CHAPTER - 1

INTRODUCTION
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Human is the only species on the land which follows both biological as well as a cultural evolution. As a result of cultured evolution finally a wild Homo sapiens transformed into social animal and so for survival of human society always doing invention within limit of nature. The invention of Medicinal plants for its use as medicine is one of the greatest achievements of Homo sapiens sapiens. As a result, over the centuries, the use of medicinal plants has become an important part of daily life despite the progress in modern medical and pharmaceutical research. Drugs of natural origin play a significant role in the public health care system of any nation. Indian Materia Medica includes about 2000 drugs of natural origin of which approximately 400 are mineral and animal origin, while the rest are of vegetable origin Ayurveda, Siddha and Unani systems 600-700 herbs for medicinal use (Rao, 2000; Jadhav et al., 2009). The World Health Organization also recommended the evaluation of the effectiveness of plants in conditions where there is a lack of safe synthetic drugs (Sagrawat et al., 2006; Jadhav et al., 2009). Approximately 3000 plant species are known to have medicinal properties in India (Prakasha et al., 2010). The traditional medical system based on plants, plays an essential role in health care, with about 80% of the world’s inhabitants relying mainly on traditional medicines for their primary health care (Owolabi et al., 2007; Attisso, 1983). In developing countries like India 65% of the population in the rural area uses traditional form of medicine to meet their primary health care needs (Anonymous, 1992). The Materia Medica contains a rich heritage of indigenous herbal practices that have helped to sustain the health of most rural people of India. The ancient texts of India like Rig Veda and Atharva Veda
(4500-1600 BC) have mentioned several medicinal plants. These are the earliest available documents dealing the medicinal knowledge, which form the basis of the Ayurveda system (Judith, 2000). Some books on Ayurvedic medicine such as Charaka Samhita and Susruta Samhita (6th century B.C.) referred to the use of more than 700 herbs (Jain, 1968; Dwivedi and Dwivedi, 2007). There are 15,000 species of the reported flowering plants found in India, out of which nearly 17% are considered to be of medicinal value (Nadkarmi, 1954; Jain, 1968; Singh et al., 2005). These plants are popularly utilized in many traditional systems of medicines like Ayurveda, Unani, Siddha and Homeopathy etc. According to World Health Organisation, a medicinal plant is any plant, which in one or more of its organ contains substances that can be used for the therapeutic purposes or which, are precursors for the synthesis of useful drugs means those plants whose therapeutic properties and constituents have been established scientifically and plants that are regarded as medicinal but which have not yet been subjected to thorough investigation (WHO, 1977). Medicinal plants are plants containing inherent active ingredients used to cure disease or relieve pain (Okigbo et al., 2008). The medicinal plants are extensively utilized throughout the world in two distinct areas, traditional system and modern system of medicine. In the traditional system includes, Ayurveda, Siddha, Unani, Homeopathy and Allopathic generally understood as modern medicine and based predominantly on the principles of Western Science which has dominated the last three centuries (Dutta et al., 1962).

According to World Health Organization, about 70 % of the world’s population relies on plants for their primary health care and some 35,000 to
70,000 species have been used as medicines, a figure corresponding to 14-28% of the 250,000 plants species estimated to occur around the world (Akerele, 1992; Farnsworth and Soejarto, 1991; Padulosi et al., 2002) and equivalent to 35-70% of all species used world-wide (Padulosi, et al., 2002). In today's global market, more than 50 major drugs originated from tropical plants (De Padula, 1999). There are 250,000 species of higher plants around the world, only 17% have been investigated for medical potential (Fransworth, 1992). The chemical and biological diversity of plants represent a potentially limitless renewable source for the use in the development of new pharmaceuticals. It is estimated that 40% of the world populations depends directly on plant based medicine for their health care (WHO, 2003).

The use of traditional medicines and medicinal plants in most developing countries as therapeutic agents for the maintenance of good health has been widely observed (UNESCO, 1996). Interest in medicinal plants as a re-emerging health aid has been fuelled by the rising costs of prescription drugs in the maintenance of personal health and well-being and the bio prospecting of new plant-derived drugs (Lucy and Edgar, 1999). Also an increasing belief on the use of medicinal plants in the industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used herbal remedies (UNESCO, 1998).

