Nature has been a source of medicinal agents for thousands of years. Since the beginning of human civilization, it has been revealed that plants are the most important source of medicines for human health (Balandrin et al., 1993). An impressive number of modern drugs have been derived from natural sources; many of these isolations were based on the uses of the agents in traditional medicine (Cragg and Newman, 2001).

Medicinal herbs were found with an ‘iceman’ frozen in the Swiss Alps for more than 5,300 years, which appear to have been used to treat intestinal parasites. Other evidence was associated with a body in the Shanidar cave located in Iraq. This buried body was found along with eight species of plants, still widely used around the world today. This evidence suggests that Neanderthals living 60,000 years ago used medicinal plants (Solecki and Shanidar, 1975; Wimmer, 2008). The primitive man consumed plants in times of sickness. Many different cultures have used indigenous plants for thousands of years. The first generally accepted use of plants as healing agent was depicted in the painting discovered in the lascaux caves in France, which have been radio carbon dated around 14,000 B.C. Medicines in the stone age was based not on science but on magic and superstition (Kutumbiah, 1962). The plants found in the Neanderthal grave of a Shanidar IV individual (Iraq) were Achillea type, *Centauvea solstitialis*, Senecio type, Muscari type, *Ephedra altissima*, Althea type. Shanidar IV flowers possessed therapeutic effects (Lietava, 1992). The plants were used as flavors, foods, ornamentals, fumigants, species and cosmetics (Kunin and Lawton, 1996; Pieroni et al., 2004). The three herbs marshmallow root (demulcent herb), hyacinth (diuretic) and yarrow (cold and fever) have been found carefully tucked around the bones of a Stone Age man in Iraq. Theophrastus (371-287 BC), a student of Plato and Aristotle, wrote extensively on the plant subjects and is considered the first real botanist. His work *Historia Plantarum* provided the list of plants and preparation of medicines, spices and perfumes from plants.
and was used for two thousand years as a reliable reference. He wrote two works of a general nature on plants. The Natural History of Plants and About the Reasons of Vegetable Growth (Horstmanshoff et al., 2004). Both had a formative influence on the botanical research of following scientists.

The earliest evidence of the use of medicinal plants, which is present on a Sumerian clay tablet from 3000 B.C., gives formulas for mixing thyme and mustard with water, wine and milk to create healing poultices and salves. Despite their knowledge of mathematics and science, the Sumerians, Assyrians and Babylonians attributed disease to supernatural agents and they emphasized the role of Priests and Priestesses in cures (Sumner, 2000). The practice of herbal medicine was left to specialists and scholars such as the learned Assyrian king Ashurbanipal, who left behind tablets recording three hundred medicinal plants, including opium and myrth.

Traditional medicine has been used since the dawn of history for treating human illness. Herbal medicine constituted the main type of traditional medicine. This type of treatment prevailed during different times of history in different countries, Egypt has a very old and glorious history in using herbal medicine. May be Egypt was amongst the first countries in the world to use herbal medicine on a rather scientific bases (Haggag, 2004). The Ancient Egyptians were quite advanced in their diagnoses and treatments of various illnesses. Their advancements in ancient medical techniques were quite extraordinary, considering the lack of “modern” facilities, sterilization, sanitation, and researching capabilities. The remedies used by Ancient Egyptian physicians came mostly from nature, Diseases were rather common in Ancient Egypt. There were many skin afflictions, such as parasites, that occurred as a result of contact with the Nile waters. Worms and tuberculosis were also common, and were transmitted from their cattle. Also, pneumonia had a fairly common occurrence. Treatments for several ailments were
outlined in these documents, utilizing resources available to them, including minerals, plant materials, and animal products (including urine). With the Egyptians diligent record keeping the scholars have been able to translate information from the Edwin Smith Papyrus, the Kahun Papyrus, and the Ebers Papyrus to learn the extent of the Egyptian’s knowledge of anatomy, disease, hygiene, disease, and healing. Herbs played a major part in Egyptian medicine.

Medical institutions, referred to as Houses of Life are known to have been established in ancient Egypt as early as the 1st Dynasty. The earliest known physician is also credited to ancient Egypt. Hesyre was the “Chief of Dentists and Physicians” for King Djoser in the 27th century BC (David, 2003). Also, the earliest known woman physician, Peseshet, practiced in Ancient Egypt.

According to the Papyrus Ebers, an ancient text written in 1500 BC, there are references to more than 700 herbal remedies and 800 compounds which were extracted from plants, the Papyrus Ebers thought to be a copy of the even more ancient Book of Thoth (3000 BC). Some of the plants mentioned in this text are opium, Cannabis, myrrh, frankincense, fennel, cassia, senna, thyme, henna, juniper, aloe, linseed, castor, caraway seeds, Marjoram Leaves, Spearmint Leaves, Basil, Hibiscus, Calendula, Anise seeds, Parsley, Cumin, Licorice Root, Chamomile, & Dill. Cloves of Garlic have been found in Egyptian burial sites, including the tomb of Tutankhamen.

The most extensive Babylonian medical text is the Diagnostic Handbook written by the physician Esagil-kin-Apli of Borsippa and it contains a list of medical symptoms and detailed observations along with the logical rules used in combining observed symptoms on the body of a patient with its diagnosis and prognosis (Horstmanshoff et al., 2004). Most of our knowledge of ancient herbal medicine during the 1st millennium BC comes
from the Torah i.e., the five books of mosses, which contain various health related laws and rituals.

The first Chinese herbal book, the *Shennong Bencao Jing*, compiled during the Han Dynasty but dating back to a much earlier date, possibly 2700 B.C., lists 365 medicinal plants and their uses - including Ma-Huang, the shrub that introduced the drug ephedrine to modern medicine. For thousands of years, plant derived (herbal) remedies have remained a vital part of traditional Chinese medicine. Out of 5500 medicinal plants used in traditional Chinese medicine, between 300 and 500 are commonly used in regular prescriptions (Han *et al.*, 1984).

The ancient Greeks and Romans made medicinal use of plants. Greek and Roman medicinal practices, as preserved in the writings of Hippocrates and especially Galen, provided the patterns for later western medicine. Hippocrates advocated the use of a few simple herbal drugs - along with fresh air, rest, and proper diet (Scarborough, 1978; Butrica, 2002). Galen, on the other hand, recommended large doses of drug mixtures including plant animal and mineral ingredients. The Greek physician compiled the first European treatise on the properties and uses of medicinal plants, *De Materia Medica*. In the first century AD, Dioscorides wrote a compendium of more than 500 plants that remained an authoritative reference into the 17th century. Similarly important for herbalists and botanists of later centuries was the Greek book that founded the science of botany, Theophrastus’ *Historia Plantarum*, written in the fourth century BC.

The Vedic hymns of the Aryans are the earliest literary source of information about healing practices in the sub-continent. These hymns provide insights into diseases prevalent during the period and their causes. With the advent of Buddhism, Jainism and other new ascetic and philosophical movements promoted free spirit of enquiry and experimentation
in all fields of knowledge, especially in medicine (Zysk, 1996), early Buddhist and Jain texts in Prakrit (Pali and other vernacular languages) describing the use of medicines, surgical procedures, trepanation, purges and emetics, practices consolidated from all levels of society (Zysk, 1998).

