Since time immemorial, in search for rescue from their disease, people looked for drugs in nature, utilizing plants for basic preventive and curative health care. Healing with medicinal plants is as old as mankind itself. Awareness of medicinal plants usage is a result of many years of struggles against illnesses due to which man learned to pursue drugs in barks, seeds, fruit bodies, and other parts of the plants. It was an integral part of the development of modern civilization. Herbal plants, the oldest form of healthcare known to mankind, are used at the household level by women taking care of their families, at the village level by medicine men or tribal shamans, and by the practitioners of classical traditional systems of medicine such as Ayurveda, Chinese medicine, or the Japanese Kampo system (Xiao and Fu, 1987).

Utilization of plants for medicinal purposes in India has been documented long back in ancient literature (Rabia, 2005). There were many different systems of traditional medicine, and the philosophy and practices of each were influenced by the prevailing conditions, environment, and geographic area within which it first evolved (WHO 2005).

The oldest written evidence of medicinal plants’ usage for preparation of drugs has been found on a Sumerian clay slab from Nagpur, approximately 5000 years old. The Chinese book on roots and grasses “Pen T’Sao,” written by Emperor Shen Nung circa 2500 BC, treats 365 drugs, several of which are still used in medicine. Ancient Egypt developed a large, varied and fruitful medical tradition. The Egyptians wrote their medical systems on rolls of papyrus. The most famous of these medical papyri, the so-called Ebers Papyrus, reports voluminously on the pharmaceutical prescriptions of the era. The Ebers Papyrus, written circa 1550 BC and represents a collection of 800 prescriptions referring to 700 plant species and drugs used for therapy. The works of Hippocrates (459–370 BC) contain 300 medicinal plants classified
by physiological action. Theophrastus (371-287 BC) founded botanical science with his books “De Causis Plantarium”—Plant Etiology and “De Historia Plantarium”—Plant History. In the books, he generated a classification of more than 500 medicinal plants. Theophrastus underscored the important feature for humans to become accustomed to them by a gradual increase of the doses. Owing to his consideration of the said topics, he gained the epithet of “the father of botany,” given that he had great merits for the classification and description of medicinal plants. In his work “De re medica” the renowned medical writer Celsus (25 BC–50 AD) quoted approximately 250 medicinal plants. Dioscorides, “the father of pharmacognosy,” Circa 77 AD, wrote the work “De Materia Medica.” This classical work of ancient history, translated many times, offers plenty of data on the medicinal plants constituting the basic materia medica until the late Middle Ages and the Renaissance, describing making of the medicinal preparations, and their therapeutic effect (Petrovska, 2012). In India, Ayurveda medicine has used many herbs such as turmeric possibly as early as 1900 BC. Sanskrit writings from around 1500 B.C., such as the Rig Veda, are some of the earliest available documents detailing the medical knowledge that formed the basis of the Ayurveda system. Many other herbs and minerals used in Ayurveda were later described by ancient Indian herbalists such as Charaka and Sushruta during the 1st millennium BC.

A natural product is a chemical compound or substance produced by a living organism like microorganisms, marine organisms, animal sources, plant sources. The definition of natural products is usually restricted to mean purified organic compounds isolated from natural sources that are produced by the pathways of primary or secondary metabolism. The term natural product has also been extended for commercial purposes to refer to cosmetics, dietary supplements, and foods produced from natural sources without added artificial ingredients.
Plants are a goldmine of novel chemicals; much impressive number of modern drugs has been developed from them. The Last decade has witnessed an increase in the investigation on plants as a source of new biomolecules for human disease management (Grierson and Afolayan, 1999). Today plants are sources of many conventional drugs (Vickers et al., 2001). The importance of medicinal plants in traditional healthcare practices has provided a clue to new areas of research and biodiversity conservation is now well recognized (Uniyal, 2006).