Medicinal plants are an important source for the therapeutic remedies of various ailments. Research work on the antimicrobial properties of plant components were first documented in the late 19th century (Zaika, 1975). Nowadays there is widespread interest in evaluating drugs derived from
plants. This is primarily due to the belief that green medicine is safe and more dependable, compared to costly synthetic drugs which are invariably associated with adverse effects, so that it is necessary to discover the new harmless pharmacotherapeutic agents from medicinal plants (Nair and Chanda, 2006). Researchers have been interested in biologically active compounds isolated from plant species for the elimination of pathogenic microorganisms because of the resistance that they have developed to antibiotics (Hunter and Reeves, 2002). Thus Indian medicinal plant-based industry is growing fastly for cosmetics, nutraceuticals, phytochemicals, pharmaceuticals and other valuable products.

Millions of rural households use species and medicinal plants in a self-help way. Over 1.5 million practitioners of the Indian system of medicine in the oral and codified streams use medicinal plants for preventing, promoting and curative applications. Recently, the growing demand for herbal products lead to a quantum jump in volume of plant materials traded within and across the countries. Despite the rich biodiversity of the India, the growing demand is putting a heavy pressure on the existing resources. Although the demand for medicinal plants is growing but some of the species are increasingly being threatened in their natural habitat. Cultivation of medicinal plants has to be encouraged to meet the future needs (Daswani et al., 2003)

India is profusely rich in the history of medicinal plants and its 75% folk population is still using an herbal preparation in the form of extracts, powder and decoction because of their easy availability in nature and the natives have stronger faith on traditional plants. Ministry of Health and Family Welfare Centre and State Governments are conducting high level research programs to
manufacture drugs. These drugs of medicinal value are competing in today's markets. A variety of plants exhibit various types of antimicrobial activities. Parasitic plants as well as Orchids are also of great medicinal values which are found to be antimicrobial in nature (Kaushik and Dhiman, 1995).

Traditional medical practices have been known for centuries in many parts of the world (Sofowora, 1984). However, these practices vary from country to country. The medicinal plants produce a number of secondary metabolites which are important for its medicinal values. But, these traditional practices need scientific authentication. Nowadays, the scientific community is actively involved in studying the medicinal properties such as antimicrobial, anti-inflammatory, antioxidants etc. of these plants. Many investigators have demonstrated the antimicrobial activity of some higher plants (Akobundu and Agyakara, 1987; Mishra et al., 1992) and quite a number of chemical compounds of plant origin have been shown to possess antimicrobial activities (Curthout et al., 1992).

Plant with possible antimicrobial activity should be tested against an appropriate microbial model to confirm the activity and to ascertain the parameters associated with it. The effectiveness of plant extracts against bacteria have been studied by a very large number of researchers in different parts of the World (Reddy et al., 2001; Erdoğru, 2002; Ates and Erdoğru, 2003), as well as in India (Rai, 1989; Negi et al., 1993). The selection of crude plant extracts for screening programs has the potential of being more successful in the initial steps than the screening of pure compounds isolated from natural products (Kusumoto et al., 1995).
Plants have a great potential for producing new drugs of great benefit to mankind. There are a variety of approaches for the search of new biologically active principles in higher plants (Farnsworth and Loub, 1983). Efforts have been done for discovery of new antimicrobial compounds from various kinds of sources such as soil, microorganisms, plants and animals. One such resource is traditional medicine and systematic screening of them may result in the discovery of novel effective compounds (Janovska et al., 2003). Further, scientific investigation and information about the therapeutic potential of the plant material is limited.

Despite the availability of potent antifungal and antibiotic agents are resistant or multi-resistant strains continue to appear, imposing the need for a consolidated search and development of new drugs (Silver, 1993). There is an urgent need to systematically evaluate the plants used in traditional medicine. Such research could lead to new drug discovery or advance the use of indigenous herbal medicines for orthodox treatment. The increased prevalence of antibiotic-resistant bacteria due to the extensive use of antibiotics may render the current antimicrobial agents inefficient to control some bacterial diseases (Tanaka et al., 2006). Herbal medicine has been frequently a part of a larger therapeutic system such as traditional and folk medicine for the treatment of infectious diseases produced by common pathogens. Medicinal plants are the potential source of new potent antibiotics to which pathogen strains are not resistant. The search and use of drugs and dietary supplements derived from plants have been accelerated in recent. Natural products, Chemists, Botanist, Ethnopharmacologist are combing the medicinal flora for biological substances that could be developed for the treatment of various
infectious diseases. Many medicinal plants have been extensively studied in order to find more effective and less toxic compounds. Purified extract of an herb active component is more reliable and safer than administration of the herb itself. Several herbs are now used whose therapeutic properties and active principle is yet not well understood.