In this cultural milieu in the Indo-Gangetic and lower Himalayan regions, tribal and wandering healers, learned physicians, ascetic and yogic traditions such as Buddhism and Jainism, and philosophical schools such as Samkhya, Visheshika and Nyaya all contributed to the emergence of a formal scientific culture of healing that became Ayurveda. The fundamental concepts and practices of Ayurvedic healing continued to be elaborated and refined over centuries and were codified during the early centuries of the C.E. in treatises composed in Sanskrit. The earliest available works are Charaka Samhita, Sushruta Samhita, Ashtangahrdayam, Ashtangasamgrah, Bhea Samhita and Kashyapa Samhita, the latter two in incomplete versions.

Historical and current studies and surveys indicate that the Eastern region of the Mediterranean has been distinguished throughout the generations with a rich inventory of natural medicinal herbs. It is well documented that indigenous Arab medicine has contributed greatly to the development of modern medicine in Europe and remains one of the closest forms of original European medicine (Saad et al., 2005). China and India have standardized their own indigenous medicine and pharmacopoeia yet countries in Africa, despite the pressures of disease and the abundance of plant species, have not followed suit. Most of the existing texts on traditional medicine in Africa deal only with medicinal plants and their uses, ignoring chemical and pharmacological studies. In Asia, the practice of herbal medicine is extremely well established and documented; as a result, most of the medicinal plants that have international recognition come from China and India. In Europe and North America, the use of herbal medicine is increasing
fast, especially for correcting imbalances caused by modern diets and lifestyles. Many people now take medicinal plant products on a daily basis, to maintain good health as much as to treat illness. Historically, all medicinal preparations are derived from plants, whether in the simple form of raw plant materials or in the refined form of crude extracts, mixtures, etc (Krishnaraju et al., 2005).

The Arabs venerated Greco-Roman culture and learning, and translated tens of thousands of texts into Arabic for further study (Castleman and Michael, 2001). As a trading culture, the Arab travellers had access to plant material from distant places such as China and India. Herbals, medical texts and translations of the classics of antiquity filtered in from east and west (Pharmaceutics and Alchemy). Muslim botanists and Muslim physicians significantly expanded on the earlier knowledge of materia medica. Al-Dinawari described more than 637 plant drugs in the 9th century (Fahd, 1996) and Ibn al-Baitar described more than 1,400 different plants, foods and drugs, over 300 of which were his own original discoveries, in the 13th century. The experimental scientific method was introduced into the field of materia medica in the 13th century by the Andalusian-Arab botanist Abu al-Abbas al-Nabati, the teacher of Ibn al-Baitar (Gaster and Holroyd, 2000; Boulanger, 2002).

The Indian subcontinent, with the history of one of the oldest civilization, harbors many traditional health care systems. Their development was supported by the diverse biodiversity in flora and fauna due to variations in geographical landscaping. Ayurveda, whose history dates back to 5000 B.C., is one of the ancient health care systems. The Ayurveda was developed through daily life experiences with the mutual relationship between mankind and nature. The ancient text of Ayurveda reports more than 2000 plant species for their therapeutic potentials. Besides Ayurveda, other
traditional and folklore systems of health care were developed in the different time periods in Indian subcontinent, where more than 7500 plant species were used (Mukherjee and Wahile, 2006). Ayurveda, the science of life, is a comprehensive medical system that has been the traditional system of healthcare in India for more than 5000 years. This medical system was well established around 2500 to 600 BC, when it evolved into two schools: the School of Physicians and the School of Surgeons, similar to allopathy. Charak Samhita, Susrut Samhita, and Ashtang Hridaya Samhita are the Senior Triad texts, and Madhav Nidan Samhita, Sarangdhar Samhita, and Bhavprakash Samhita are the Junior Triad texts. Around 600 BC. Ayurveda was branched into internal medicine; pediatrics; psychiatry; surgery; eye, ear, nose, and throat; toxicology; geriatrics; and eugenics/aphrodisiacs. The body is composed of 3 body doshas, 3 mental doshas, 7 dhatus, and malas. The harmony among the body doshas of vata (nervous system), pitta (enzymes), and kapha (mucus) and the gunas, or mental doshas (which are human attributes: satogun [godly], rajas [kingly], and tamas [evil]), constitutes health, and their disharmony constitutes disease. The management of illness requires balancing the doshas back into a harmonious state through lifestyle interventions, spiritual nurturing, and treatment with herbo-mineral formulas based on one's mental and bodily constitution. (Mishra et al., 2001)

Anatomical knowledge in ancient India was derived principally from animal sacrifice, chance observations of improperly buried human bodies, and examinations of patients made by doctors during treatment. The Vedic philosophies form the basis of the Ayurvedic tradition, which is considered to be one of the oldest known systems of medicine. Two sets of texts form the foundation of Ayurvedic medicine, the Susruta Samhita and the Charaka Samhita. The Susruta Samhita provided important surgical and anatomical information of the understanding of anatomy by Indians in the 6th century BC.
The early Aryans invaded India about 1500 B.C. and the Vedic age started.

The Rigveda texts contain the hymns for Soma and those for herbs, the oldest literature in the world is found in the 1,028 sacred hymns of the Rgveda (Rig-Veda) (Wilson, 1977). Written in Sanskrit, it includes a history of the Aryans, a view of prehistoric times, requests for benevolence and blessings from various mythological gods and goddesses, and divine remedies for disease and disorders.

The term Ayurveda (i.e., science of life) is found in some old versions of both Ramâyana and Mahâbhârata and in the Atharvaveda, of the sacred texts of India, the Atharvaveda (Atharva-Veda) contains the most detailed information dealing with medicine, health, and disease (Gordon, 1949; Whitney, 1962; Griffith, 1985).

Suśruta had the credit of making a breakthrough in the field of surgery including rhinoplasty, the repair of torn ear lobes, perineal lithotomy, cataract surgery, and several other excisions and other surgical procedures. Susruta writings were compiled into a Samhita. The Suśruta-samhitā, which deals mainly with surgical medicine, explains it as follows; Indra-->Dhanvantari-->Suśruta. The Sushruta Samhita attributed to Sushruta in the 6th century BC describes 700 medicinal plants, 64 preparations from mineral sources, and 57 preparations based on animal sources (Dwivedi and Dwivedi, 2008). The earliest foundations of Ayurveda were built on a synthesis of selected ancient herbal practices dating back to the early second millennium BC, together with a massive addition of theoretical conceptualizations and new therapies dating from about 400 BC onwards, and coming out of the communities of thinkers which included the Buddha and others (Ernst, 2007).

A work on internal medicine, gives the following transmission of sages: Brahmā-->Daksa-->Prajāpati-->Aśivināu-->Indra-->Caraka. According
to the compendium of Charaka, the *Charaka samhita*, health and disease are not predetermined and life may be prolonged by human effort. The compendium of Sushrutha, the *Sushrutha samhita* defines the purpose of medicine to cure the diseases of the sick, protect the healthy, and prolongs life. Both these ancient compendia include details of the examination, diagnosis, treatment, and prognosis of numerous ailments. The *Sushrutha samhita* is notable for describing procedures on various forms of surgery.

Both Charaka and Suśruta were medical doctors as well as pharmacists, so they studied more than 1000 herbs thoroughly. The Ayurveda had been used by his devotees for medical purposes. It eventually spread over Asia with the advanced evolution of Buddhism (Okuda and Natsume, 2010). Ayurveda had already developed eight different subspecialties of medical treatment, named Ashtanga, which included surgery, internal medicine, ENT, pediatrics, toxicology, health and longevity, and spiritual healing. Ayurvedic medicine was mainly composed of herbal preparations which were occasionally combined with different levels of other compounds, as supplements. In the Ayurvedic system, the herbs used for medicinal purposes are classed as brain tonics or rejuvenators. Among the plants most often used in Ayurveda are, in the descending order of importance: (a) Ashwagandha, (b) Brahmi, (c) Jatamansi, (d) Jyotishmati, (e) Mandukparni, (f) Shankhapushpi, and (g) Vacha (Murthy *et al.*, 2010).