Herbal Medicine sometimes referred to as Herbalism or Botanical Medicine, is the use of herbs for their therapeutic or medicinal value, which originally came from Greece and Rome to Europe and then spread to North and South America. A herb is a plant or part of plant valued for its medicinal, aromatic or savory qualities. Herb plants produce and contain a variety of chemical substances that act upon the body (Schultes, 1972). The result is that herbs are staging a comeback and herbal ‘renaissance’ is happening all over the globe. The herbal products today symbolise safety in comparison to the synthetics that are regarded as unsafe to human and environment. Nonetheless herbs have also been priced for their medicinal, flavouring and aromatic qualities for centuries.

Herbal medicine has become a popular form of healthcare. Even though differences exist between herbal and conventional pharmacological treatments. Herbal medicine can be tested for efficacy using conventional trial methodology. The major part of traditional therapy involves the use of plant extract and their active constituents (Akerele, 1993). Old European reference books (e.g. medical herbals) document a variety of other plants such as *Salvia officinalis* (sage) and *Melissa officinalis* (balm) with memory improving properties, and cholinergic activities have recently been identified in extracts of these plants (Perry et al., 1998). Other specific herbal extracts have also
been demonstrated to be efficacious for specific conditions. (Holm et al., 1998; Watanabe et al., 2001; Ernst, 2005; Mazzanti, 2005). Rural patients are more dependent on traditional or folk medicinal healers for cure of urinary tract infections (UTI) and sexually transmitted diseases (STD) (Hossan et al., 2010).

Medicinal plants are not only a major resource base for the traditional medicine & herbal industry but also provide livelihood and health security to a large segment of Indian population.

Plants synthesize a vast range of organic compounds that are traditionally classified as primary and secondary metabolites (Croteau et al., 2000).

Secondary metabolism involves compounds present in specialized cells that are not directly essential for basic photosynthetic or respiratory metabolism but required for plants, survival in the environment, as for of the absence of an efficient excretory system plant produced secondary metabolites (Fraenkel, 1959; Whiting, 2001; Theis and Lerdau, 2003; Wijngaard et al., 2012). Plant, secondary metabolites can boost the immune system, protect the body from free radicals, chemical defence against microorganism, insects and other predators or even other plants, adaptation of plants to their environment (Swain, 1977; Bennett and Wallsgrove, 1994; Kutchan, 2001) act as a precursor for bioactive compounds used as therapeutic drugs (Tatsuta and Hosokawa, 2006).

Major secondary metabolites that occur in plants are terpenes, alkaloids, amines, non protein aminoacids, cyanogenic glycosides, glucosinolates, phenolics that include flavonoids, polyacetylenes, polyketides, polypropanoids, tannins, saponins, protease inhibitors and lectins. These compounds also play a major role in providing structure they are lignin, cutin. Other important examples
of the secondary metabolites that are being commercially used for their health promoting effect like subsiding pain, circulatory diseases, anticancer agents, insecticides, these are morphine, digitoxin, pyrethrin, taxol.

Most pharmaceutically important secondary metabolites are isolated from wild or cultivated plants because their chemical synthesis is not economically feasible. Chemodiversity in nature offers a valuable source as secondary metabolites, previously regarded as waste products are now recognized for their resistant activity against pests and diseases (Verpoorte, 1998). Biotechnological production in plant cell cultures is an attractive alternative, but to date this has had only limited commercial success because of a lack of understanding of how these metabolites are synthesized (Caldentey and Inzé, 2004). Accumulation of secondary metabolites often occurs in plants subjected to stresses including various elicitors or signal molecules. Understanding signal transduction paths underlying elicitor-induced production of secondary metabolites is important for optimizing their commercial production, signal components are employed directly or indirectly by elicitors for induction of plant secondary metabolite accumulation (Zhao et al., 2005). The use of bioactive compounds in different commercial sectors such as pharmaceutical, food and chemical industries signifies the need of the most appropriate and standard method to extract these active components from plant materials (Azmir et al., 2013). Extraction using non-conventional methods microwave assisted extraction and ultrasound assisted extraction) can result in a yield increase in shorter time using less solvent (Bandar et al., 2013).

