CHAPTER VII

Concluding Remarks

In this present research dissertation synthesis, characterisation and DNA binding ability of some polydentate ligands based transition metal complexes have been described. This research thesis contains seven chapters.

Chapter I contains the general overview of polydentate ligands (mainly Schiff base ligand) and their transition metal complexes. It also includes the background and thinking process behind the synthesis and DNA interaction study of transition metal complexes.

Chapter II deals with the experimental sections giving the reagents and solvents used to synthesize ligands and their transition metal complexes. The details of instruments used in different spectroscopic and analytical techniques were described briefly in this chapter.

Chapter III involves the synthesis of a new Schiff base ligand and its Zn(II) complex. The synthesized Schiff base ligand and its Zn(II) complex have been characterized by different spectral and analytical techniques. Results of the physical measurements exhibit that the Zn(II) metal ion is coordinated by two azomethine nitrogen and two phenolic oxygen atoms, and hence it adopts a tetrahedral geometry. The synthesized complex is stable and non-electrolyte in nature. The ability of the synthesized complex to bind to DNA was monitored by different techniques. The experimental results indicate that the Zn(II) complex interacts remarkably with CT DNA and confirms an intercalative mode of binding to CT DNA. Apart from high binding affinity with DNA at stable energetics, it is also seen that the complex has interaction potential with other biologically important pathways like apoptosis regulation, which hints toward possible involvement with carcinogenesis. In this study, it is also evident that the synthesized complex aided in the recovery of oxidative stress and inhibited lipid peroxidation. On the basis of these facts, antioxidant therapy by synthesized Zn(II) complex alone or in combination with other pharmacological strategies appears as the most reasonable treatment of oxidative stress induced several mental disorders like mental stress, trauma, and anxiety.

Chapter IV presents the synthesis and physico-chemical charecterization of a new Co(II) complex. The physico-chemical and spectroscopic results reveal that the synthesized complex is mononuclear and posses tetrahedral geometry around the

Co(II) ion. The results of DNA binding study suggest that the synthesized complex act as an efficient metallointercalators. The result of antibacterial activity showed that both gram positive and gram negative bacterial were susceptible to such metal complex and may provide a support to protect against bacterial disorder. According to molecular docking analysis, proteins like progesterone receptor and Induced myeloid leukemia cell differentiation protein Mcl-1 has high binding affinity with the Co(II) complex. Because of such benevolent biological activities, the synthesized complex may be productive for the design of new metal-based drugs.

In **chapter V** includes the synthesis, characterization of metal-organic hybrid complex of Cu(II). The blue colored complex has Parallelopiped shaped orthorhombic crystals with space group $P2_12_12_1$. The three-dimensional structure of the complex was stabilized due to extensive inter- molecular hydrogen bonding interactions. The compound shows a great probability of being an analgesic drug although it can have a long way to go to establish it as a standard drug. In the present study it is clear that the novel Cu (II) complex aided in the revival of oxidative stress.

Chapter VI contains the synthesis and characterisation of ionic liquid tagged azo-azomethine Zn(II) complex. The synthesized complex was tested for DNA interaction and the results showed that the complexes bind with CT-DNA through intercalative mode. The docking study showed a favourable interaction between the metal complex and the receptors 11-β- hydrosteroid dehydrogenase 1 (2BEL) and receptor breast cancer (3hb5).

The results have showed that the synthesized complexes have greater binding affinity toward CT-DNA and their activites can be further modified by tuning the nature of ligand or simply changing the metal ion. This DNA binding strategy should be valuable in finding the powerful agents for probing and targeting nucleic acids. There are two issues that must be addressed precisely in future work:

1) Enacting full control over the selectivity of attack. This will require a more comprehensive analysis of the kinetic and mechanistic profiles of the interaction.

2) Advancement in ligand design to promote recognition and more strong binding to the target nucleic acids. This will yield remarkable advancement in DNA cleavage efficiency also. We have already initiated moleculer modeling analysis which may help in designing new type of ligands and complexes.