Nature has bestowed upon us a very rich botanical wealth and a large number of diverse types of plants that grow wild in different parts of our country. In India, the use of different parts of several medicinal plants to cure specific ailments has been in vogue from ancient times (Shiva, 1996). India is one of the 12-mega biodiversity centers having about 10% of the world’s biodiversity wealth, which is distributed across 16 agro-climatic zones (Dev, 1997). In India around 20,000 medicinal plant species have been recorded
recently (Bhattacharjee, 1998), but more than 500 traditional communities use only about 800 plant species for curing different diseases (Kamboj, 2000). With a view to strengthen the medicinal plants sector all over the country as well as to conserve the wild stock, the NMPB (National Medicinal Plants Board) was set up by the Government of India in 2000. The prime objective of setting up the board was to establish an agency which would be responsible for coordination of all matters with respect to the medicinal plants sector, including drawing up policies and strategies for in situ conservation, cultivation, harvesting, marketing, processing, drug development, etc. (Kala and Sajwan, 2007). In India, several steps have been taken to improve the quality of Ayurvedic medicines. Good manufacturing practice (GMP) guidelines have been introduced so as to ensure quality control. Medicinal plant boards have been constituted at state and central level to inspire people particularly the farmers for adopting cultivation of medicinal plants. Herbal gardens have been developed to make common man conversant with the rich heritage of Indian system of medicine. Various institutes like National Institute of Pharmaceutical Education and Research (NIPER), National Botanical Research Institute (NBRI), Central Institute of Medicinal and Aromatic Plants (CIMAP) and Central Research Drug Institute (CDRI) are playing pivotal role in laying down standards for Ayurvedic system of medicine (Singh, 2007).

With the passage of time a scientific revolution, in almost all the fields started (Dubick, 1986; Singh, 2007). Medicinal plants have been known for millennia and are highly esteemed all over the world as a rich source of therapeutic agents for the prevention of diseases and ailments The search for eternal health and longevity and for remedies to relieve pain and discomfort drove early man to explore his immediate natural surroundings (Lai, 2004; Tapsell et al., 2006; Nair and Chanda, 2007; Sharma et al., 2008). Universal trend is now following the old footsteps that is from synthetic to herbal
medicine, is termed as “Return to Nature” (Kumar et al., 2011; Shah et al., 2011).

Bioactive compounds currently extracted from plants are being used as food additives, pigments, dyes, insecticides cosmetics, perfumes and fine chemicals (Balandrin and Klocke, 1988). The bioactive extract should be standardized on the basis of active compound. The bioactive extract should undergo limited safety studies (De Smet, 1997; Blumenthal et al., 1998; EMEA 2002; WHO 2004; Ahmad et al., 2006; Samy and Gopalakrishnakone, 2007). There is a growing interest in correlating phytochemical constituents of a plant with its pharmacological activity (Gupta, 1994; Vaidya and Antarkar, 1994). The variability in chemical composition can result in significant differences in pharmacological activity: involving both pharmacodynamics and pharmacokinetics issues (Park, 2008). It is very important that a system of standardization is established for every plant medicine in the market because the scope for variation in different batches of medicine is enormous (Ekka et al., 2008).

There are many natural products which serve as a major source for drug and pharmaceutical use for instance: quinine, theophylline, penicillin G, morphine, paclitaxel, digoxin, vincristine, doxorubicin, cyclosporin, and vitamin A, all share two important characteristics- they are cornerstones of modern pharmaceutical care, and they are all natural products (Ebadi, 2007). Three quarters of plants that provide active ingredients for prescription drugs came to the attention of researchers because of their use in traditional medicine (Jepson and Craig, 2008). Among the 120 active compounds currently isolated from the higher plants and widely used in modern medicine today, 80 percent show a positive correlation between their modern therapeutic use and the traditional use of the plants from which they are derived. More than two thirds of the world's plant species, at least, 35,000 of
which are estimated to have medicinal value come from the developing countries.

The chemical investigation of plants has been a favourite area of research in India, leading to the isolation of several hundred new compounds and the elucidation of structure of many novel and complex metabolites. In the past, natural products had considerable impact on medicine and even today, many of these, with diverse structures and activities are of paramount importance, which has been exhaustively reviewed by various workers (Bell, 1980; Bell and Charlwood, 1980).

Although plants accumulate various metabolites but in the present study, various primary and secondary metabolites viz, Carbohydrates (Sugar, Starch), Lipids, Proteins, Ascorbic Acid, Phenolic compounds, Flavonoids, Phytosterol, Alkaloids, have been reviewed.

Carbohydrates are hydrates of carbon, macromolecule, consisting of carbon (C), hydrogen (H), and oxygen (O) atoms, with empirical formula $C_n(H_2O)_n$, usually with a hydrogen:oxygen atom ratio of 2:1. The carbohydrates (saccharides) are divided into four chemical groups: monosaccharides, disaccharides, oligosaccharides, and polysaccharides (Davis and Sawyer, 1916). Carbohydrates perform numerous roles in living organisms. Polysaccharides serve for the storage of energy (e.g., starch and glycogen), and as structural components (e.g., cellulose in plants and chitin in arthropods). Plant and fungal cells are surrounded by a cell wall rich in diverse polysaccharides, carbohydrates in the cell wall function to maintain cell shape and integrity (Spoehr et al., 1942). The carbohydrate components make up approximately 90% of the primary wall, oligosaccharides (oligosaccharins) released from plant or microbial cell walls can serve as signals to regulate plant defense and plant growth and development (Darvill et al., 1985; Mohnen and Hahn, 1993) polysaccharides, released from covalent attachment within plant cell walls,
can function as regulators of various physiological processes such as morphogenesis, rate of cell growth and time of flowering and rooting, in addition to activating mechanisms for resisting potential pathogens (Fry et al., 1990; Zablackis et al., 1995). Plant extracts contain diverse mixtures of sugars. rapid quantification of sucrose and fructans by thin-layer chromatography (TLC), HPLC, GC and densitometry, enzymatic methods, colorimetric methods (John et al., 1996; Chow and Landhäusser, 2004; Caffall and Mohnen, 2009; Raessler et al., 2010), simple gravimetric technique for measuring the standing crop or production of carbohydrate-rich solutions such as honeydew or nectar (Dungan et al., 2004).

Enhancement of immune complex clearance, showed potent anti-ulcer activity and radical scavenging effect (Yamada, 1995). Polysaccharides are known for antithrombotic and antiviral effect, and to inhibit the complex process of angiogenesis, anticoagulant activity (Franz et al., 2000; Yu et al., 2003; Yang et al., 2008) and antinociceptive activity (Howe et al., 2002) are some of the known pharmacological activity.