Recently, the emergence of recombinant DNA technology has opened up a new field with the possibility of directly modifying the expression of genes related to biosyntheses of these compounds (Bourgaud et al., 2001). Plant cell and transgenic hairy root cultures are promising potential alternative sources for the production of high-value secondary metabolites of industrial
importance. Recent developments in transgenic research have opened up the possibility of the metabolic engineering of biosynthetic pathways to produce high-value secondary metabolites (Rao and Ravishankar, 2002).

With the advent of the increased use of secondary metabolites recently, certain polyphenolic and bioflavonoids have been found to be the potential source of reverse transcription inhibitors and anti-hepatotoxicity, immunomodulatory, anti-inflammatory, antimicrobial, antifeedent and antioxidant activities (Banerji, 1993). Skin diseases like eczema, leucoerma, ringworm, scabies, and many other conditions are treated completely with herbal drugs. The evidence base for phytotherapy is small and lags behind that for the nutritional sciences, mainly because phytochemicals are ingested as complex mixtures that are incompletely characterised and have only relatively recently been subject to scientific scrutiny (Walker, 2006).

In the present investigation, a systematic evaluation of the primary (soluble sugars, starch, lipid, proteins, ascorbic acid and phenols) and secondary metabolite (flavanoids, phytosterol and alkaloids) has been carried out in *B.diffusa* and *T.undulata*. The antimicrobial and antioxidant properties of metabolites rich fractions isolated from selected plant species have also been investigated.

*Boerhavia diffusa* is a species of flowering plant in the four o'clock family which is commonly known as tar vine, punarnava meaning that which rejuvenates or renews the body, or red spiderling. It is widely dispersed and is found in the tropical, subtropical and temperate regions of the world. It is distributed in China, India, Australia, Pakistan, Egypt, Sudan, Sri Lanka, U.S.A. and South Africa. It is taken in herbal medicine for pain relief. *Boerhavia*, the spiderlings, is a genus of about 40 species of annual or perennial herbaceous plants. *Boerhavia* belongs to family Nyctaginaceae. The four o'clock family (Nyctaginaceae) has a number of genera with unusual
morphological and ecological characters, several of which appear to have a "tendency" to evolve repeatedly in Nyctaginaceae. Despite this, the Nyctaginaceae have attracted little attention from botanists (Douglas and Manos, 2007).

The genus *Tecomella undulata* is a tree species that produces quality timber. In Rajasthan it is mainly found in western parts distributed in Barmer, Jaisalmer, Jodhpur, Pali, Ajmer, Nagaur, Bikaner, Churu and Sikar districts. *Tecomella undulata* belongs to family Bignoniaceae (Jacaranda family). The Bignoniaceae family comprising of about 110 genera and 650 species is a family of flowering plants, commonly known as the Trumpet Creeper family, Jacaranda family, Bignonia family, or the Catalpa family. Plant species belonging to this family are distributed worldwide, but most of them occur in the tropical and sub-tropical countries. Although the family is small, the Bignoniaceae plants are important for their reported bio-active constituents and diverse pharmacological activities. Bignoniaceae family plants are also widely used in traditional medicinal systems Bignoniaceae family is shown to have high pharmacological value.

Roheda is mainly used as a source of timber. Its wood is strong, tough and durable, excellent for firewood and charcoal. Roheda plays an important role in ecology. It acts as a soil-binding tree by spreading a network of lateral roots. The species has been identified as an important factor for environmental conservation in arid zones as a stabilizer of shifting sand dunes, providing shelter for wildlife. It is also a very useful species for afforestation of the drier tracts due to its drought and fire resistant properties (Kumawat *et al.*, 2012).

A metabolite profiling and biological study undertaken in *Boerhavia* leaves and roots, phytochemical characterization revealed rotenoids and alkaloids terpenes, phenylpropanoids, indol compounds, norisoprenoids, among others which were identified. Organic acid analysis was also
performed, allowing their characterization in this species for the first time, and oxalic, ketoglutaric, pyruvic, quinic and fumaric acids were identified. Additionally, several flavonoids and one phenolic acid were also confirmed. (Pereira et al, 2009).

