Preface

Alzheimer's Disease (AD) is an age-related neurodegenerative disorder which accounts for more than 80% of dementia cases worldwide in older people. It is characterized by the deposition of Aβ plaque and neurofibrillary tangles. The disease leads to progressive loss of memory and functional ability to learn and is primarily characterized by the progressive loss of memory associated with other cognitive deficits.

Despite decades of study on the etiology of the disease and also significant efforts by the pharmaceutical industry to develop therapies, there is no effective treatment available to cure AD or inhibit its progression significantly. However, there are four drugs, viz. donepezil, galantamine, and rivastigmine, approved by USFDA, acting on the cholinergic pathway, and memantine acts on the NMDA receptor. Given the complex and multifactorial nature of the disease, the development of multifunctional ligands was considered a better option.

The present study is divided into the introduction, which deals with Alzheimer's disease (AD), its pathophysiology, and current treatments for AD; literature reports related to the relevant work; and the hypothesis, rationale, and plan. Further, it also includes the rationale for synthesizing and evaluating novel piperic acid glycine-amide/benzylpiperazine derivatives of two series. The designed molecules were promoted to synthesis and *in-vitro* enzyme inhibition studies. The potent molecules obtained from the *in-vitro* study were further investigated for enzyme kinetics, antioxidant, metal chelation, and neuroprotection study. Furthermore, lead compounds were selected for *in-vivo* studies in AD animal models to evaluate the working memory and learning response.

General synthetic procedure involved in the synthesis of targeted compounds, their biological evaluation with the conclusion and final summary.