The word "lipid" encompasses both fats and oils. Lipids, like carbohydrates, are important in energy storage and this is the best known function of lipids. However lipids are used for a lot of other functions in plants and animals other than energy storage, Lipids are an essential constituent of all plant cells. The chemical composition of the lipid appears to be characteristic of the species of plant (Purdy and Truter, 1961). The vegetative cells of plants contain -5 to 10% lipid by dry weight, and almost all of this weight is found in the membranes (Ohlroggeav and Browse, 1995) commonly found in plant seeds. Lipids found in plants play an important part in market values. Vegetable oil, olive oil, canola oil and avocado oil are all acquired from plants that contain these lipids.
Lipids include fatty acids, fats, oils, steroids (sterols), waxes, cutin, suberin, glycerophospholipids (phospholipids), glyceroglycolipids (glycosyl-glycerides), terpenes, and tocopherols (Hadley, 1981). Important functions, including storage of metabolic energy, protection against dehydration and pathogens, the carrying of electrons, and the absorption of light, chilling tolerance (Moon et al., 1995) resistance to drought stress (Repellin et al., 1997).

Genetic modification of oil-producing plants has been achieved to produce ready-modified oils and increase their utility (Aitzetmüller, 1993). The fatty acid composition of the seed lipids of plants, in contrast to leaf lipids, may contain highly specific unusual fatty acids, which are often correlated to plant family (Kinney, 1994). Plant fatty acid amides show immunomodulatory effects (Gertsch, 2008).

Proteins are constructed from even smaller molecules called amino acids. They participate in every aspect of plant growth and development. Proteins are involved in processes such as catalyzing chemical reactions (enzymes), facilitating membrane transport, intracellular structure and energy generating reactions involving electron transport, amino acids are now treated as another source of Nitrogen for some plants. Many factors, such as competition with microorganisms, or amino acid concentration in soil, influence the level of uptake of amino acids from the soil (Adamczyk et al., 2010), great sources of protein that come solely from plants such as dark green vegetables, whole grains, legumes (beans, peas, and lentils), nuts, and seeds (Jo Bartell, 2011), 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).
Plants as alternative hosts for the production of recombinant proteins are being actively pursued, taking advantage of their unique characteristics. Proteins function as heat shock proteins (Vierling, 1991), pathogen related proteins (Linthorst and Loon, 1991) ribosome inactivating proteins (Barbieri et al., 1993), lipid transfer protein (Kader, 1996). The key to cost-efficient production in any system is the level of protein accumulation (Ma et al., 2007; Chen, 2008; Egelkrout et al., 2012).

Ascorbic acid is a small molecule when compared with DNA, RNA or proteins, its metabolic impact is no less considerable. In general, ascorbic acid is not as widely distributed as other vitamins. It was first isolated in 1928 as hexuronic acid from the adrenal cortex and obtained in pure form from the fruits. It plays role in growth, differentiation and metabolism of plants (Chinoy, 1984; Foyer and Lelandais, 1993; Grantz et al., 1995; Smirnoff, 1996; Smirnoff and Wheeler, 2000).

Phenols are the basic building block for many plant constituents. They are simple or complex in nature. They act as antinflammatory and antiseptic. Phenolic compounds are aromatic substances. They are formed via the shikimic acid pathway or the malonic acid pathway. There roles in regulating the growth and development of plants (Harborne, 1964 a,b, 1980; Legrand et al., 1976; Harborne, 1989; Nicholson, 1992; Khan et al., 2001) and against the microbial infections have been reviewed. (Harborne 1964 a, b; Ribereau, 1972; Lattanzio, 2003; Uba et al., 2008; Bhattacharya et al., 2010).

Phenolic compounds constitute one of the main classes of secondary metabolites. Flavonoids are polyphenolic compounds that are ubiquitous in nature, Flavonoids occur naturally in fruit, vegetables, and beverages such as tea and wine (Nijveldt et al., 2001), and are categorized, according to chemical structure, into flavonols, flavones, flavanones, isoflavones, catechins,
anthocyanidins and chalcones (Iwashina, 2000; Tapas et al., 2008; Dixon and Pasinetti, 2010; Xiao et al., 2011; Petrussa et al., 2013).

Quantification of flavonols (myricetin, quercetin, kaempferol, and isorhamnetin), flavones (luteolin and apigenin), and phenolic acids (chlorogenic, caffeic, ellagic, and rosmarinic acids using Folin-Ciocalteau assay used to analyse total phenols and the amount of total flavonoids were analysed using aluminium chloride calorimetric assay (Ogbeide and Parvez, 1991; Nataraj et al., 2009; Samatha et al., 2012), HPLC-DAD-MS (Hertog et al., 1992; Justesen et al., 1997; Mattila et al., 2000; Plazonić et al., 2009), spectrophotometric method (Rolim et al., 2006), reversed-phase high-performance liquid chromatographic (RP-HPLC) method (Haghi and Hatami, 2010).

The flavonoids have recently aroused considerable interest because of their potential beneficial effects on human health—they have been reported to have immunosuppression (Kim and Cho, 1991), flavonoids inhibit oxidation of low-density lipoprotein and reduce thrombotic tendency (Hertog et al., 1993,) coronary heart disease prevention, and anticancer activity (Holiman et al., 1996; Craig, 1999; Ielpo et al., 2000; Prior and Cao, 2000; Ronald and Cao, 2000; Williams et al., 2004), inhibitors of xanthine oxidase (Cos et al., 1998), some flavonoids exhibit potential for anti-human immunodeficiency virus functions (Yao et al., 2004; Botta et al., 2005), antioxidant activities (Chun et al., 2007), treatment of gout, hyperuricemia, and reperfusion injury (Shohaib et al., 2011), antiviral, anti-allergic, antiplatelet, anti-inflammatory, antitumor (Kumar and Pandey, 2013).

Phytosterols are cholesterol-like molecules found in all plant foods, with the highest concentrations occurring in vegetable oils, Nuts and seeds contain moderate levels, and fruits and vegetables generally contain the lowest concentrations of plant sterols (Weihrauch and Gardner, 1978;
Ostlund, 2002), plant oils are excellent sources of phytosterols. Phytosterols differ from animal cholesterol only slightly in their structure, but vary greatly in their ability to induce atherosclerosis, which is the buildup of a fatty plaque on vessels that can lead to heart disease (Tilvis and Miettinen, 1986; Glueck et al., 1991; Jones et al., 1997; Plat et al., 2000; Moreau et al., 2002). Anti-inflammatory activity (García et al., 1993). Biological activities of phytosterols are effects on lecithin: cholesterol acyltransferase activity, bile acid synthesis, oxidation and uptake of lipoproteins, hepatic and lipoprotein lipase activities and coagulation system have been linked to their anti-atherogenic properties (Moghadasian, 2000). The hypocholesterolemic effect that is lowering of the intestinal absorption of both dietary and endogenous cholesterol (Bartnikowska, 2000), phytosterol chemically acts as an antioxidant, and membrane stabilizer (Yoshida and Niki, 2003), significant reductions in lipid profiles which included cholesterol, triglycerides, LDL and VLDL (Kalsait et al., 2011).

Alkaloids are a class of naturally occurring organic nitrogen-containing bases. Alkaloids are found primarily in plants (Odebiyi et al., 1978), and are especially common in certain families of flowering plants. 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 have traditionally been of interest only due to their pronounced and various physiological activities in animals and humans. The tropane alkaloid scopolamine is a medicinally important anticholinergic drug (Yun et al., 1992). A picture has now begun to emerge that alkaloids too have important ecochemical functions in the defense of the plant against pathogenic organisms and herbivores or, as in the case of pyrrolizidine alkaloids, as pro-toxins for insects, which further modify the alkaloids and then incorporate them into their own defense secretions (Kutchan, 1995).
Alkaloids are very useful pharmaceutical agents because of their biological activities (Vachnadze et al., 2001; Gotti et al., 2006; Kumar et al., 2009), antioxidant (Benabdesselam et al., 2007), antimicrobial, antifungal, antitumor, cytotoxic, antiplasmodial, antioxidative, antimutagenic, antigenotoxic and hallucinogenic properties, enhances insulin sensitivity and also produces vasorelaxant effect (Deng et al., 2011; Patel et al., 2012), analgesic potential and anti-inflammatory activities (Chen et al., 2012).