Phytochemically, different chemical constituents such as Radermachol, Undulatin, Lapachol, Tecomelloside, Stigmasterol, -amyrin, -sitosterol, -sitosteryl acetate, compesterol, stigmasterol and many others have been isolated from the plant Tecomella undulata (Nagpal et al., 2010).

Primary metabolites are those organic substances which are synthesis during photosynthesis and these organic compounds are essential for plant life, growth and development.

As their name implies, carbohydrates are composed of the elements of water and carbon so their formula approximates to a multiple of CH$_2$O. Most of the dry weight of plants is carbohydrate of one kind or another. All carbohydrates are polar and the low molecular forms are commonly known as sugars. Monosaccharides are used as energy reserves in plants. The simplest is the three carbon sugar, glyceraldehyde but most of the carbohydrates in plants are based on glucose or other six carbon sugars, cellulose (polysaccharides) is a cell wall component another particularly in herbaceous tissue is pectin. This is made up of a modified sugar, galacturonic acid and in the plant the carboxyl groups are esterified with methyl (CH$_3$) groups (Sambaiah and Lokesh, 1998). Biologically-active oligosaccharides (oligosaccharins) released from plant or microbial cell walls can serve as signals to regulate plant defense and plant growth and development (Mohnen and Hahn, 1993).

Starch is a substance that plants use to store energy. It is the end product of photosynthesis and can be stored for later use in seeds, tubers, and roots. The storage of starch or sucrose as a principal reserve carbohydrate is
associated with the broadest variation in phenological patterns (Brocklebank and Hendry, 1989) The different forms of starch - amylose or amyllopectin - are critical for its various properties (Barthakur et al., 1995). Chemically, starch is a polysaccharide comprised of glucose molecules linked together in long chains. Starch synthesis begins with the synthesis of ADP-Glu from Glu-1-P and ATP via ADP-Glu pyrophosphorylase (Grennan, 2006).

Starch can serve as an adhesive, carrier substance, filler, or thickener. Starch is an important renewable resource for the chemical, paper, and packaging industry. It can be used to produce paste, adhesives, lubricants, films, building materials, synthetics and biodegradable packaging (Kennedy et al., 1988).

Lipids are fatty substances with long hydrocarbon chains and often ester linkages. There are three classes of lipids in plants. The simplest are the triglycerides or fats in which three fatty acids are attached to a glycerol molecule by ester bonds. These are the most energy-rich form of food reserve. Plants tend to accumulate fats only when it is important to pack a lot of energy into a small space, such as a seed, The compartmentation of neutral lipids in plants is mostly associated with seed tissues, where triacylglycerols (TAGs) stored within lipid droplets (LDs) serve as an essential physiological energy and carbon reserve during postgerminative growth (Chapman et al., 2012). Membrane lipids are similar to triglycerides except that one of the fatty acids is replaced by a polar group such as a sugar in a glycolipid or a phosphate compound in a phospholipid. Generally speaking the unsaturated acids (oleic, linoleic and linolenic acids) are more fluid (and nutritionally desirable) than the saturated acids (palmitic and stearic).

Proteins are also derived partly from carbohydrates through the formation of amino acids. These latter simple compounds are then combined with nitrates from the soil and other substances to form the highly complex
protein molecule. Plants store proteins in embryo and vegetative cells to provide carbon, nitrogen, and sulfur resources for subsequent growth and development. Also proteins are the main constituent of protoplasm, they are stored mostly only in seeds, where they occur as solid granules called aleurone grains. Stored protein provides building blocks for rapid growth upon seed and pollen germination. Similarly, protein reserves in vegetative cells provide the building blocks for seed and fruit set during reproductive growth and for rapid expansion of vegetative structures after periods of dormancy (Herman and Larkins, 1999). Hundreds of proteins are known to occur in plant tissues. They are especially valuable as muscle and nerve builders rather than as sources of energy, and are an essential part of the animal diet.

