The present thesis entitled “Study of Anticancer role of a few Andrographolide derivatives and of a Nanoencapsulated form of Andrographolide” comprises of work done in CSIR-Indian Institute of Chemical Biology under the guidance of Dr. Mrs. Krishna Das Saha. The registration for the Degree of Doctor of Philosophy (Science) was done in the Department of Biotechnology under University of Calcutta.

The entire thesis comprises of seven chapters. Chapter: 1 spells out the Introduction which discusses in brief, the entire work of the thesis. Chapter :2 explains the cancer and its types, signaling pathways related to cancer and apoptosis and the Literature Review spelling the noble work of the previous researchers on the hazards of conventional chemotherapeutic drugs and radiation therapy which has subsequently increased the demand of Herbal Drugs to reduce the side effects of the conventional chemotherapy.

Andrographolide, the active principle of Andrographis paniculata, which is widely available in India, has been of tremendous importance in the recent times to cure several fatal diseases. Limited reports are available on the curing of cancer by andrographolide. Further, the preparation of synthetic derivatives of andrographolide had expressed better efficiency in curing the fatal disease- Cancer. Since, the synthetic derivatives along with mother andrographolide itself have expressed less solubility, less stability, low bioavailability and low half-life period, nanoformulation of andrographolide was demanded for by the previous researchers. It had been observed that nanoformulation had expressed better efficacy than the parent molecule.

After receiving a concrete idea the works of the previous researchers the Aims and Objectives of the present study has been spelt out in Chapter: 3.
In order to establish the objectives of the present study, *Chapter: 4* has compared the effect of andrographolide and its di-spiropyrrolidino (seven analogues known as Sarcosine series) and di-spiropyrrolizidino (eight analogues known as Proline series) oxindole andrographolide analogues on a panel of six cancer cell-lines including a non-cancer cell-line. Three of these derivatives belongs to the proline series (viz. CY2, CY14, CY15) which have shown relatively potent cytotoxic effect via apoptosis induction in a cell specific manner on three cell lines (HCT116, MiaPaCa-2 and HepG2) out of five cancer cell lines when tested. The Nanoformulation of the andrographolide was demanded for and discussed in *Chapter: 5* which expressed high solubility, high stability, high bioavailability and greater half-life period.

After the formulation of nanoandrographolide, it was partially characterized and tests for its apoptosis induction capability were conducted on mouse melanoma cell-line (B16F10) to evaluate its efficacy compared to the parent molecule (andrographolide). Interestingly, nanoandrographolide expressed nearly five times more efficiency than andrographolide. *Chapter: 6* has discussed the antitumor efficacy of nanoandrographolide over the mother compound andrographolide when tested on B16F10 induced mouse melanoma tumor model and mouse EAC tumor model *in vivo*. It was found that nanoandrographolide more efficiently reduced the tumor size in both the mouse tumor models so nanoandrographolide can be considered as future drug candidate against those cancers.

Finally, *Chapter: 7* deal with the overall discussion, future perspectives and findings from the *Chapters: 4, 5 and 6*. In conclusion, it can be stated that three andrographolide derivatives those we have examined (CY2, CY14 and CY15) and nanoandrographolide are more potent than free andrographolide and they causes cell death via mitochondrial pathway of apoptosis induction, similar to andrographolide. Moreover, nanoandrographolide induces apoptosis by modulating the PI3K/ Akt/NF-κB axis.