Alkaloids are also reported to be toxic to health (Clement et al., 1997, 1998; Radulović et al., 2012).

Microbes are single-cell organisms, they are the oldest form of life on earth. Microbes include bacteria, archaea, fungi and protists. Some microbes cause disease in humans, plants, and animals. Others are essential for a healthy life. Indeed, the relationship between microbes and humans is delicate and complex. Diseases causing organisms in are known as pathogenic microorganisms. An antimicrobial or antibiotic is an agent that kills microorganisms or inhibits their growth. Antimicrobial medicines can be grouped according to the microorganisms they act primarily against. For a long period of time, plants have been a valuable source of natural products for maintaining human health, medicinal plants extracts and phytochemicals, both with known antimicrobial properties, are of great significance in therapeutic treatments (Hammer et al., 1999; Sokmen et al., 1999; Nascimento et al., 2000; Ríos and Recio, 2005; Tiwari et al., 2005; Ushimaru et al., 2007; Mahesh and Satish, 2008; Sharma et al., 2009; Temrangsee et al., 2011; Dubey et al., 2012; Selvamohan et al., 2012; Borde et al., 2013), Structural modification of antimicrobial drugs to which resistance has developed has proven to be an effective means of extending the lifespan of commonly used antimicrobial agents (Cushnie and Lamb, 2005).
Active phytochemicals in herbal medicine are associated with their pharmaceutical activities, medicinal plants show vast spectrum of pharmacological activities constituents mainly include triterpenes and triterpenoid saponins, flavonoids, iridoids, lignans, alkaloids, polysaccharides and ellagic acids. A number of species with these active constituents have been used as folk medicine for the treatment of fever, detoxifying, acesodyne and hemostasis (Hooper and Leonard, 1965; Tang et al., 2004; Dahanukar et al., 2000; Ho et al., 2012). Antiepileptogenic and neuroprotective therapy for seizures (Sucher, 2006), in cardio-protective effects antipyretic, analgesic and anti-inflammatory and anti-cancer effects, reducing free radical oxidative, antitumor properties, the active components of herbal medicine are also used in nutrient supplement (Ho and Jie, 2007; Huang et al., 2009), these natural compounds from traditional Chinese medicines with potent anti-HIV activities (Zhang et al., 2010), antidiabetic (Khan et al., 2012; Patel et al., 2012).

A free radical is any molecule that has an odd number of electrons which are highly reactive and, therefore, transient. Free radicals are generated in vivo as byproducts of normal metabolism. They are also produced on exposure to ionizing radiation, to drugs capable of redox cycling, or to xenobiotics that can form free radical metabolites in situ (Maestro, 1980; Freeman and Crapo, 1982; Halliwell and Gutteridge, 1986; Halliwell, 1994), also produced by exercise (Davies et al., 1982). Dysfunction induced by free radicals are a major component of ischemic diseases of the heart, bowel, liver, kidney, and brain (McCord, 1985). At high concentrations, free radicals and radical-derived, non radical reactive species are hazardous for living organisms and damage all major cellular constituents. At moderate concentrations, however, nitric oxide (NO), superoxide anion, and related reactive oxygen species (ROS) play an important role as regulatory mediators in signaling processes (Dröge, 2002; Etherton et al., 2004; Valko et al., 2007; Sen et al., 2010).
An excessive and/or sustained increase in ROS production has been implicated in ischemia/reperfusion injury (Paller et al., 1984), the pathogenesis of cancer, diabetes mellitus, atherosclerosis, neurodegenerative diseases, alzheimers, rheumatoid arthritis (Kehrer, 1993; Smith et al., 1997; Aruoma, 1998), obstructive sleep apnea, and other diseases. Accumulation of the free radicals in body organs or tissues can cause oxidative damage to bimolecules and membranes of cell, eventually leading to many chronic diseases, such as inflammatory, cancer, diabetes, aging, cardiac disfunction and other degenerative diseases (Chaminda et al., 2001; Wang et al., 2004; Valko et al., 2006; Mazumder and Rahman, 2008).

In living organisms, the levels of free radicals and other ‘reactive species’ are controlled by a complex web of antioxidant defences, which minimize (but do not completely prevent) oxidative damage to biomolecules. Antioxidants (e.g., glutathione, arginine, citrulline, taurine, creatine, selenium, zinc, vitamin E, vitamin C, vitamin A, and tea polyphenols) and antioxidant enzymes (e.g., superoxide dismutase, catalase, glutathione reductase, and glutathione peroxidases) exert synergistic actions in scavenging free radicals (Fang et al., 2002). Researchers have reported that intake of fruits, vegetables and other foods having high antioxidant activity has been associated with reduced risks of cancer, cardiovascular disease, diabetes and other diseases (Schinella et al., 2002; Trouillas et al., 2003; Etherton et al., 2004).

Antioxidants are shown to be anticarcinogens (Sun, 1990), free radicals and Reactive Oxygen Species (ROS) are toxic, mostly owing to direct damage of sensitive and biologically significant targets, and are thus a major cause of oxidative stress; that complex enzymatic and nonenzymatic systems act in concert to counteract this toxicity; and that a major protective role is played by the phenomenon of adaptation (Halliwell, 1991, 1992; Kane et al., 1993;
Yu, 1994; Turrens, 2003; Apel and Hirt, 2004; Andreyev et al., 2005; Bayr, 2005; Liochev, 2013).

Various medicinal herbal extracts have been examined for their antioxidant activity using DPPH free radical activity (Pietta et al., 1998; Choi et al., 2002; McCune and Johns, 2002; Ramos et al., 2003; Shyur et al., 2005; Aqil et al., 2006; Borchardt et al., 2008; Khalaf et al., 2008; Borchardt et al., 2009; HO et al., 2012), FRAP (Katalinic et al., 2006; Surveswaran et al., 2007), ABTS (Cai, 2004; Djeridane et al., 2006; Proestos et al., 2013).

In the present study two plants namely - *Boerhavia diffusa* and *Tecomella undulata* have been studied.

*Boerhavia diffusa* belongs to family- Nyctaginaceae, and almost all the plants of this family accumulate carbohydrates as sugar, starch, and nonstructural carbohydrate (NSC) (Poorter and Kitajima, 2007; Bhalerao, 2012). Carbohydrate storage is a key functional trait that can explain species differences in growth and survival that lead to species coexistence through niche assembly processes and life-history trade-offs. (Myers and Kitajima, 2007).

Presence of lipids, fatty acids were investigated with a predominance of linolenate, palmitate and linoleate (Roughan, 1985; Miralles et al., 1988), in fruits (Galetti et al., 2000; Passos and Oliveira, 2004), as pollen reserves are seen in *Boerhavia* sp (Pizo and Oliveira, 2000; López et al., 2006; Malviya et al., 2010; Struwig et al., 2011).