Proteins are rarely extracted from plant tissues for food purposes, the exception being the uses put to soybeans. Proteins have very few industrial uses (Fairbairn and Shrestha, 1967). Proteins along with carbohydrates, lignin, and water, cutin, suberin, and inorganic compounds form a complex array in the plant cell wall (Showalter, 1993) and signal transduction (Stone and Walker, 1995).

Ascorbate is a major metabolite in plants. Ascorbic acid (vitamin C) is an abundant component of plants. Present in chloroplasts it occurs in all cell compartments, including the cell wall. Ascorbate has also been implicated in regulation of cell division by influencing progression from G1 to S phase of the cell cycle (Smirnoff, 1996). It has proposed functions in photosynthesis as an enzyme cofactor (including synthesis of ethylene, gibberellins, and anthocyanins) and in control of cell growth (Smirnoff and Wheeler, 2000). Ascorbate in the cell wall acts as a first line of defence against ozone. Cell wall ascorbate and cell wall-localized ascorbate oxidase (AO) have been implicated in control of growth. It is an antioxidant and, in association with other components of the antioxidant system, protects plants against oxidative stress.
damage resulting from aerobic metabolism, photosynthesis and a range of pollutants. Ascorbate is also a cofactor for some hydroxylase enzymes (e.g. prolyl hydroxylase) and violaxanthin de-epoxidase (Gallie, 2013). High AO activity is associated with rapidly expanding cells and a model which links wall ascorbate and ascorbate oxidase to cell wall extensibility is presented.

Phenolic Compounds composed of one or more aromatic benzene rings with one or more hydroxyl groups (C-OH). Although the essential oils are often classified as terpenes, many of these volatile chemicals are actually phenolic compounds, such as eucalyptol from *Eucalyptus globulus*, citronellal from *E. citriodora* and clove oil from *Syzygium aromaticum*. Like the terpenes, many phenolic compounds are attached to sugar molecules and are called glucosides or glycosides (Raja et al., 2000). Phenolic compounds, including their subcategory, flavonoids, are present in all plants and have been studied extensively in cereals, legumes, nuts, olive oil, vegetables, fruits, tea, and red wine. Many phenolic compounds have antioxidant properties, and some studies have demonstrated favorable effects on thrombosis and tumorogenesis and promotion various phytoestrogens are present in soy, but also in flaxseed oil, whole grains, fruits, and vegetables (Etherton et al., 2002).

Tannins are distributed all over the plant kingdom. Tannins are mainly located in the vacuoles or surface wax of the plants. Tannins are the most abundant secondary metabolites made by plants, commonly ranging from 5% to 10% dry weight of tree leaves, Tannins may help regulate the growth of secondary phloem and xylem tissues. There may be a loss in the bioavailability of tannins in plants due to birds, pests, and other pathogens (Narayanan and Seshadri, 1972). They are also found in the heartwood of conifers and may play a role in inhibiting microbial activity, thus resulting in the natural durability of the wood (Mondal et al., 1998). Tannins can defend
leaves against insect herbivores by deterrence and/or toxicity (Barbehenn and Constabel, 2011).

Flavonoids or bioflavonoids (from the Latin word flavus meaning yellow, their colour in nature) are a class of plant secondary metabolites. Flavonoids were referred to as Vitamin P probably because of the effect they had on the permeability of vascular capillaries. The flavonoids are a large group of naturally occurring phenylchromones found in fruits, vegetables, grains, bark, roots, stems, flowers, tea, and wine. Up to several hundred milligrams are consumed daily in the average Western diet.

According to the IUPAC nomenclature, they can be classified into: flavonoids or bioflavonoids, isoflavonoids, derived from 3-phenylchromen-4-one (3-phenyl-1,4-benzopyrone) structure, neoflavonoids, derived from 4-phenylcoumarine (4-phenyl-1,2-benzopyrone) structure. Three flavonoid classes above are all ketone-containing compounds, and as such, are anthoxanthins (flavones and flavonols). This class was the first to be termed bioflavonoids. The terms flavonoid and bioflavonoid have also been more loosely used to describe non-ketone polyhydroxy polyphenol compounds which are more specifically termed flavanoids. The three cycle or heterocycles in the flavonoid backbone are generally called ring A, B and C. Ring A usually shows a phloroglucinol substitution pattern.

