1. INTRODUCTION

Nature, a treasure chest, endowed with rich wealth of medicinal plants has become a target for the search of many lead compounds which are biologically active and important reservoirs that have instilled the phytochemical researchers to explore and expand its potential. The literature survey indicates that therapeutic usage of plants has been mentioned in Rigveda (3500-1600 BC) and also the classical text like Charaka Samhita and Sushrutha Samhita have been served as Materia Medica for the purpose of treatment of various kinds of illness (Grover and Vats, 2001). Chinese were the first to use the herbal preparations as medicine for the treatment of various kinds of diseases (Xiao and Fu, 1987).

Use of plants as a source of medicine is considered to be an important component of the health care system in India. The practice of employing plants as preventive and curative health care has been in use since time immemorial not only in rural areas of the developing countries such as India, but also in developed countries as well. The herbal medicines are being synergistically used these days with the allopathic medicines (Kamboj, 2000). Varieties of medicinal herbs are being used in our daily life in view of the fact that the plant derived medicines are considered to be safe and effective. The World Health Organization (WHO) estimates that about 80% of the world’s population use herbal medicines in all aspects of primary health care needs (Tripathi et al., 2003).

Synthetic drugs manufactured by the affluent and influential pharmaceutical industries have side effects. Hence, there is a requirement to adapt medicines which are naturally available with negligible or no side effects. The herbal medicinal system, which was part of the traditional culture of people, has become a profession in the modern world.
in view of their efficacy and efficiency and hence is in heavy demand in the developed and developing countries (Tempesta and King, 1994; Maridass and De-Britto, 2008).

Phytomedicines are based on formulations prepared from leaves, roots, seeds, bark or flowers having rich biological properties with several function(s) (Manach et al., 2004). Phytonutrients or phytoconstituents, are considered to be secondary metabolites exhibiting diverse and multiple pharmacological activities such as antinflammatory, antipyretic, anticancerous, antimicrobial, antioxidant, antidiabetic, antitumor, antimutagenic, antidiarrhoeal, antispasmodic etc., revealing the efficacy of particular plant(s) (Middleton et al., 2000).

Knowledge of therapeutic drug usage does not end with the study of medicinal plants alone. Beneficial effects of medicinal plants and their maximum utilization can be understood by way of other aspects such as botany, ethnobotany, pharmacognosy, pharmacology, phytochemistry, biochemistry, biodiversity etc. Advancement in the field of Science and Technology has helped greatly in isolation, identification and structural elucidation of chemical components obtained from natural sources. Therefore, phytochemical studies regarding identification and isolation of biomolecules with pharmacological activity from medicinal herbs are gaining interest amongst the researchers and pharmacologists. This is mainly due to use of highly developed instrumentation technology in analytical chemistry like chromatography, IR, ESI-MS and NMR. These techniques supplement the pharmaceutical industry with the prototype, based on which novel and more potent medicines can be designed and formulated at low cost.

For instance, about 70,000 plants species, from Lichens to flowering trees, have been used for medicinal purposes so far (Kumar, 2012). Several potent drugs obtained from plants are being used as medicines all over the world. Many
pharmaceutically important drugs obtained from flowering plants are being sold comparatively at low prices. However, utilization of these plants for the purpose of manufacturing of drugs all over the world might lead to their extinction which is of great concern today. This largely exposes constrain regarding the utilization of medicinal plants because of the intricate structures of the compounds (Singh and Ghouse, 1993).

During recent years, the herbal medicines have attracted much recognition and acceptance within the medicinal community due to the intrinsic demand from public and medicinal establishments. The study of ethnobotanical and pharmacological aspects has successfully revealed several medicinal plants with diversified bioactivities that are being used in the treatment of various kinds of diseases and their related complications (O’Neill and Levis, 1993).

Diabetes mellitus is a multifarious group of metabolic disorder characterized by chronic hyperglycemia owing to defects in secretion or action of insulin or both. Normally, blood glucose levels are mainly controlled by insulin, a chief hormone secreted by the β-cells of pancreas. When the blood glucose level elevates, insulin is released from pancreas to signal the conversion of excess glucose into glycogen in liver and skeletal muscles. The impairment of cellular glucose homeostasis leads to diabetes (the body either cannot produce enough of insulin or does not use it) (Ivanova and Georgiev, 2013).

Amongst the four main categories of diabetes [viz., type 1 diabetes (reduced or no insulin secretion by pancreas), type 2 diabetes (reduced sensitivity of the tissues to insulin), gestational diabetes (hyperglycemia during pregnancy) and juvenile diabetes (occurs in new born babies)], type 2 diabetes is more common and prevalent in human beings. It is characterized by impaired cell response to insulin and/or β-cell dysfunction. Initially reduced insulin effect on cells (insulin resistance) leads to hyperglycemia and
eventually turns to a syndrome called Diabetes mellitus (Modak et al., 2007). Fig.1 represents the regular blood glucose management in the biological system by the hormone, insulin.

