for *Trichoderma viridae* (in vitro) by Harper et al. (1974). Rao et al. (1980) have studied antimicrobial properties of fixed oil in unsaponifiable matter of *Dillenia indica*. Malik et al. (1991) had observed the activity of some indigenous plants against systemic fungal pathogens. Naqvi et al. (1991) had screened antibacterial, antifungal and anthelmintic investigations on Indian Medicinal plants. Bashir et al. (1992) had studied antimicrobial activity of certain plants which were used in the folk medicine. Antifungal activity of the essential oil of *Coriandrum*
sativum was examined by Garg (1992). Antifungal activity in *Salvia santolinifolia* was examined by Ahmed et al. (1993). Antifungal activity of neem leaf extract on seed mycoflora of wheat was studied by Khan et al. (1993).


Above listed plants were tested against 10 micro-organisms i.e. *Aspergillus niger* strain I, *A niger* strain II, *Candida albicans*, *Helminthosporium sativum*, *Microspernum gypseum*, *Penicillium Spp.*
Trichoderma viridae, Trichyspermum ammi, Trichophyton mentagrophytes and Chrysosporium pannicale.

Out of 25 plant extracts 10 were found to be effective against the test fungi.