Nowadays multiple drug resistance has developed due to the indiscriminate use of commercial antimicrobial drugs commonly used in the treatment of infectious disease (Davis 1994; Service, 1995). In addition to this problem, effects on the host including allergic reactions, hypersensitivity and immune-suppression. This condition made scientists to search for new antimicrobial substances because the alarming incidence of antibiotic resistance in bacteria of medical importance (Monroe and Polk, 2000). Therefore, there is a constant need for new and effective therapeutic agents (Bhavnani and Ballow, 2000), and also a need to develop alternative antimicrobial drugs for the treatment of infectious diseases from medicinal plants (Cordell, 2000). Antimicrobial agents of plant origin have enormous therapeutic ability; they are effective in the treatment of various infectious diseases while simultaneously mitigating many of the side effects that are often associated with synthetic antimicrobial agents (Iwu et al., 1999).

The beneficial medicinal effects of plant materials typically result from the combinations of secondary products present in the plant. These compounds are more complex, specific and found in certain taxa such as family, genus and species, but the heterogeneity of secondary compounds is found in wild species (Balandrin el al., 1985). The medicinal actions of plants are unique to a particular plant is taxonomically distinct with the concept that combination
of secondary products in a particular plant is taxonomically distinct (Wink, 1999). The plant’s secondary products may exhibit their action by resembling endogenous metabolites, ligands, hormones, signal transduction molecules or neurotransmitters and thus have beneficial medicinal effects on humans due to similarities in their potential target sites. Thus, random screening of plants for active chemicals is as important as the screening of Etno-botanically targeted plant species (Principle, 1989).

Recently, it has been investigated that many human pathogenic bacteria have developed resistance against several synthetic drugs, indicating need to search for alternative medicine (Levy, 1998; De Smet, 2002; Dawson, 2005). A lack of scientific experiment on herbal medicines poses a conundrum for healthcare professionals when dealing with these products (Barret et al., 1999). Only a limited number of in vivo and in vitro studies on antimicrobial properties of herbal products have been published, also it has not been determined whether they are superior or equivalent to antibiotics (Tambekar et al., 2007; Cupp, 1999). Many herbal products claim to have antimicrobial properties, but very little research has been conducted to investigate their claims (Dubey et al., 2004; Tambekar et al., 2009). In order to promote Indian herbal medicine, there is an urgent need to evaluate the therapeutic potentials of the herbal preparation available in India.

The pathogenic bacteria and fungus infection are a cosmopolitan problem and the situation is more critical, especially in the third world countries where in most cases lack of adequate sanitation and primary health care programs makes it difficult and expensive to combat diseases. A number of higher plants have been used for centuries as remedies for human diseases. This has
encouraged scientists to screen medicinal plants for various biological activities including antibacterial and antifungal effects (Omer and Elnima, 2003; Saadabi et al., 2009). Approximately 80% of individuals from developed countries use traditional medicines which have compounds derived from medicinal plants (Igbinosa et al., 2009). Interest in plants with antimicrobial properties has been revived as a result of antimicrobial resistance. In addition, certain antibiotics impose undesirable side effects such as nausea, depression, bone marrow, thrombocytopenic purpura and agranulocytosis leading to the emergence of previously uncommon diseases (Marchese and Shito, 2001; Poole, 2001). This has given scientists the impetus to search for newer and alternative microbial compounds from medicinal plants (Aliero and Afolayan, 2006). Plant extracts and phytochemicals with antimicrobial properties are of great significance in therapeutic treatments.

Chhattisgarh is a land-locked State in the heart of India, between 17°46" - 24°8" N latitude and 80°15" - 84°24" E longitudes. In view of extremely rich bio-cultural diversity in the state and dependence of forest dwellers for their health requirements of medicinal plants the Government has declared Chhattisgarh as an 'HERBAL STATE' in 2001. The forest area of Chhattisgarh is a large store house of varieties of Medicinal and Aromatic plants and they sustain the lives of large population of forest dependent rural communities.