Proteins have been screened in fruits of these plants (Passos and Oliveira, 2004; Shisode and Kareppa, 2011), seeds (Barclay & Earle, 1974; Ghosh et al., 2014; Beegum et al., 2014), proteins in different forms act against infections (Bhatia and Lodha, 2005).
Phenolic compounds have also been reported, these phenolic compounds are responsible for the antioxidant activity (Surveswaran et al., 2007; Gopal et al., 2010; Kumar and Ravichandran, 2011; Dhakar et al., 2012; Malhotra et al., 2013; Govindan and Muthukrishnan, 2013; Ramachandra et al., 2013; Ammar et al., 2014; Bhardwaj et al., 2014; Nagarani et al., 2014; Sharma et al., 2014).

Metabolite profiling includes, terpenes, phenylpropanoids, indol compounds, norisoprenoids, Organic acid analysis showed punarnavoside (Rotenoids), 12a-hydroxyrotenoids, (−)-4,11,12a-trihydroxy-9-methoxyrotenoid and (−)-4,9,11,12a-tetrahydroxyrotenoid, 9-O-methyl-inone B, boeravinone C and boeravinone H (Messana et al., 1986; Ahmed et al., 1990; Linghu et al., 2014), oxalic, ketoglutaric, pyruvic, quinic and fumaric acids (Pereira et al., 2009), other phytochemical constituents, as B-sitosterol (Phytosterols), Liriodendrin (lignans), Boerhavine (Xanthones) and Potassium nitrate (Salts) Mono- and sesquiterpenoids, aromatics (both benzenoids and phenylpropanoids), aliphatic compounds, lactones, and nitrogen-bearing compounds were also observed (Santhosha et al., 2011; Levin et al., 2013). Liriodendrin and syringaresinol mono-D-glycoside, ursolic acid also the seeds of this plant contain fatty acids and allantoin (Mahesh et al., 2012).

Boerhavia species have screened to have to some common flavones and flavonols, this exudate contains a novel C-methylated isoflavone named abronisosflavone C-glycosylflavonoids (Richardson, 1978; Fadeyi et al., 1989; Wollenweber et al., 1993), presence of flavonoid glycosides, namely, eupalitin 3-O-β-d-galactopyranosyl-(1→2)-β-d-glucopyranoside, eupalitin 3-O-β-d-galactopyranoside, and 6-methoxykaempferol 3-O-β-d-(1→6)-robinoside, quercetin and isorhamnetin, rutin, narcissi, isoquercitrin, and isorhamnetin 3-O-β-D-glucopyranoside, two flavan-3-ols, catechin epicatechin, kaempferol, luteolin-7-O-[2"-O-(5"-O-feruloyl)-D-apiofuranosyl]-b-D-glucopyranoside,
vitexin, isovitexin, isoorientin, orientin, vicenin-2, chryso-eriol, apigenin and luteolin (Li et al., 1996; Stintzing et al., 2004; Rinaldo et al., 2007; Maurya et al., 2007; Nazir et al., 2011; Lakshmi et al., 2012; Petrus et al., 2013; Roy et al., 2014) pinitol, quercetin and quercetin-3-O-β-L-rhamnopyranoside (Jawla et al., 2013).

Phytosterol screening of Boerhavia species showed presence of Δ5-sterols as principal sterols. None of the species examined contained Δ7-sterols as principal sterols, 5,23 stigmastadienol, 5,24(25) stigmastadienol and stigmastanol (Inamdar et al., 1966; Miralles et al., 1988; Patterson and Xu, 1990; Salt et al., 1991). Chemical fractionation of different extracts of various members of family resulted in a mixture of rapanone and suberonone, a mixture of β-sitosterol and stigmasterol oleic acid, geranilgeraniol, (Agrawal et al., 2010; Hameed et al., 2011; Murti et al., 2011; Kumarmayank and Singh, 2012; Talele et al., 2012; Awohouedji et al., 2013; Gomes et al., 2013). Numerous other bio active compounds include Pinnatol, Allantoin, α-Spinasterol, β-Sitosterol glucoside, Octocosanal, Dulcitol. Presence of a purine nucleoside hypoxanthine 9-Larabinose, dihydroisofuroxanthone-borhavine, and phytosterols has been isolated from the plant (Rahim et al., 2012).

Alkaloids screened in genera Boerhavia punarnavine (Alkaloids), certain plants show peak concentration at flowering stage, some in leaves, roots (Swanholm et al., 1959; Nandi and Chatterjee, 1974; Sinha and Dogra, 1985; Manu and Kuttan, 2007; Verma and Kasera, 2007; Ujowundu et al., 2008; Manu and Kuttan, 2009; Meloni et al., 2012; Omotayo and Borokini, 2012; Suriyavathana et al., 2012; Thite et al., 2013; Saxena and Argal; 2014), triantemine and ecdysterone, (Suthari et al., 2011; Gulshan et al., 2012).

The members of family Nyctaginaceae were seen active against the dermatophytic species of Microsporum gypseum, Microsporum fulvum and
Microsporum canis (Abad et al., 2007), also against pathogenic fungi *candida albicans* and *Aspergillus niger* (Muthumani et al., 2009; Chakraborthy, 2009; Kumar et al., 2010; Rani et al., 2012; Abyaneh and Rai, 2013) varying degrees of inhibition seen against fungal stains *Pencillium citrinum* and *Monascus purpureus*, maximum anti-fungal activity is seen for *Monascus purpureus* compared to standard clotrimazole. (Sripathi and Poongothai, 2013) antifungal activity against *Fusarium solani*, *Fusarium oxysporium* and *Fusarium granularium* (Hajji et al., 2010).

Seeds of *Boerhavia* species, which were frequently, observed growing on cattle dung heaps were screened for their antibacterial properties against *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas cichorii* and *Salmonella typhimurium* (Kumar et al., 1997). *Boerhaavia erecta* when tested showed maximum inhibition against *Aeromonas hydrophilla* and *Bacillus cereus* (Samy et al., 1999). The methanolic extracts Nyctaginaceae floral extracts (five different colors) were screened biologically by performing four bioassays: antibacterial, antifungal, brine shrimp lethality and phytotoxicity (Ali et al., 2005, 2006). Some isolates that produced toxins were identified as *Pseudomonas* sp., *Acinetobacter* sp., *Corynebacterium* sp., *Actinomyces* sp., *Clostridium* sp., *Bacillus* sp., *Shigella* sp., *Proteus* sp., *Enterobacter* sp., *Penicillium* sp., *Aspergillus flavus*, *Aspergillus niger* and *Aspergillus repens* were tested against the plant extract (Kola, 2007). Antibacterial activity of *Boerhavia* sp., was assessed against six bacterial strains—*Pseudomonas testosteroni*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae*, *Bacillus subtilis*, *Proteus morganii*, *Micrococcus flavus* (Nair et al., 2008, Umamaheswari et al., 2008; Sharma et al., 2010).

Antiviral activity of antiviral protein from different extracts showed antiviral activity against foot-and-mouth disease virus (FMDV) and Aujeszky virus (ADV) in IB-RS-2 pig cell line and bovine diarrhoea virus (BVD) in GBK bovine cell lines, but none against foot-and-mouth disease virus (FMDV), artichoke mottled crinkle virus (AMCV) (Koseki et al., 1990;
Bolognesi et al., 1997; Vivanco et al 1999a,b). Against mechanically transmitted viruses but not against aphid-transmitted viruses (Bolognesi et al., 2002). Recently isolated antiviral proteins from different species showed ribonuclease activity against Torula yeast RNA. It also exhibited depurination activity against supercoiled pBlueScript SK+ plasmid DNA, potato virus X, potato virus Y, potato leaf roll virus, and potato spindle tuber viroid (Bhatia and Lodha, 2005). On bioassay antiviral activity against sunnhemp rosette virus, RNase activity against viral RNA of the tobamoviruses, Tobacco mosaic virus (TMV) infecting *Cyamopsis tetragonoloba* leaves was observed (Bhatia and Lodha, 2005; Choudhary et al., 2008).

