INTRODUCTION

The plant kingdom has long serve as a profile source of useful drugs, food additives, flavoring agents, colourants, binders and lubricants. As a matter of fact, it has been estimated that about 25% of all prescribed medicines today are substance derived from plants (Gamaniek, 2000). The use of traditional medicine and medicinal plants in most developing countries as a normotive basis for the maintenance of good health has been widely observed (UNESCO, 1996). Furthermore, an increased reliance on the use of medicinal plants in the industrialized countries has been treated to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies (UNESCO, 1998).

Herbal or ‘botanical’ medicines, recorded in developing countries with ancient civilizations, such as Egypt and China, provide an abundant pharmacopoeia of products that have been prescribed for many diseases over many centuries. The natural products underlying traditional medicines have received increased scientific attention recently (Han et al., 2002; Vickers, 2002). Since there are national and indigenous rights over plant derived resources, basis scientific investigations based on medicinal plants and indigenous systems have increased in developing countries (Han et al., 2002). Herbal medicines provide rational means for the treatment of many disease that are incurable in other systems of medicine (Kameshwara Rao, 2000; Subramani and Goraya, 2003). Their bio-molecules appear as alternatives for the control of even resistant species of bacteria and pathogens and their uses have been shown to have a scientific basic (Ganguly et al., 2001; Martino et al., 2002).

Traditional medicine is an important source of potentially useful new compound for the development of novel antibacterial agents. According to the reports
of many researchers (WHO, 2001; Cohen, 2002) antibiotic resistance of microbes is a world wide problem. Traditional plant therapies coupled with dietary measures as prescribed in Ayurvedic and other indigenous system of medication are good supplement for the treatment of diseases nowadays (Eisenberg et al., 1993; Macleanan et al., 1996). The efficacy of plant – based drugs used in traditional medicine have been paid great attention because they are cheap and have little side effects (Cowan, 1999; Bibitha et al., 2002; Dharmasri et al., 2003; Maghrani et al., 2005). The use of medicinal plants as tradicinal medicines is well known in rural areas of many developing countries. Traditional healers usually are cheaper and sometimes more effective than modern chemical medicine (Sandhu and Herinrich, 2005).

Rich sources of medicines in plants produce wide array of bioactive molecules, most of which probably evolved as chemical defense against predation or infection. It is estimated that only one percent of 2,65,000 flowering plants on earth have been studied exhaustively for their chemical composition and medicinal value (Martins et al., 2001). India is one of the twelve mega diversity countries in the world and has 45,000 plants species including 17,000 flowering plants have been claimed to possess medicinal properties against human diseases. The country has a rich floral diversity (Perumalsamy and Gopalakrishnakone, 2007).

Phytochemical is a rapidly expanding area with new techniques for the analysis of organic compounds. Phytochemical evaluation is one of the tools for the quality assessment of plants, which includes preliminary phytochemical screening, chemo profiling and marker compound analysis using modern analytical techniques. Medicinal plant research is directed at verifying ethno-medical claims by herbalist with the ultimate aim of isolating active compounds and standardizing the crude extracts used in traditional medicines (Sofowora, 1986; Sofowora, 1993). In order to
discover new bioactive compounds, extracts are simultaneously evaluated by chemical screening (Wing, 1999).

Popular knowledge of plants which can be used by humans is based on thousands of years’ experience. By "trial and error", people learnt how to recognize and use plants including those with a magic religious function (Rodrigues et al., 2003). Traditional medicine or ethnomedicine is a set of empirical practices embedded in the knowledge of a social group often transmitted orally from generation to generation with the intent to solve health problems. It is an alternative to Western medicine and is strongly linked to religious beliefs and practices of indigenous cultures. Medicinal plant lore or herbal medicine is a major component of traditional medicine (Bussmann and Sharon, 2006).

