Introduction
Natural products have been investigated and utilized to alleviate disease since early human history. In the early 1900s, before the "Synthetic Era", 80% of all medicines were obtained from roots, barks and leaves. In more recent times, natural products have continued to be significant sources of drugs and leads. Their dominant role is evident in approximately 60% of anticancer compounds and 75% of drugs for infectious diseases either as natural products or their derivatives (Newman et al., 2003; Cragg et al., 2005 and 2009; Sa et al., 2010). Natural product preparations have historically been the major source of pharmaceutical agents. Analysis of FDA new-drug approvals from 1981 to 2002 reveals that natural products continued to play a pivotal role during that time, even if the industry had turned to other discovery strategies (Newman et al., 2003). Indeed, more than 90% of current therapeutic classes derive from a natural product prototype and interestingly, roughly two-thirds to three quarters of the world’s population relies upon medicinal plants for its primary health care (World Health Organization, 2002; Balunas and Kinghorn, 2005).

Historically also there were several problems associated with natural products (especially plant-derived products) that contributed to declining interest in their development within the pharmaceutical industry. Purification and identification of active constituents from complex natural product mixtures containing dozens to hundreds of different chemical substances, often of quite similar chemical and physical properties, were slow and not cost-effective. Once the active constituent was isolated and purified, its chemical structure still needed to be established. These issues are compounded in that natural products are often poor pharmaceuticals; their chemical stability may be marginal; they may have poor solubility or poor bioavailability characteristics; they may not formulate well (Lipinski et al., 1997; McChesney et al., 2007).

Many significant advances in institutes and industry have been inspired by the pursuit of capturing the value of natural products. A number of advances in capability and technology are fostering a renaissance in natural products research and are directly or indirectly addressing the historical impediments to development of natural products (Schuster, 2001; Tulp, 2004; Koehn, 2005; Gomord et al., 2005; Brown and Newman, 2006; Fullbeck et al., 2006; Jung, 2006; Newman, 2006). Perhaps the strongest
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Impetus for development of new natural products is the advancement in bioassay technology over the last several years (Piggot, 2004; Littleton et al., 2005; Potterat, 2006; Rollinger et al., 2006). We now have highly automated, very specific and selective bioassays in which materials, including natural products preparations, can be evaluated quickly and economically.

It is generally estimated that there are approximately 300,000 species of higher plants (Lawrence, 1951). However, some report the number to be 250,000, others estimate the number to be as high as 500,000. The disparity in the numbers partly reflects a difference in philosophy among systematic botanists. It also reflects the more aggressive exploration of unusual environments, particularly diverse environments such as the tropical rainforests, where new species of higher plants are being encountered continually. Of the approximately 300,000 species of higher plants, about 1%, or roughly 3000, has been utilized for food. Of those 3000, about 150 have been commercially cultivated (McChesney et al., 2007). On the other hand, approximately 10,000 of the world’s plants have documented medicinal use – considerably more than the 3000 or so that have been utilized for food. Looking specifically at the utilization of plant materials in western medicine (the US, Western Europe, etc.), it is found that roughly 150–200 of such agents are incorporated. This is still a very small percentage of all higher plants. Thus, there are potentially many more important discoveries in the plant kingdom to be exploited for pharmaceutical application. The challenges associated with development of natural products as pharmaceuticals are illustrated by the Taxol story. Several misconceptions, which constrain utilization of plant natural products, for discovery and development of pharmaceuticals, are addressed to return natural products to the forefront (McChesney et al., 2007).

Herbal or medicinal plants products in various forms have been available for many hundred years for treatment of diseases in both Eastern and Western cultures. Botanical herbal drugs are fully accepted and widely prescribed in India, China, Japan and several other Asian and African countries. In addition some countries in Europe such as Germany, allow physicians to prescribe botanical drugs. In the USA, several botanical drugs are under clinical development as the standard scientific data on safety; efficacy and toxicity are not available for herbal preparation (Raskin et al., 2002, Ahmad et al., 2006). Despite the remarkable progress made by chemistry,
pharmacology, molecular biology and genome research and high throughput screening, the new chemical entities (NCE) pipeline of pharmaceutical companies are at historically low (Cordell, 2000). A 40% increase in the research and development spending in pharmaceutical research from 1996-2001 did not overcome this problem (Bolten and De-Gregorio, 2002). However many experts believe that the majority of plant derived natural products possibly valued at billions of dollars—remain undiscovered or unexplored for their novel pharmacological activity (Gentry, 1993; Mendelson and Balick, 1995; Raskin et al., 2002) Therefore, there is a need to redesign strategies for discovering novel molecules from plants.

Basically plants are considered an important source of novel bioactive compounds and human health products due to (i) Enormous propensity of plants synthesizes mixture of structurally diverse bio compounds with multiple potent therapeutic effect. (ii) Low cost and highly seal protein and secondary metabolite bio-manufacturing capacity of plants. (iii) Diminishing return of the NCE approach to drug discovery and disease treatment and prevention. (iv) Cost limitation of chemical synthesis of complex biomolecules. (v) Perceptional because of the history of human use and co-evolution of plants and humans, phytochemicals provide a safer and more holistic approach to disease treatment.

