Cancer is a growing public problem whose estimated worldwide new incidence are about 6 million cases per year. It is the second major cause of deaths after cardiovascular diseases. It is a disease characterized by unregulated proliferation of cells. By statistics, men are largely affected by lung, colon, rectum and prostate cancer whilst women are suffering from breast, colon, rectum and stomach cancer (Abdulla M & Gruber P, 2000). The majority of human cancers results from exposure to environmental carcinogens; include both natural and manmade chemicals, radiation and viruses (Ames BN, et al., 1995).

Cancer is the disease in which disorder occurs in the normal processes of cell division, which are controlled by the genetic material (DNA) of the cell. For the efficient reproduction of cells to daughter cells, a highly concerted action at molecular level is required. The insults like viral gene integration, carcinogenic chemicals, radiation exposure etc imbalance this concert and generates daughter cells with transformed behavior. Carcinogenic process completes through initiation, promotion and progression (Yuspa SH, Poirier MC, 1988).

Conversion of a normal cell to malignant phenotype is called transformation. A transformed or malignant cell acquires many characteristic features like independence over growth signals, limitless replication potential, evasion of apoptosis, continuous angiogenic capability, invasion and metastasis and loss of cell-cell communication (Hanahan D and Weinberg RA, 2000; Trosco et al., 2004). Some genetical factors also predispose cells for malignant conversion. Mutations in genes; protooncogenes, results in altered cell signaling, for example, mutations in any of the components in the signal transduction pathways such as Ras/MAPK pathway, elicits continuous transmittance of signals in to the nucleus need for transcription of many other proteins associated with cell survival, proliferation and surpassing apoptosis (Hiatt KK, et al., 2001). Unwanted expressions of
some proteins in a tissue those are normally not expected there also seems to be associated with malignant conversion (DeVita, )

Evasion of apoptosis is one of the hallmarks of cancer cell(Kaufmann, SH, 2001). Apoptosis is the major mechanism by which cells keeps control over proliferation (Lowe SW, et al., 2000). It is energy-consuming process requiring many components to bring about the apoptosis. There are two different pathways in apoptosis: extrinsic and intrinsic. Both the pathways converge to caspase-3. Caspases are protease enzymes particularly involved in apoptosis. P53, NFKB, PI3K, Bcl-2 protein family are some other protein families involved in apoptosis. Due to most of these components are mutated in a cancer cell, apoptosis is now considered to be a potential target for chemotherapy.

Different chemotherapeutic drugs inducing apoptosis through different pathways. Irrepairable DNA damage induced by chemotherapeutics is mainly by ROS generation (Nakamura Y et al., 2000), topoisomerase 1(TOP1) inhibition (Hsiang et al., 1985) or tubulin arrest during mitosis. Researches are going on to find more efficient chemotherapeutic drug leads, which are selective for tumor cells. In this aspect, plant and other natural sources serve as the source for the discovery of more drug leads as drug candidates in the treatment of cancer. Many natural products are indicated as chemoprotective agents against commonly occurring cancers worldwide. The drugs currently in use for treatment of cancer cell are synthetic or semi-synthetic. Semi-synthetic drugs are synthesized using a template molecule from nature. One of such natural template molecule is camptothecin. The derivatization of camptothecin yields more potent forms like topotecan and irinotecan. Because of the structural complexity, camptothecin cannot be produced synthetically. The interest upon CPT was high because of the unique molecular target of this compound, the topoisomerase1 enzyme, required for transcription of DNA. Cancer cells are endowed with overexpression of Top1 and this makes them more sensitive to CPT.
This compound was originally isolated from a Chinese tree, *Camptotheca acuminata* by Wall and Wani, in 1956. Due to the great demand of this compound, many alternative sources have been identified so far. Sakato and Misawa have started the experiments for the *in vitro* production of CPT in *C. acuminata*. Later, camptothecin was found in *Nothopodytes foetida* and *Ophiorrhiza mungos* (Govindachari et al., 1972; Tafur et al., 1976). Roja and Heble did tissue culture experiments and isolated CPT and 9-methoxy CPT in *N. foetida*. In *O. mungos*, Sudo et al., patented for enhanced production of CPT and 10-HCPT (Sudo et al. 1991). Comparative study of *Nothopodytes* and different *Ophiorrhiza* species for CPT content has shown that CPT is present very high in *Nothopodytes* compared to *Ophiorrhiza* species. But the tissue culture response was high for *Ophiorrhiza* species.

Various biotechnological strategies are used to optimize product yield from plant tissue culture, namely, improvement of culture condition, selection of high yielding cell lines, elicitation, immobilization, hairy root cultures, biotransformation etc. By using these techniques, enhanced production of CPT has been achieved by many groups. Lorence A(2004) set up hairy root cultures of *C. acuminata* and isolated CPT and 10-HCPT from the cultures.

Elicitation with biotic and abiotic elicitors is found to be good method for the enhanced production of secondary metabolite of pharmacological importance. Apart from CPT, many other polyphenolics like anthraquinone derivatives are reported from various *Ophiorrhiza* species and other Rubiaceous members. Kitajima M, *et al.*, (1998) found that in the tissue cultures of *O. pumila*, the amount of CPT is less and anthraquinone derivative were abundant, as the cultures got aged.

Anthraquinones consisted of many derivatives like emodin, aloe-emodin, physcion, Rhein etc. The antitumor activity of these compounds is well documented. Emodin and other hydroxy and amino derivavers of anthraquinones are showing potent anticancer activities.

The present study aims to enhance the in vitro production of CPT from Ophierrhiza rugosa var. decumbens by implementing various biotechnological approaches. Also, a search for other antineoplastic drugs from the cultures is another goal of interest.