Traditional medicine (TM) occupies an important place in the health care systems of developing countries. The World Health Organization (WHO) estimates that more than 80% of health care needs in these countries are met through traditional health care practices. The people in developing countries depend on TM, because it is cheaper and more accessible than Orthodox Medicine (OM) (Sofowora, 1993; Luoga et al., 2000 and World Health Organisation, 2002). Traditional medicine is also acceptable than OM because it blends readily into the people’s Socio-cultural life (Tabuti et al., 2003).

Many infectious diseases are known to be treated with herbal remedies throughout the history of mankind. Even today, plant materials continue to play a major role in primary health care as therapeutic remedies in many developing countries (Zakaria, 1991). Plants still continue to be almost the exclusive source of drugs for a majority of the world’s population (Hamburger and Hostettman, 1991).
Medicinal plants represent an important health and economic component of biodiversity. It is essential to make the complete inventory of the medicinal component of the flora of any country for conservation and sustainable use. The conservation of the threatened and endangered medicinal species in the wild is indispensable (Rahman et al., 2004).

Pharmacology

Medicinal plants are still a major part of the traditional medical system in developing countries. Several herbal remedies are now being intensively used in therapy. The use of medicinal plants as antiinflammatory and antiarthritic drugs in medicine is a practice common in India, although in most cases the active principles of the plants are unknown. However, evaluation of the pharmacological effects of the herbal crude extracts can still be used as a logical research strategy in the search for new drugs.

In view of this fact, in the present investigation, the ethanol extracts of the whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia* were used to study the anticancer, antidiabetic, hepatoprotective, antifertility and antiinflammatory activities through animal model.

*Polygala* was traditionally used by American to treat snake bites (Mc Guffin et al., 1997) and as an expectorant to treat cough and bronchitis. *Polygala* is considered as a powerful tonic herb (Teeguarden, 1998) that can help to develop the mind and aid in creative thinking. Perusal of literative reveals that, information on the phytochemical profile and pharmacological studies are totally lacking.

Taking into consideration of the medicinal importance of *Polygala*, the whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia* were analyzed for the
The present study attempts

1. To study the pharmacochemical characterization of whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia*
   a. Ash and extractive values.
   b. Fluorescence analysis.
   c. Preliminary phytochemical screening.

2. The HPTLC profiles of ethanol extracts of whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia* to confirm the presence of alkaloids, flavonoids, glycosides, saponins and steroids.

3. GC-MS analysis of ethanol extracts of whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia* to identify the compounds.

4. To assess the anticancer activity of ethanol extracts of whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia* against Dalton Ascetic Lymphoma.

5. To assess the antidiabetic activities of ethanol extracts of whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia* in Alloxan induced diabetic rats.

6. To assess the hepatoprotective activity of ethanol extracts of whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia* against hepatic toxicity induced by Carbon tetrachloride (CCl₄).

7. To assess the antifertility activity of the above said plant extracts.

8. To evaluate the antiinflammatory activity of ethanol extracts of whole plant of *Polygala javana*, *P. chinensis* and *P. rosmarinifolia* on carrageenan induced oedema in rats.

**Anticancer**

Cancers are characterized by the dysregulation of cell signaling pathways at multiple steps. However, most current anticancer therapies involve the modulation of a single target. The lack of safety and high cost of monotargeted therapies have
encouraged alternative approaches. Both natural compounds, extracted from plants or animals, and synthetic compounds, derived from natural prototype structures, are now being used as cancer therapeutics and as chemo preventive compounds. A number of natural products, with diverse chemical structures, have been isolated as anticancer agents. Several potential lead molecules such as camptothecin, vincristine, vinblastine, taxol, podophyllotoxin, combretastins, etc. have been isolated from plants and many of them have been modified to yield better analogues for activity, toxicity or solubility. Several successful molecules like topotecan, irinotecan, taxotere, etoposide, teniposide, etc. also have emerged as drugs upon modification of these natural leads and many more are yet to come.