India has huge diversity of medicinal plants with some known biological activities. However, there is an increased quest to redesign the screening strategies to get novel or alternative therapeutic compounds or preparation against various tropical diseases, complex chronic and infectious diseases including cancer or where modern medicine is not available or loosing it’s importance. It is expected that traditionally used medicinal plants have least or no toxicity and may provide safe novel herbal preparation or compounds against target disease (Cowan, 1999). Such areas of interest include the problems caused by MDR bacteria, non-effective treatment of several chronic diseases like cancer and neurodegenerative diseases etc. Indian medicinal plants have been systematically screened for their several pharmacological properties including antimicrobial, antidiabetics, antimalarial, antioxidant, anticancer activities at many institutions and showed varying level of in vitro and in vivo activities. However, concerted efforts for the systematic screening of medicinal plants for their broad spectrum antimicrobial, antioxidant and antimutagenic activities are in the stage
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of infancy.

Recently emphasis has been given on antimicrobial and toxicity screening of medicinal plants. Several plant extracts/metabolite or active constituents have been evaluated as reviewed for their antimicrobial properties (Cowan, 1999; Nostro et al., 2001). Bioactive extracts of Indian medicinal plants have been investigated for their broad-spectrum antibacterial activity against certain MDR bacteria at our laboratory (Ahmad et al., 1998; Ahmad and Beg, 2001, Ahmad et al., 2003; Aqil and Ahmad, 2003; Aqil et al., 2005; Aqil and Ahmad, 2007). Although fraction based activity and identification of major compound remains to be investigated.

Another biological activity of natural product of current research interest is antioxidant activity due to its role in health and disease management. Many aromatic medicinal plants and spices contain compounds that possess confirmed strong antioxidant components. The essential oils derived from aromatic plants not only serve as fragrance and flavor agents but also as dietary antioxidants expected to prevent several diseases caused by free radicals. For that reason, free radicals and related species have attracted a great deal of attention in recent years. The various free radicals can adversely alter lipids, protein and DNA and have been implicated in the etiology of major human diseases including aging. Natural protective antioxidant mechanisms include superoxide dismutase (SOD), catalase, glutionine, glutathione peroxidases and reductases, vitamin E (tocopherol and tocotrienols) vitamin C etc and several dietary components. There are epidemiological evidences correlating higher intake of compounds/foods with antioxidant abilities to lower incidence of various human morbidities or mortalities (Vivekananthan, 2003).

Many workers have shown that antioxidant based drugs/ formulations could be effective for prevention and treatment of complex diseases like atherosclerosis, stroke, diabetes, cancer, Alzheimer’s disease, Parkinson’s disease etc. This provides a benefit to the research in exploring the most effective and safe antioxidants from natural products, traditional herbal medicine and medicinal plants, herbs, spices and dietary sources (Papas, 1999).

Major phytocompounds with potent antioxidant activity includes carotenoids, curcumin from turmeric, flavonoids, isoflavanones, diterpenes, caffeine (coffee and
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tea), gingerol, chlorogenic acid, vanillin and chlorophyllin etc. Many of these phytocompounds appear to be important in cancer prevention through their other activity like inhibition of tumor production. Indian medicinal plants have now been screened for such activity at several laboratories. Thus, a fair number of traditionally used medicinal plants have a promising potential (Tiwari, 2001, 2004). A large number of edible and medicinal plants are yet to be screened for such activity.

For the last several years, many mutation related carcinogenesis have been found and this has resulted in much detailed research on mutagenesis (Yoshikawa et al., 1996). Consequently, from cancer preventing point of view, an interest has also been aroused in the presence of antimutagens in foodstuffs as well as in traditionally used medicinal plants, herbs and spices (Sangwan et al., 1998). The screening of plant extracts/phytocompounds for an antimutagenic activity has been performed using several mutagen assay systems in bacteria, yeast and some plant and animal cell cultures (Musarrat et al., 2006).

However, the mutagen assay system developed by Ames et al. (1975) and subsequent minor modification in the bacterium S. typhimurium and assay system has been extensively used in the identification of antimutagens effects of a variety of physical factors, synthetic and natural compounds (Sangwan et al., 1998). Several authors have documented the antimutagenic activity of plant extracts associated with secondary metabolites that acts as antimutagen (Bala and Grover, 1989; Kaur et al., 2002; Aqil et al., 2008). However majority of the Indian medicinal plants have not systematically screened for antimutagenic activity. Therefore concerted efforts are needed to explore and exploit the Indian medicinal plants in mutation related carcinogenesis.

On the other hand mechanism of mutagenesis is complex, however many mutagens and carcinogens may act through the generation of reactive oxygen species. Therefore, the discovery and exploration of plant extracts/phytocompounds possessing both antioxidant and antimutagentic properties are of great practical and therapeutic significance. Plant rich in flavonoids and phenolic compounds are known to exhibit various biological activities including antimutagenic and anticancer activities (Musarrat et al., 2006; Ali et al., 2008). It is presumed that plant good in
antioxidant activity could also show antimitogenic activity and such natural products could reduce or inhibit the mutagenic potential of mutagens and carcinogens (Miadoková et al., 2002).

Considering the importance of targeted screening of medicinal plants for their novel biological activities and their therapeutic potential, the present study has been taken with following objectives

1. To determine the antibacterial activity of certain Indian medicinal plants against drug resistant bacteria.

2. To screen the antioxidant activity of plant extracts by using different *in vitro* assays.

3. To evaluate the antimitogenic properties of certain antioxidant active plant extracts against direct and indirect acting mutagens using Ames/Salmonella assay.

4. Phytochemical analysis of certain active fractions by different spectroscopic and chromatographic techniques.