Flavonoids are phenolic substances isolated from a wide range of vascular plants, with over 8000 individual compounds known. A variety of in vitro and in vivo experiments have shown that selected flavonoids possess antiallergic, antiinflammatory, antiviral and antioxidant activities, significant anticancer activity including anticarcinogenic properties and even a prodifferentiative activity, certain flavonoids possess potent inhibitory activity against a wide array of enzymes, but of particular note is their inhibitory effects on several enzyme systems intimately connected to cell
activation processes such as protein kinase C, protein tyrosine kinases, phospholipase A$_2$, and others (Middleton, 1998; Pietta et al., 1998; Moon et al., 2006), these are reported to possess a wide range of activities in the prevention of common diseases, including CHD, cancer, neurodegenerative diseases, gastrointestinal disorders and others (González et al., 2010).

Recent analyses have focused on our understanding of the role of flavonoids in such well-established processes as plant-microbe interactions and protection against ultraviolet (UV) light, and have also uncovered a previously unsuspected role in male fertility (Shirley, 1996). They include pollinator attractants, oviposition stimulants, feeding attractants and deterrents, allelopathy and phytoalexins (Iwashina, 2003). Flavonoids protect plants against various biotic and abiotic stresses. Flavonoid oxidation contributes to these chemical and biological properties and can lead to the formation of brown pigments in plant tissues as well as plant-derived foods and beverages. Flavonoid oxidation in plants is mainly catalyzed by polyphenol oxidases (catechol oxidases and laccases) and peroxidases. These activities are induced during seed and plant development, and by environmental stresses such as pathogen attacks. Their complex mode of action is regulated at several levels, involving transcriptional to post-translational mechanisms together with the differential subcellular compartmentalization of enzymes and substrates (Pourcel et al., 2007; Agati et al., 2012).

Plant sterols are an essential component of the membranes of all eukaryotic organisms. They are either synthesised de novo or taken up from the environment. Plant cells synthesize a complex array of sterol mixtures in which sitosterol, stigmasterol and 24-methylcholesterol often predominate. Sitosterol and 24-methylcholesterol are able to regulate membrane fluidity and permeability in a similar manner to cholesterol in mammalian cell
membranes (Hartmann, 1998). Plant sterols can also modulate the activity of membrane-bound enzymes, although some plant sterols have a specific function in signal transduction. The phytosterols are products of the isoprenoid pathway. The dedicated pathway to sterol synthesis in photosynthetic plants occurs at the squalene stage through the activity of squalene synthetase (Piironen et al., 2000).

Phytosterols, are steroid compounds similar to cholesterol which occur in plants and vary only in carbon side chains and/or presence or absence of a double bond. Stanols are saturated sterols, having no double bonds in the sterol ring structure. More than 200 sterols and related compounds have been identified. Free phytosterols extracted from oils are insoluble in water, relatively insoluble in oil, and soluble in alcohols. Phytosterol-enriched foods and dietary supplements have been marketed for decades. The commonly consumed plant sterols are sitosterol, stigmasterol and campesterol which are predominantly supplied by vegetable oils. Phytosterols are plant components that have a chemical structure similar to cholesterol except for the addition of an extra methyl or ethyl group; however, phytosterol absorption in humans is considerably less than that of cholesterol. In fact, phytosterols reduce cholesterol absorption, although the exact mechanism is not known, and thus reduce circulating levels of cholesterol. The efficacy of phytosterols as cholesterol-lowering agents (Katan et al., 2003; Berger et al., 2004; Jones et al., 2009). Plant membrane of raft composition are less sensitive to temperature variation as a result of membrane components like sitosterol and stigmasterol and glucosylcerebrosides, which are typical of plants, which extend temperature range of membrane(Dufourc, 2008).

