# ABSTRACT

Molecules that interact with DNA have been studied extensively with the aim of designing new types of chemotherapy agents and probes for nucleic acid structures. Studying the interaction of transition metal complexes with DNA have been the main focus of recent investigations. Development of new molecules that can obstruct cancerous cells by interacting with DNA in a non-classical mechanism is an example of new anticancer approach. Transition metal complexes are ideal for these tasks, as their unique characteristics allow specific interactions with DNA and other important bio-molecules. Transition metals which are used largely in this area of research include platinum, ruthenium, rhodium, palladium, Vanadium and Nickel. Among these transition metals, Platinum(II) based compounds and related drugs fascinated the inorganic chemists during a long period because of its anti-cancer activity, especially cis-platin. But, these drugs have so many disadvantages too such as lesser solubility, dose-limiting side effects *etc*. which necessitates the upgradation of anticancer approach. To explore this area of research here we have dissertated interaction of some newly synthesized transition metal complexes with DNA.

Chapter I is an introductory one that describes different types of polydentate ligands and their transition metal complexes and their applications in biological fields. This chapter also contains a brief literature review on related works as well as the objective and application of the research works.

Chapter II contains the sources of the different chemicals and materials used in this research work. This chapter also contains details of the physico-chemical and spectroscopic techniques, *viz.*, Elemental analysis, Magnetic susceptibility measurement, IR, UV-Visible, NMR- spectroscopies, ESI-MS, *etc.*, used for the physicochemical characterization of the synthesized complexes. This chapter also describes briefly the procedure to study different applications of the compounds.

Chapter III involves synthesis, characterization of a new Zn(II) complex and its interaction with DNA by diverse physical and spectroscopic techniques. The newly synthesized complex was further examined for antioxidant activity.

Chapter IV includes preparation, characterization of a new tetradentate Co(II) complex and its interaction with DNA using different advanced techniques. The synthesized compound was also used to study antibacterial activity against gram positive (*S. aureus*, *B. subtilis*) and gram negative (*E. coli*, *P. aeruginosa*) bacteria.

Chapter V encompasses synthesis, characterization and DNA cleavage activity of Cu(II) complex. *In vitro* antioxidant activity of the new Cu(II) complex was also investigated.

Chapter VI includes the synthesis and physico-chemical properties of ionic liquid tagged azo-azomethine ligand and its Zn(II) complex. The newly synthesized complex was further researched for DNA interaction study.

Finally Chapter VII contains the concluding remarks of the research works embodied in this dissertation.