PREFACE

This dissertation is not just compilation of work done in a laboratory but of experiences and desire of a group few people to address issue that relates to human suffering at large. My postgraduate education exposed me to the intricacies of medicine, their use and effects. It allowed me simultaneously to ponder upon the overwhelming achievements of mankind to ameliorate human suffering and at the same time its struggle to check diseases and their threats.

Infectious agents had always attracted my attention. More specifically, it is the magnanimity that is hidden in their apparently minute structures, indicated by their ability as a community to keep the best of mankind's energy engaged for centuries in designing ways and means to combat them. Yes, antibiotics fascinated me. More so because it exemplified a unique case where nature had problem as well as its solution in the same place coated in mystery and complexity and left for mankind to open and discover.

As we know, the search for antibiotics began in the late 1800s, with the growing acceptance of the germ theory of disease, a theory, which linked bacteria and other microbes to the causation of a variety of ailments. As a result, scientists began to devote time to searching for drugs that would kill these disease-causing bacteria. The goal of such research was to find so-called "magic bullets" that would destroy microbes without toxicity to the person taking the drug.

Since the days of Alexander Fleming's Penicillin and Selman Waksman's streptomycin, the world has traversed a long route in discovering complex molecules that can check growth of pathogens. There was need for it. There is still a need for it. We found the menace of drug resistance cropping soon after the first celebrations of the magic bullet was getting over. The phenomena of drug resistance indicated in clearest terms that even the best of antibiotics will have a shelf life, ironically decided by these minute organisms and their ability to alter and change.

I found that plants kingdom, the sole domain that is destined by nature to produce glucose, the elemental energy molecule, has much to give us even now apart from paying the lead role on our macro eco system. It has million solutions bundled into it waiting excavation, understanding and discovery. The wild rush toward synthetic molecules as potent drugs for checking pathogens has gained tremendous prominence partly because if its predictable efficacy and clear understanding of its shape and form and partly because of the mad rush of the corporate world to justify its synthesis and the cost involved in making them. While this approach had given us few molecules that rank best in its category, for example, the wonder drug Ciprofoxacin, it had also undermined the need for exploration of the plant kingdom for such molecules being well aware of the potential hidden in it.

preventive properties. There are more than thousand known phytochemicals. It is well known that plant produce these chemicals to protect itself but recent research demonstrates that many phytochemicals can protect humans against diseases. Some of the well-known phytochemicals are lycopene in tomatoes, isoflavones in soy and flavanoids in fruits. Phytochemicals are not essential nutrients and are not required by the human body for sustaining life.

I therefore had a strong desire to explore for a potent phytochemical substance that can be used for controlling *Staphylococcus aureus*, a pathogen that is known to be a threat to every hospital for its ability to cause nosocomial infections. But natural, I went on to explore plants that harbored such molecules and my systematic approach led to the findings that is compiled in this dissertation.

Chapter one introduces the subject of herbal antibiotic as well as it's relevance to present day drugs of similar activity. It defends the need for search of phytochemicals as antibiotic candidates and explains the over-all aim of the research programme. Chapter two is dedicated to screening of prospective plants for compounds having anti-bacterial properties. Chapter three relates to purification isolation and characterization of a single mother moiety, named here as Dodochromen, present in one of the selected plant, viz. *Dodoneae viscosa*. Chapter four describes susceptibility test of the candidate molecule *in vitro* and *in vivo*. Chapter five describes study on inhibitory activity of Dodochromen on an MRSA confirmed for methicilin resistance at molecular level. The sixth and final chapter provides the toxicity, cytotoxicity and pharmacological information about the molecule.

The molecule discovered and described in this compilation represents a minute fraction of its members in the plant community. A large number of them remain to be discovered. Many may fail the test of controlling the smart bugs but few that pass will be invaluable addition to the list of life saving drugs that are discovered by mankind.

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