Alkaloids belong to the broad category of secondary metabolites. This class of molecule has historically been defined as naturally occurring substances that are not vital to the organism that produces them. Alkaloids
Introduction

have traditionally been of interest only due to their pronounced and various physiological activities in animals and humans. Alkaloids do have important ecochemical functions in the defense of the plant against pathogenic organisms and herbivores or, as in the case of pyrrolizidine alkaloids, as protoxins for insects, which further modify the alkaloids and then incorporate them into their own defense secretions (Kutchan, 1995; Thakkar and Ray, 2014). Alkaloids in medicinal plants are reported for their antimicrobial and antimalarial activity (Hadi and Bremner, 2001; Ameyaw and Eshun, 2009).

Alkaloids have been isolated and purified using HPLC (Tsuchiya et al., 1999; Borde et al., 2014), alkaloid determination methods include spectrophotometry, gas chromatography, fluorimetry, ion chromatography, coulometry, gaschromatography, and electro chromatography (Shamsa et al., 2008).

Free radicals or reactive oxygen species, (ROS) or activated oxygen species (AOS) are produced as byproduct of normal metabolism also by xenobiotic compounds, drugs or ionizing radiations (Freeman and Crapo, 1982). ROS or free radicals are highly toxic these cause damage to genetic material and lipid peroxidation also inactivate membrane bound enzymes (Florence, 1996). Plants generate ROS also as signaling molecules to control various processes such as programmed cell death, pathogen defence, and stomatal behavior (Apel and Hirt, 2004). These medicinal herbs exhibited far stronger antioxidant activity and contained significantly higher levels of phenolics than common vegetables and fruits. (Cai et al., 2004). They also cause chronic and degenerative disease like Alzheimer’s disease, ageing, pulmonary disease, cardiovascular disease, cancer, rheumatoid arthritis (Pham-Huy et al., 2008). Many medicinal plants have great antioxidant potential, antioxidants reduce oxidative stress in cells and, therefore, are
useful in treatment of disease like cancer, cardiovascular and inflammatory diseases (Krishnaiah et al., 2011).

Flavonoids and phenolic acids are shown to have potential health benefits, biological properties of the flavonoids and focuses on the relationship between their antioxidant activity, as hydrogen donating free radical scavengers, and their chemical structures (Rice-Evans et al., 1996; Croft, 1998). With an increase in new technologies, certain animal models and studies with cell line in culture show observed activities may be due to superoxide and hydrogen peroxide produced during the autooxidation of polyphenols (Sang et al., 2005). A deeper understanding of the antioxidant mechanism can be achieved by experiments involving photoinduced hydrogen-atom transfer to a hydrogen abstractor (Neshchadin, 2010).

Due to increased and indiscriminate use of antibiotics for treatment of humans and animals there develops the antibiotic resistance and multidrug resistance microorganisms like Salmonella spp. which has increased a great deal in developing countries. Different extracts of various Medicinal plants have been reported to have good antimicrobial activity. The active crude alcoholic extracts were found to have no cellular toxicity (Ahmad et al., 1998). Being a rich source of secondary biomolecules such as tannins, terpenoids, alkaloids, and flavonoids (Cown, 1999), which exhibit significant pharmacological effects, spices and herbs appeal to many consumers who question the safety of synthetic food additives. Hundreds of medicinal plant species worldwide are used in the traditional medicine as a treatment for skin diseases caused by bacteria, fungi and viruses (Prashantkumar and Vidyasagar, 2008). Plant extracts and essential oils have been used as alternatives to antibiotic due to their antimicrobial activities and the favorable effect on the animal intestinal system (Ljubiša et al., 2009). Plant extracts are able to restrict the growth of bacteria due to the presence of active principles
in it. These active principles may inhibit protein synthesis of bacterial cell wall or alter the membrane function, inhibit protein synthesis or synthesis of purine and pyrimidines, hinder respiration or antagonize the metabolic pathways of microorganism leading to retardation of growth of bacteria. These active principles in these plants could be used as potent antibiotics (Sharma et al., 2010).