Prostate cancer (PC) has emerged as the most frequently diagnosed cancer, except for non-melanoma skin cancer, among men in many Western countries in the last decade. However, in the Asian population there is an increasing trend observed in prostate cancer cases which accounts for nearly a quarter of all new male cancer diagnoses. Increasing age and some genetic and ethnic risk factors have been identified but few modifiable risk factors are known. The introduction of Prostate Specific Antigen (PSA) testing has increased the detection of previously undiagnosed disease but its contribution to the observed increases in prostate cancer incidence is not clear. Considerable variations in the incidence of prostate cancer have been observed in different geographic regions and socio-economic groups across the globe but it is not known whether, or to what extent, these may be attributed to differential uptakes of PSA testing. Prostate cancer is the third most common cause of cancer death in men but many cases do not progress. There is therefore an important clinical need for better prognostic markers so that the increasing numbers of men with prostate cancer can be appropriately managed.

This thesis begins with a descriptive epidemiological study using cancer incidence data during the period 2007 to 2015 from a single tertiary care centre of North Karnataka. The aim was to determine whether the incidence of prostate cancer was continuing to rise and to describe any demographic, socio-economic patterns or clinical characteristics that might suggest particular at-risk groups. To understand whether any socio-economic differentials in incidence might be due to PSA testing, I examined Gleason grade-specific prostate cancer incidence by socio-economic groups over time. A total of 471 patients were diagnosed with PC, the mean age at presentation was 70 years, and mean PSA level was 37.71 ng/mL. Digital rectal
examination (DRE) was abnormal in 87.5% of 471 cases. Significant correlation was observed between PSA level and DRE ($P = 0.0005$), correlation of PSA and Gleason’s score was $P = 0.0006$, and histopathological results showed high risk in patients ($P = 0.0001$). This is the first hospital-based study of PC incidence with clinical and histopathological features. PC remains an important public health problem with increasing incidence and significant burden on health-care resources in India.

To explore the role of potentially single nucleotide polymorphisms (SNPs) that have been suggested to be implicated in the development and progression of PC. While individual SNPs are only moderately associated with PC risk, in combination, they have a stronger association. Therefore, identification of numerous variations in genes and analysis of their effects may lead to a better understanding of their impact on gene function and health of an individual. We therefore investigated the association between the rs4242382-A variant at 8q24 and PC risk in North Karnataka population, and compared our data with previous results from other populations to clarify the significance of the locus in multi-ethnic populations. Our results from the SNP genotypes evaluated in this study contribute to our understanding of genetic susceptibility to prostate cancer, these SNP genotypes alone may be of limited clinical value for predicting risk of developing prostate cancer or of developing more aggressive prostate cancer. Additional translational studies with larger cohort may ultimately reveal how these common genetic variants may be used clinically, such as for risk stratification and in communicating risk-based information to individuals interested in early detection and prostate cancer prevention.

Patients with metastatic prostate cancer invariably progress after primary androgen ablation and develop castration-resistant disease after a median time of 18-24 months. We report our early experience with docetaxel based chemotherapy in patients with
mCRPC. Patients with mCRPC and aged ≥80 years having rising serum PSA, increasing extent of disease on bone scans and physical findings, following androgen deprivation therapy were included into the study. In our study the overall survival was 32.61 ± 6.09 months in patients receiving docetaxel. Serum PSA decline rates at least 50% from baseline was seen in 34.32% of patients at 3 months on docetaxel treatment. Docetaxel was also effective in pain reduction, decline in serum PSA levels and improvement in health related quality of life. Our study demonstrates significant response rates to docetaxel chemotherapy but that a considerable number of patients had treatment-related complications. This highlights the need for careful patient selection and optimization of chemotherapy dosing.

Evidence from the World Health Organization, states that about 65% of the population across the globe prefer to use traditional and herbal medicines to treat disease. The use of complementary alternative medicines has dramatically increased in India along with USA, in the last two decades. Approximately 60% of anticancer agents are derived from medicinal plants and other natural resources; however, there are still a number of plants that have an anticancer potential but they have not yet been fully investigated. Hence, in order to meet the needs we designed to study the therapeutic use of two medicinal plants *Leea indica* Merr. (Leeaceae), and *Allophylus cobbe* (L.) Raensch. (Sapindaceae) belonging to two different families collected from Western Ghats of North Karnataka to evaluate the preliminary phytochemicals, determination of total phenolic contents, *in vitro* antioxidant and anticancer activity using *in vitro* model systems on DU-145 and PC-3 human prostate cancer cell lines. The results in the present study are agreed to some extent with the traditional uses of the plants investigated. The antioxidant activity of the extracts correlated well with the total phenolic contents and indicated that phenolic compounds are dominant contributors to
the antioxidant activity of the extracts. Considering the selectivity of *L. indica* and *A. cobbe* plant in the treatment of cancer cells, it needs to be validated on several other cell lines. However, using *in vitro* model we observed that aqueous leaf extracts of *A. cobbe* whereas methanol and ethanol leaf extracts of *L. indica* were found to be selectively cytotoxic *in vitro* to (DU-145 and PC-3) human prostate cancer cell lines.