**Antidiabetic**

Diabetes refers to Diabetes Mellitus or less often to Diabetes Insipidus. Diabetes Mellitus and Diabetes Insipidus share the name "Diabetes" because, both the conditions are characterized by excessive urination (polyuria). The word "diabetes" is borrowed from the Greek word meaning "a siphon." The 2nd-century A.D. Greek physician, Aretus the Cappadocian, named the condition "diabetes." He explained that patients with it had polyuria and "passed water like a siphon." When "diabetes" is used alone, it refers to Diabetes Mellitus. The two main types of Diabetes Mellitus; insulin-requiring type-1 diabetes and adult-onset type-2 diabetes are distinct and different diseases in themselves.

The non insulin-dependent diabetes mellitus is one of the most common disorders worldwide. It is a group of metabolic disorders characterized by hyperglycemia. The metabolic disorders include alterations in the carbohydrate, fat and protein metabolism associated with absolute or relative deficiencies in insulin secretion and / or insulin action. Along with hyperglycemia and abnormalities in
serum lipids, diabetes is associated with microvascular and macrovascular complications, which constitute the main cause of morbidity and mortality of diabetic patients.

The prevention of diabetes is an urgent worldwide public health concern. Obesity and insulin resistance induced by over eating and physical inactivity typically characterize the period preceding onset of type 2 diabetes. The caloric restriction and physical exercise have obvious importance. They stress that, actively promoting healthy eating and sleeping habits should be considered for the prevention of obesity and insulin resistance.

**Hepatoprotective**

Liver diseases are one of the most severe ailments. They are mainly caused by toxic chemicals, excess consumption of alcohol, infections and autoimmune disorders. Most of the hepatotoxic chemicals damage liver cells mainly by inducing lipid peroxidation and other oxidative damage in the liver. They may be classified as acute or chronic hepatitis (inflammatory liver diseases), hepatosis (non-inflammatory diseases) and cirrhosis (degenerative disorder resulting in fibrosis of the liver).

Inspite of tremendous advances made in allopathic medicine, management of liver diseases is still a challenge to modern medicine. The modern medicine little to offer for the alleviation of hepatic ailments, whereas, the most important representatives are the phytoconstituents (Chandrasekhar *et al.*, 2004). Plant drugs are known to play a vital role in the management of liver diseases. About 80% of the world’s population relies on the use of traditional medicines which are predominantly based on plant materials (Satagopan, 2000). Numerous plants and polyherbal formulations are reported to possess hepatoprotective activities (Malhotra *et al.*, 2001). In order to develop satisfactory herbal combination to treat liver diseases, plants have
antioxidant, stimulation of liver regeneration and cholorectic properties (Subramanian and Pushpangadan, 1999).

**Antifertility**

The options available to men for fertility control are much more limited compared to those for women. The male reproductive system, particularly the process of spermatogenesis, sperm maturation and transport and also the sperm-egg interaction are so complex that it has not so far been possible to find an effective intervention that can be converted into a product. Continued efforts over the past three decades to develop additional methods of male contraception have made some significant contribution in the field. However, there is still no method available in the field of male contraception that satisfies the essential criteria of safety, efficacy, economy and complete reversibility. Inspite of considerable development in contraceptive technology, search for male antifertility agents in plants continues to be a potential area of investigation.

**Antiinflammatory**

Antiinflammatory refers to the property of a substance or treatment that reduces inflammation. Inflammatory diseases including different types of rheumatic diseases are very common throughout the world. Although rheumatism is one of the oldest known diseases of mankind and affects a large population of the world, no substantial progress has been made in achieving a permanent cure. The search involving screening and development of drugs for antiinflammatory activity is an unending problem. There is much hope of finding active anti-rheumatic compounds from indigenous plants, as these are still used in therapeutics despite the progress made in conventional chemistry and pharmacology for producing effective drugs (Handa et al., 1992).