SUMMARY

The present work was focused on the systematic study of the anti-cancer properties of plants which were selected after preliminary investigations. The selected plants were collected from their natural habitats. The parts to be used were washed and shade-dried. The dried parts were crushed to coarse powder and extracted with 50% ethanol as solvents in the Soxhlet apparatus, concentrated in rotary vacuum evaporator, lyophilized and was stored at 4°C for use.

*Magnolia grandiflora* Linn. bark extracts were tested for their anti-cancer properties both in vivo and in vitro. For in vivo study, tumors were induced in Swiss albino mice using DMBA and MC. The mice treated with the carcinogens for six months were treated with the *M. grandiflora* bark extract at 833.3μg plant extract/kg body weight and 1.66 mg plant extract/kg body weight till the experiment was over. Body weight, dietary habits and longevity of the animals were observed. At the end of the experiment, necropsies were done for the observation of the changes in the vital organs and their weights were taken. Lungs and liver of the animals were fixed at 10% paraformaldehyde (pH 7.5), sectioned, stained with HE stain and histopathological examinations were done.
Fifty percent ethanol extracts of *Belamcanda chinensis* Linn. (rhizome), *Magnolia grandiflora* Linn. (bark), *Nerium indicum* Mill. (root bark) and three fractions of *N. indicum* root bark whole extract were tested against human cervical cancer cell lines Bu25Tk and mouse myeloma cancer cell Sp2/0 Ag-14 for their cytotoxic activity using MTT assay. These extracts were also tested for their cytotoxic activity using SRB assay against human cervical cancer cell ME180 and human breast cancer cell MCF-7. The effect of these extracts on the cell cycle of the chronic myelogenous leukemia cell K562 was also tested. The effect of aqueous extract of the leaves of *Croton caudatus* which was claimed to be cancer-curing at the time of this study was also checked *in vivo*. The aqueous leaf extract (8.25 mg/kg body weight of the animal) were injected intraperitoneally, kept for 24 hrs and chromosomal aberrations and synaptonemal complex damages were checked.

The *M. grandiflora* bark extract had the ability to reduce the weight and volume of tumors induced in the lungs of the animal, both male and female. In males, the volume of the tumor was reduced by 58.91% (*p*<0.001) in the plant extract treated group while in the females it was reduced by 84.93% (*p*<0.001). The tumor weight was also reduced in the males by 47.32% (*p*<0.001) and by 54.31% (*p*<0.001) in the females treated with plant extract compared to the carcinogen-treated groups. The weight of the lungs in the plant extract treated group was also reduced in comparison to carcinogen-treated group. It was reduced by 48.81% (*p*<0.001) and 57.06% (*p*<0.001) in male and females, respectively when the plant extract concentration of
100mg/60 kg body weight was administered. There was no significant difference in the body weight, longevity and weight of the other vital organs between the carcinogen-treated groups and plant extract treated groups.

MTT assay also showed the cytotoxic potential of the plants. At a concentration of 80μg plant extract/100μl of the cell suspension containing 400-1000 cells, the growth of the bu25Tk- cells was inhibited by N.indicum (47.7%), M.grandiflora (62.84%) and B. chinensis (55.9%) respectively. The growth of the Sp2/01 Ag-14 mouse myeloma cancer cells were also inhibited by the extracts of these plants. At a concentration of 80μg plant extract/100μl of the cell suspension containing 400-1000 cells, the growth of the cells were inhibited by N. indicum (96.3%) and B. chinensis (79%) respectively.

The SRB assay also showed the cytotoxic activities of these plant extracts on human cervical cancer cell ME180 and human breast cancer cell MCF-7. When exposed to N. indicum extract at a concentration of 80μg plant extract/100μl of the cell suspension containing 400-1000 cells, the increase in the number of MCF-7 cells in comparison to plant extract untreated group was only 0.5%. In the case of M. grandiflora and B. chinensis at the same concentration, the increase of cells was only 27.3% and 18.2% respectively. The increase of the cells when exposed to M. grandiflora and B. chinensis were 40.1% and 58.6% in comparison to the plant extract untreated control group.
The cell cycle profile of chronic myelogenous leukemia cell K562 exposed to these plant extracts showed that the plant extracts had the potential to arrest the cells at G₂ and G₀-G₁ phases. The plant extract untreated cell showed 23.76% of cells at G₂ stage while the number of this cells was increased to 38.49% when the cells were exposed for 24 hrs to 40μg extract of *N. indicum*. For G₀-G₁ stage, 1.16% of the cells were at this stage when it was not exposed to plant extract but the number increase to 12.22% when the cells were exposed to 40μg *N. indicum* extract for 24 hrs. No significant changes were observed in the cell cycle profile of the K562 exposed to other plant extracts.

The aqueous extract of the leave of *Croton caudatus* Geiseler had the ability to induce chromosomal breaks and other abnormalities (16.55%, p<0.01) in the bone marrow cells of mice. It also has the ability to damage the mice germ cells as indicated by the synaptonemal complex aberrations (14.77%, p<0.01). The extract when tested for cytotoxicity in cancer cell lines showed no significant effect.

The three plants, viz., *Nerium indicum*, *Magnolia grandiflora* and *Belamcanda chinensis* possessed anti-cancer potentials against cancer cell lines tested. *Nerium indicum* had cytotoxic potential on cancer cell lines Bu25Tk⁻, Sp2/01 Ag-14, MCF-7, ME180, and had the potential to arrest the cycling K562 cells at G₂ and G₀-G₁ phases. The *Magnolia grandiflora* had cytotoxic potential in cancer cell lines Bu25Tk⁻ and MCF-7. It also had the potential to reduce the tumor volume, tumor
weight and lungs weight of mice. *Belamcanda chinensis* had the cytotoxic potential on cancer cell lines Bu25 Tk7, Sp2-01 Ag-14 and MCF-7. These three elite plants might hence be the promising candidates for exhaustive search of anti-cancer compounds for subsequent application in the treatment of cancer.