![Fig.1 Blood-glucose management in the normal human beings. (www.sciencedirect.com)](image)

It has been shown that glucose-induced increased level of reactive oxygen species (ROS) is responsible for a link between the elevated level of glucose and pathways that are responsible for hyperglycemia induced vascular complications (Kaiser et al., 1993). Therefore it becomes imperative to control both blood glucose and cellular redox condition in order to manage the diabetic complications (Brownlee, 2005).

Reactive oxygen species (ROS) are highly reactive chemicals which are regularly produced in the human system by normal biological factors like respiration, peroxisomes, macrophages and also by various exogenous factors such as pollutants, pesticides, organic compounds, smoke etc. Some of these species are superoxide (O$_2^-$), singlet oxygen (¹O$_2$), nitric oxide (NO), peroxy (ROO) hydroxyl (OH·) and hydrogen
peroxide (H₂O₂). They are neutralized by highly organized complex antioxidant defense system which includes enzymes, superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), glutathione-s-transferase (GST), glutathione reductase (GR) and molecules like reduced glutathione, vitamin-E, vitamin-C, etc., (Uttara et al., 2009). Under chronic conditions of hyperglycemia, elevated free radical generation disturbs the protective functioning of cell antioxidants (the oxidative imbalance) followed by altered levels of antioxidant enzymes resulting in oxidative stress (Maritim et al., 2003). The antioxidant defense system and mechanism of cellular damage by oxidative stress is schematically shown in Fig.2

![Mechanisms of oxidative cellular damage](www.intechopen.com)

**Fig.2** Schematic representation of antioxidant defense system and mechanism of oxidative cellular damage. (www.intechopen.com)
1.1 *Cassia auriculata L.*

*C. auriculata* is a wild medicinal plant with its vivid attractive yellow flowers, found in temperate, dry and arid parts of India, Sri Lanka, China, Pakistan, Myanmar, West Indies and certain parts of Africa.

**Description**

It is a bushy small plant with solid and woody stem which is brown in colour. The leaves are dull green and closely packed. Its flowers are bright yellow and arranged in clusters to form a large terminal inflorescence. The fruit is a legume which is flat and pale brown in colour when dried (Jayaweera, 1992).

**Chemical constituents**

*Cassia auriculata* L. plant contains tannin, found rich in bark (Anonymous, 1992). Leaves possess Di-(2 ethyl) hexyl phthalate, myristyl alcohol, β-sitosterol β-D-glucoside, quercetin 3-O-glucoside and rutin (Nageswara Rao et al., 2000). Flowers contain polysaccharides, flavonoids, anthracene derivatives and dimeric procyanidins (Kumaran and Karunakaran, 2007). Leaves and flowers have shown to contain anthraquinone glycosides, terpenoid glycosides, protoanthocyanidin, flavonol glucosides, hydroxyl anthraquinones and their glycosides, phenolic acids (gallic acid)
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(Surveswaran et al., 2007). Seed has shown the presence of grape seed oil, n-Hexadecanoic acid, 9-Octadecenoic acid, 1,3,12-Nonadecatriene and Stearic acid (Yesuraj et al., 2012).

Ethnobotanical uses of *Cassia auriculata* L.

*Cassia auriculata* L., widely mentioned in Indian ethnomedicine, possesses diverse biological activities and pharmacological functions. It is also considered to be one of the important dye-yielding medicinal plants in India. It has been largely used as traditional medicine and a potent adjunct in the treatment of rheumatism, conjunctivitis and Diabetes mellitus (Joshi, 2000). The powdered seeds are used in ophthalmia, diarrhea/dysentery and hemorrhages (Kirtikar and Basu, 1998; Vaidya, 1998). Dried flowers are used as an external scrub for body odour and in the treatment of skin disorders. The juice extracted from the flower is used in the treatment of conditions like aligospermia (decreased sperm count), premature ejaculation and impotence. The bark is astringent, and finds use against sore throat and in checking hemorrhages. Decoction of the bark is effective in treating impotency and sexual related problems, helpful in avoiding leucorrhoea and per-vaginal discharge (Parmar and Chakraborty, 2011). The leaves are revitalizing as they alleviate feverishness and create a feeling of coolness and freshness. It also reinstates the perturbed processes of nutrition (Vedavathy and Rao, 1991). It may be noted that paste made from dried leaves with vinegar is used for various skin diseases. Fruits (seeds) are antihelmentic. Juice of the fruits/seeds is very effective not only in treating indigestion but also to get relief from skin ailments. The root is used in the treatment of skin diseases, leprosy, tumors, asthma and urethrorrhoea. The whole plant decoction is considered to be panacea for the treatment of skin related ailments, worm
infestation and also as a potent tonic for female menstrual disturbances (Kumar et al., 2002).

Focusing on its use to ameliorate hyperglycemia, hyperlipidemia and oxidative stress that can be attributed to its phytochemical contents, further studies involving bioassay guided isolation might definitely lead to novel antidiabetogenic agent that can also address free radical mediated damages. Systematic evaluation of *C. auriculata* is useful for understanding the functionality and chemical constituents and also supports in view that the plant can be beneficiary source of potent natural antioxidants.