Antiprotozoal activity assayed against *Entamoeba histolytica* and *Giardia lamblia* axenic trophozoites (Tapia-Pérez et al., 2003). Anti-plasmodial activity *in vitro* and *in vivo* with no toxicity assayed (Ramazani et al., 2010), the hydro alcoholic extracts tested revealed a perfect anthelmintic activity on *Eudrilus eugeniae* and *Eisenia foetida*, earthworm *Phertima prosthuma* and can be used for the effective treatment of helminthiasis. (Joshny et al., 2012; Zachariah et al., 2012).

The plants of the family Nyctaginaceae comprises of about 290 species and are well known for their ornamental and medicinal values, indigenous people all over have used to cure many infirmities including dysentery, diarrhea, muscular pain and abdominal colic treatment of gastric ulcers and inflammation. (Malairajan et al., 2005; Rinaldo et al., 2007; Aoki et al., 2008). strong cytotoxic activity (compared to vincristine sulphate), strong analgesic activity, and anti-pyretic activity and anti-oxidant activity, the antiedematogenic activity, inhibitory activity of mice edema ear, inhibiting swelling, anticoagulant effect, AChE inhibitory activity, Antidiarrhoeal, antiulcer, thrombolytic activity, Edema, gonorrhea, chronic coughs, piles, anticancer, kidney diseases, treatment of toothache and strengthening of gums.
are some common pharmacological activities seen (Rumzhum et al., 2008; Barukial and Sarmah, 2011; Feitosa et al., 2011; Sripathi et al., 2011; Dey et al., 2012; Soniya et al., 2013; Vandresena et al., 2013; Venugopala et al., 2013) antiasthmatic activity (Noumi, 2010).

Permanent hyperglycemia in alloxan-induced diabetic rats reversion, also regeneration of insulin-producing cells, excellent lipid lowering potential, with significant reduction in total cholesterol, triglycerides, LDL, VLDL and a significant increase in HDL, serum cholesterol reduction. Adverse affects on hematological indices, with significant reduction in packed cell volume, Hb concentration and RBC count and reduction in WBC count. reduction of heavy metal (Lead) pollution through absorption and adsorption in air and water (Saikia and Lama, 2011; Ponnusamy et al., 2010; Pradhan et al., 2012; Rahmatullah et al., 2012; Gulshan and Rao, 2013; Sharma et al., 2013; El-Abhar and Schaalan, 2014).

Inflammation is usually regarded as a pathological state. It is a physiological response of the living tissue to injury, provided the injury is not of such a degree as to cause necrosis or loss of viability. Inflammation is characterized by redness, pain and swelling. There are many drugs available for inflammation like Non-steroidal anti-inflammatory drug (NSAID). But these drugs have many adverse effects like peptic ulceration, Na\(^+\) and water retention, raised transaminases, mental confusion, etc. While the drugs obtained from plant source (herbal drug) have fewer side effect.

*Boerhavia* sp. show both antiinflammatory and anti pyretic activities, dry skin, pain, anti inflammatory activity may be due to some endogenous compounds which are responsible for inhibition of prostaglandin and bradykinin synthesis (Muthumani et al., 2010; Rajeswari and Krishnakumari, 2010; Singh et al., 2010; Dey et al., 2012; Jayakumari et al., 2012; Dixit and Mittal, 2013; Sen et al., 2013).
Tecomella undulata belongs to family Bignoniaceae, species of which have been studied in regard to the ecological and evolutionary roles of their secondary metabolites that mediate interactions among plants and their herbivores. The family is recognized for the presence of iridoids, anthraquinones, flavonoids, phenylpropanoid glycosides, terpenoids and quinines, carbohydrates, saponins, Steroids, coumarins, phenolic, glycosides and alkaloids isolated from members of this family (Poser et al., 2000; Castillo and Rossin, 2010).

Presence of Carbohydrates, total carbohydrate of insoluble polysaccharides (TCIP) during the differentiation of anthers is reported (Nanda and Gupta, 1983), also in different plant parts stem, leaves, roots, flowers in Tecomella sp (Ugbabe et al., 2010; Zaheer et al., 2011; Menezes et al., 2014), Microspore cytoplasm contains variable amounts of insoluble carbohydrates at different stages of microsporogenesis, endexine composition shows traces of polysaccharides (Konyar and Dane, 2013), starch storage is reported in roots (Paulo et al., 2014).

Lipids, reported in certain seed oil are trans-9, trans-12-octadecadienoic 5, trans-9,trans-11,cis-13-octadecatrienoic, palmitic, stearic, octadecenoic, linoleic acid (Chisholm and Hopkins, 1965; Badam and Patil, 1980; Castillo et al., 2010). Lipophilic deposits in the smooth endoplasmic reticulum and mitochondria (Machado et al., 2006) in seeds (Shahidi, 2006), neutral lipids are seen in mature fruits (de Souza et al., 2008), in nectar (Tomlinson and Zimmerman, 2010), developing anthers (Konyar et al., 2013).

Proteins reported in seeds (Jones and Earle, 1966; Abbade and Takaki, 2012; Ullah et al., 2013), floral nectar (Thomas and Dave, 1992; Kram et al., 2008), in leaf (Cernusak et al., 2010) in flowers (Zaheer et al., 2011).

Phenolic compounds as glycosides and other derivatives also have been reported in various members, which are shown responsible for potent
antioxidant activity of plant extracts (Kanchanapoom et al., 2002; Aladesanmi et al., 2007; Pianaro et al., 2007; Woode et al., 2008; Carvalho et al., 2009; Scotti et al., 2009; Santos et al., 2010; Atolani et al., 2011; Compaoré et al., 2011; Torane et al., 2011; Kumar and Ravichandran, 2011; Nagaraja and Paarakh, 2011; Alvarenga et al., 2012; Oliveira et al., 2012; Pan et al., 2012; Sharma et al., 2013; Paula et al., 2013).

Flavonoids are a group of polyphenolic compounds, diverse in chemical structure and characteristics, found ubiquitously in plants. The six classes of flavonoids flavanones, flavones, flavonols, isoflavonoids, anthocyanins, and flavans vary in their structural characteristics around the heterocyclic oxygen ring. (Harborne, 1967; Peterson and Dwyer, 1998; Tanko et al., 2008; Islam et al., 2010; Melo et al., 2010; Xiao et al., 2011; Joselin et al., 2013; Odoh et al., 2013; Patel, 2013; Torres et al., 2013; Jeyasankar and Chinnamani, 2014; Patel and Patel, 2014). Various flavonoids reported in plant extracts are rutin, isoquercitrin, quercetin, hyperoside, quercitrin and luteolin and the glycosides of ferulic, sinapic p-coumaric acids and kaempferol, apigenin in different extract (Aboutabl et al., 2008; Compaoré et al., 2011). The bioavailability, metabolism, and biological activity of flavonoids depend upon the configuration, total number of hydroxyl groups, and substitution of functional groups about their nuclear structure (Kumar and Pandey, 2013).

