Scope of the present study
Prostate cancer is the most common cancer and the second leading cause of cancer related deaths in men in the global population and also in India. Initial treatment for prostate cancer is usually androgen-ablative therapy, radiotherapy or radical prostatectomy and the patients respond to androgen-ablative therapy in the beginning of treatment. However, many patients eventually fail this therapy and die of recurrent androgen-independent prostate cancer and metastasis. Up to 30% of men undergoing radical prostatectomy will also relapse, often as a result of metastatic cancer present at the time of surgery. The efficacy of cytotoxic chemotherapy for treatment of hormone-refractory prostate cancer has been tested in clinical trials. In general, response rates of <10% were observed in single-agent studies. Thus, there is a tremendous need for the development of mechanism-based targeted strategies for treatment of prostate cancer. It has been proved that plant derived diets reduced the incidence as well as progression of prostate cancer.

Diallyl disulfide (DADS), a component of garlic has been known to exert chemopreventive activity against colon, lung, breast, stomach, esophagus and skin cancers. Its molecular mechanism of action is not clear. DADS have an antiproliferative property against cancerous cells. Numerous reports imply that high consumptions of allium vegetables reduce the risk of cancers from various organs. Survey of literature revealed that in vitro studies with PC 3 cancer cell lines to be a good model to assess the potent chemopreventive activity of DADS against human prostate cancer. There are limited reports available on the anticancer effects of DADS on prostate cancer, the molecular mechanisms underlying the chemopreventive role of
DADS on prostate cancer are not well established. Hence, the present study was designed to investigate the multiple mechanisms underlying the chemopreventive role of DADS on prostate cancer in vitro and in vivo. This study includes effects of DADS on cell cycle analysis, apoptosis, metastases and status of histone acetylation, since these pathways are involved in the cancer progression.

The specific objectives include,

- To evaluate the effects of DADS on cell proliferation and cytotoxicity in prostate cancer cell line.

- To study the molecular mechanisms involved in the induction of cell cycle arrest by DADS in prostate cancer cell line.

- To find out the molecular mechanisms underlying the induction of apoptosis in prostate cancer cell line by DADS.

- To investigate the effects of DADS on the level of matrix metalloproteinases in prostate cancer cell line.

- To study the effects of DADS on the induction of histone acetylation in PC 3 cells.

- To study the chemopreventive effect of DADS on rat prostate carcinogenesis.