The use of medicinal plants as source for relief from illness can be traced over five millennia to written documents of early civilization in China, India and near east countries. Records of early civilization in all parts of the world reveal that a substantial number of drugs used in modern medicine were in use even in ancient times. The use of plants for curing various human ailments figured in ancient manuscripts such as The Bible, The Rig Vedas, The Iliad, The Odyssey and the History of Herodotus. Over 6000 years ago, the ancient Chinese were using drug plants. The Egyptians, Babylonians, Sumerians, Greeks and Romans, all developed their respective characteristic Materia Medica. Medicinal plants have been in use since time immemorial and even today plant products find extensive use in household remedies, ethnomedicine, cosmetics and traditional systems of medicine. As described in Unani and Ayurveda, herbal medicines are sources of treating the morbid conditions. The drugs that are obtained from trees, shrubs or herbs contribute about 25 percent of the total prescription drugs. In India as well as in many other countries, phyto-pharmaceuticals form an integral part of the national health care programs. Medicinal plants are a source of great economic value all over the world and play important role in the health care system of the world’s population. In Europe herbal remedies are very common, prescription drugs are sold alongside essential oils, herbal extracts or herbal teas. US government has also established the “Office of Alternative Medicine” at the National Institute of Health at Bethesda to support alternative medicine, that includes basic and applied research in traditional systems of medicines such as Chinese & Ayurvedic etc. In India too, the herbal remedy is so popular that the Government of India has created a separate department “AYUSH” under the Ministry of Health & Family Welfare. Plant derived medicines is an upcoming research area because of its versatile applications offering insightful therapeutic benefits and reasonable treatments. Bio-efficacy of medicinal plants are indispensable. Use of medicinal plants is not restricted to humans only; they can be used as indigenous healers for non human species also. Sick animals tend to forage plants rich in secondary metabolites. Leaves, barks, flower and seeds of the various plants are
involved in herbal medicine due to their anesthetic, antimicrobial, anti-allergic, anti-inflammatory, anti-malarial and various other medicinal properties. The bioactivity in these plant parts is due to the presence of active compounds in the form of secondary metabolites.

Plants secrete secondary metabolites and pigments that can have therapeutic potential, which can be refined to produce drugs. Alkaloids, terpenoids, glycosides, saponins, steroids etc are some of the common secondary metabolites. They are also called as plant phytochemicals which possess variable functions. These phytochemicals have enormous bioactive potential. Phytoalexins are one of the antimicrobial compound synthesized by plants that accumulate rapidly at the areas of incompatible pathogen infection. They may rupture the cell wall, delay maturation, disrupt metabolism or prevent reproduction of the pathogen in question. Other plant products like lectins and polypeptides possess antiviral property whereas sterols and polyphenols have antidiarrhoeal and antihelmintic property. Fruits contain secondary metabolites with antifungal properties called as phytoanticipin. Phytoanticipins are preformed antifungal secondary metabolites present in the healthy plants. For example, glucosinolates are stored in vacuoles. Phytoanticipins are exceptional as they are preformed, rather than being synthesized from remote precursors after pathogen infection (phytoalexins). Ohio Wesleyan University, USA found that some birds select nesting material which are rich in antimicrobial agents and protect their young ones from harmful bacteria (Ichida, 2004). Although hundreds of plant species have been tested for antimicrobial properties, majority of them have not been adequately evaluated (Balandrin et al., 1985). Secondary metabolites are the reason behind antimicrobial activity. These metabolites require different extraction process for the separation through standard procedures. Extraction methods involve the separation of medicinally active parts of plant tissue from inert components by using specific solvents. It is the extract which after standardization exploited as medicinal agent in the form of fluids extracts or any dosage form like capsules (Tiwari et al., 2011). This plant product is the consortium of all the metabolites like alkaloids, glycosides,
flavonoids, lignans etc. General procedures for medicinal plant extraction includes plant tissue homogenization, Soxhlet extraction, maceration, infusion, digestion and sonication. Some of the recently used extraction process are protoplast extraction and molecular distillation (Handa et al., 2008).

The solvents influence the extraction process by affecting the quantity of phytochemicals to be extracted. As the basic parameters involve diversity of different compounds extracted, diversity of inhibitory compounds extracted, toxicity of the solvent in bioassay process and the potential hazards of the extractants. Most recommended techniques for quality control of herbal drugs are chemical fingerprints obtained by chromatographic and electrophoretic techniques, since they might represent appropriately the “Chemical integrities”. Qualitative analysis of biomarkers will ensure the presence of most of the metabolites related to their pathways. The LC-MS fingerprints of metabolites of clinically proven efficient drugs may be the best option for the standardization of herbal drugs. Rapid data mining procedures and aligning algorithms tools has been used to process huge raw data generated from metabolome analysis (Duran et al., 2003; Stoyanovaa et al., 2004; Goodacre et al., 2004). These processed data have been used successfully in various pharmacological studies such as disease diagnostics, drug discovery (Keith et al., 2010) and human nutritional science (Cevallos et al., 2009; Vaclavik et al., 2010). Considering the vast potentiality of plants as sources for antimicrobial drugs with reference to antibacterial and antifungal agents, a systematic investigation was undertaken to screen selected plants for antibacterial and antifungal activity and role of active plant extract in differential protein expression of the target organism. The proteome analysis of the respective organisms before and after treatment leads to better understanding of the biological regulations at the molecular levels. Although genomic studies reveal valuable information about molecular mechanisms in organisms, the proteome analysis is often essential for better understanding of biological processes. In the present study, antimicrobial activity of extracts of selected ten plants was evaluated against six bacteria and three fungal strains. The plant extract with highest activity
against the reference pathogen was selected as the most active extract. For further proteome analysis, reference pathogen was treated with sub-lethal dose (1/2 MIC) of active extract. The cellular and secretory proteins of the treated as well as control sample were extracted and subjected to 2-D analysis for determining the differential protein expression. The cellular and secretory proteins which show significant differential expression were analyzed and characterized using highly sensitive LC-MS technique. The present study reports LC-MS-Q-TOF method for qualitative analysis of proteins that couples high resolution chromatographic separation with sensitive and specific mass spectrometric detection. Q-TOFMS is an excellent technique to analyze and identify protein with accurate mass measurements, high resolution and ion separation due to Time of Flight (TOF) (Zeng et al., 2007).

The work included the following objectives:

1. Preparation of various extracts according to polarity.
2. Screening of various extract to evaluate their antimicrobial potential using various assays.
3. Determine the Minimum Inhibitory Concentration (MIC).
4. Study the toxicity of the most active extract.
5. Treatment of pathogenic bacteria and fungi with sub-lethal doses of the most active extract.
6. Isolation of protein after treatment with sub-lethal dose.
7. Study the protein profile of treated and untreated culture.