Phytosterols and other compounds as sitosterol, erythrodiol, oleanolic acid, ursolic acid and 5′, 6′ norigemone, stigmasterol have been isolated from Tecomella species (Singh et al., 1972; Ogwa et al., 1977; Zani et al., 1991; Beveridge et al 2002; Moreau et al., 2002; Mitaine-Offer et al., 2002; Jin et al., 2004; Luo et al., 2004; Hashem and Sleem, 2006; Aboutable et al., 2007; Perera et al., 2008; Aliyu et al., 2009; De Abreu et al., 2010; Bhanumathy et al., 2010; Choudhury et al., 2011; Kaur et al., 2012; Kumar and Rao, 2013).
Alkaloid, Tecostatin (Hammouda et al., 1963; Costantino et al., 2003), mainly contain pyrrolizidine alkaloids (PAs), withasomnine, and the novel 4'-hydroxy-withasomnine, newbouldine and 4'-hydroxynewbouldine, incarville 7-O-ferulate, lapachol, dehydro-α-lapachone and 3-hydroxy- dehydroiso-α-lapachone, and a novel pyrrolo(1,2b) pyrazole alkaloid, 5beta-Hydroxy-skitanthine and Boschniakine (Hammouda and Khalafallah, 1971; Mukherjee and Ray, 1986; Satyavathi et al., 1987; Chi et al., 1992; Adesanya et al., 1994; Houghton et al., 1994; Yu-Ming Chi et al., 1995; Roeder, 2000; Costantino et al., 2003; Chi et al., 2005). Martinelline and martinelllic acid (Witherup et al., 1995), tecomine and tecostamine (Joselin et al., 2013).

Potent in vivo antifungal activity of Bignoniaceae plants against Magnaporthe grisea (Hebert) Barr (rice blast) on rice plants, Botrytis cinerea Pers ex Fr (tomato grey mould) and Phytophthora infestans (Mont) de Bary (tomato late blight) on tomato plants, Puccinia recondita Rob ex Desm (wheat leaf rust) on wheat plants and Blumeria graminis (DC) Speer f. sp. hordei Marchal (barley powdery mildew) on barley plants. Antifungal activity against dermatophytes and wood rot fungi complete inhibition of the mycelial growth and conidia in the filamentous fungi of B. cinerea (Wilson et al., 1997, Rasadah et al., 1998). Colletotrichum acutatum Simmonds, Colletotrichum gloeosporioides Simmonds, M. grisea and Pythium ultimum Trow was observed, also the development of rice blast, tomato late blight, wheat leaf rust, barley powdery mildew and red pepper anthracnose (Colletotrichum coccodes (Wallr) S Hughes) was controlled (Cho et al., 2006).

Traditional medicine for the treatment of skin diseases also comprised of various Bignoniaceae plant extracts, against fungal strains comprising several filamentous fungi and yeasts, inhibition of the growth of standardized cultures of Aspergillus niger and Fusarium oxysporum (Portillo et al., 2001; Rocha et al., 2004; Rojas et al., 2006). Known flavonoids from epicuticular
wax of leaves of *Tecomella* species showed antifungal activity against *Cladosporium sphaerospermum* and *C. albicans*. (Alcerito et al., 2002; Owolabi et al., 2007; Bastos et al., 2009). *Tecomella* species were tested for their antifungal potential against eight important species of *Aspergillus* such as *A. candidus*, *A. columnaris*, *A. flavipes*, *A. flavus*, *A. fumigatus*, *A. niger*, *A. ochraceus*, and *A. tamari*, activity against *Cryptococcus neoformans*, *Candida tropicalis*, *Trychophyton rubrum*, *Microsporum furfur*, *Epidermophyton floccosum* (Satish et al., 2007; Jain and Belsare, 2009; Gandhi and Ramesh, 2010).

Various members of family Bignoniaceae are commonly practiced medicinal plants in the villages of Salem District, Tamilnadu (India), in South, Central and West Africa for the treatment of various ailments and infection, antibacterial activity of crude leaf extracts against human pathogenic bacteria *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Salmonella typhi*, *Klebsiella pneumoniae* and *Vibrio parahemolyticus* (Rasadah and Houghton, 1998; Rojas et al., 2006; Owolabi and Omagba, 2007; Senthilkumar et al., 2010).

Most of the plant extracts showed significant antibacterial activity than bacitracin. (Satish et al., 2008, Limsuwan et al., 2009). Extracts and isolated flavones are particularly useful against pathogenic, *S. aureus* and toxic effects on brine shrimps (Bastos et al., 2009).

Different anatomical parts of Bignoniaceous plant species have been evaluated in vitro against human herpesvirus type 1 (HSV-1), vaccinia virus (VACV) and murine encephalomyocarditis virus (EMCV) vaccinia virus Western Reserve (VACV-WR) and dengue virus 2 (DENV-2) HSV-2, poliovirus type 2, adenovirus type 2 and VSV) by the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay this screening discloses the high potential of the Bignoniaceae family as source of antiviral agents (Simões et
Species belonging to family Bignoniaceae have been extensively studied in regard to their pharmacological properties this family is recognized for the presence of active compounds which are markers of oviposition and feeding preference to species which have became specialist feeders, anti-insect properties, pesticides. Relieve general pain, painful joints and kidney stones, analgesic and anti-inflammatory effects. It reduced paw edema induced by carrageenan, inhibited leukocyte recruitment into the peritoneal cavity, inhibition of formation of granulomatous tissue. The extracts clearly demonstrated antinociceptive activity, cytotoxic activity, reduced swelling, analgesic activity, gastroprotective, ulcerprotective, anti-cancer activity, activity against leishmaniasis, skin disorders, venereal diseases, rheumatism, diuretic and astringent properties, antidepressant, antidote against animal venoms, hypopigmentation, reduction of menopausal symptoms, anti-helminthic, anti-bronchitis, anti-leukodermatic, antitussive, antineoplastic, uterine contractile, antimalarial activity (Alguacil et al., 2000; Muñoz-Mingarro et al., 2003; Yao et al., 2004; Bafor and Sanni, 2009; Gachet and Schühly., 2009; Bafor et al., 2010; Castillo and Rossini, 2010; Dash et al., 2010; da Rocha et al., 2011; Heim et al., 2012; Prasanna et al., 2013; Mostafa et al., 2013, 2014).

_Tecomella species_ are extensively used for the empirical treatment of diabetes mellitus, _Tecoma stans_ exert antidiabetic effects stimulating glucose uptake in both insulin-sensitive and insulin-resistant murine and human adipocytes without significant proadipogenic or antiadipogenic side effects, Cholesterol and triglyceride decrease (Nash et al., 1950; Hammouda and Khalafallah, 1971; Tanko et al., 2008; Aguilar-Santamaría et al., 2009;
Alonso-Castro et al., 2010; Raju et al., 2011; Bharathi et al., 2012; Raju and Hemamalini, 2012; Saini and Singhal, 2012).

Excellent antinociceptive and anti-inflammatory activity, which may due to presence of higher phenolic and flavonoid content. Antitumoral and antitrypanosomal activities. The anti-lipoxygenase and anti-cyclooxygenase effect seen in fractions showed a partial correlation with the anti-inflammatory properties attributed to it (Duarte et al., 2000; Miranda et al., 2001; Owolabi and Omogbai, 2007; Aboutabl et al., 2008; Guenka et al., 2008; Ching et al., 2009; Carey et al., 2010; Latha et al., 2011; Doshi et al., 2012, Sowemimo et al., 2013).

Although some work has already been carried out in the selected plant species but in the present study a systematic investigation has been carried out on their phytochemical, antimicrobial and antioxidant efficacy.