In this modern era, epilepsy is one of the most frequent neurodegenerative diseases after stroke. The term “epilepsy” is derived from Greek word “epilambanein” which means “to seize upon” or “to attack”. It affects approximately 1-2% of population worldwide. It affects more than 2 million Americans and 50 million people worldwide. Epilepsy, a common chronic neurological disorder characterized by recurrent unprovoked spontaneous seizures also known as seizure disorder. Epilepsy begins anywhere between the ages of 3 and 14 years, and continues indefinitely. Epilepsy is one of the major neurological disorders where modern drug therapy is complicated by side effects, long-term toxicity and about 40% patients are refractory to therapeutic intervention and thus its effective and safe therapy remains a challenge. Medicinal plants used for therapy of epilepsy in traditional medicine have been shown to possess promising anticonvulsant activities which can be considered as invaluable source for search of new antiepileptic compounds. Behavioral disorders are perhaps the most common and serious complications of epilepsy. For patients with difficult-to-control epilepsy, depression makes a greater contribution to impaired quality of life than seizure frequency or demographic factors.

Although the mechanism of epilepsy is not completely understand, there is considerable evidence that voltage-gated currents contribute to the generation of epileptogenic seizures. It has been shown that toxins that prolong Na⁺-channel opening cause seizures. Similarly drugs that prevent activation of K⁺-currents, GABA-receptor antagonists, glutamate receptor agonists and cholinergic agonists also induce convulsions with augmented transmitter release. The primary treatment for epilepsy is the use of antiseizure medicines called anticonvulsant or antiepileptic drugs (AED) to bring seizures
under control. AEDs can reduce the occurrence of seizures or prevent them from occurring, but they do not cure epilepsy. On the basis of similarity of the cascade of synaptic and intracellular events exhibited by epilepsy and vascular brain injuries, Antiepileptic drugs (AEDs) have been tested as possible neuroprotective agents. Interestingly, some AEDs were shown to be promising tools to counteract experimentally induced brain ischemia, whereas most of the putative neuroprotective agents previously tested in clinical trials showed either limited efficacy or untoward side effects. Some of the AEDs have been discontinued because of lack of efficacy and severe adverse effects (restlessness, confusion, hallucinations), and some AEDs have been discontinued in phase II clinical trial owing to its toxicity. It can be stated that most available older or newer AEDs bestow no clinical significant neuroprotective effects with very narrow therapeutic window, thus making them highly unlikely that they will be able to offset the cellular damage.

Mutations in several genes have been linked to some types of epilepsy. Several genes that code for protein subunits of voltage-gated and ligand-gated ion channels have been associated with forms of generalized epilepsy and infantile seizure syndromes. Several ligand-gated ion channels have been linked to some types of frontal and generalized epilepsies. One speculated mechanism for some forms of inherited epilepsy are mutations of the genes which code for sodium channel proteins; these defective sodium channels stay open for too long thus making the neuron hyper-excitable. The roles of kindling and excitotoxicity, if any, in human epilepsy are currently hotly debated. Other causes of epilepsy are brain lesions, where there is scar tissue or another abnormal mass of tissue in an area of the brain. The complexity of understanding what seizures are have led to considerable efforts to use computational models of epilepsy to both interpret experimental and clinical data, as well as guide strategies for therapy.
During the past few years, there is a growing interest to screen the plant derived compounds for the treatment of several disease including epilepsy and related diseases, although our knowledge of their effects is far from complete. India is blessed with many varieties of aromatic and medicinal plants. The agro-climatic conditions and rainfall is favouring bioavailability of more than 7,500 species of medicinal plants. Vedas and other ancient scriptures have clearly indicated the use of Ayurvedas, our indigenous system of health-care, for many ailments. Ayurveda alone describes about 2000 species of plants with more than 10,000 formulations. Over the past few years there has been considerable interest in the use of herbal medicines in the world.

Herbal medicine is a major component in all indigenous traditional medicine and a common element in ayurveda, homeopathic, naturopathic and traditional oriental medicine. The World Health Organization (WHO) estimates that 4 billion people, 80% of world population presently use herbal medicines for some aspect of primary health care. WHO notes that about 74% of plant derived pharmaceutical medicines are being used in modern medicine in ways that correlated directly with their traditional uses as plant medicines. It is obvious that importance of herbal drugs is gaining momentum in recent times and the pharmacological and clinical studies on the plant derived drugs are in progress throughout the world in order to establish their effectiveness and safety.

Even though much work has been done on the anticonvulsant effects of selected medicinal plants no systematic investigation was carried out on the neurobiological role of *Bacopa monnieri*, with particular reference to anticonvulsant and neuroprotective activity. From the survey of literature, it is obvious that screening of Phytochemical plants with particular reference to anticonvulsant/antiepileptic activity was performed by number of workers for the past few years from other countries and much is awaited from
our country which is endowed with rich heritage of flora and fauna. Hence the present study is undertaken to examine the anticonvulsant effect of different fractions of *Bacopa monnieri* on selected neurochemical parameters in different areas of rat brain.

*Bacopa monnieri*, also referred to as water hyssop and brahmi, has been used in the ayurvedic system of medicine for centuries. The present study is carried out with a focus on characterization of antiepileptic bioactive fractions extracted from *Bacopa monnieri* plant and to define the neurobiological role of these fractions with particular reference to antiepileptic and neuroprotective activity.

The present investigation has been presented in four chapters

1. To study the possible involvement of cholinergic activity during induced epilepsy and on pretreatment with anticonvulsant extracts of *Bacopa monnieri*.
2. To study the role of biogenic amines during epileptic and antiepileptic treatments.
3. Studies on some selected aspects of glutamate and associated metabolism during PTZ-induced epilepsy and on pre-treatment with different extracts of *Bacopa monnieri*.
4. To study the energy status and its metabolism during epileptic and antiepileptic treatments.

These chapters are preceded by a general introduction, and methods adopted and succeeded by summary and conclusions followed by Bibliography.

The study also likely to emphasize the antiepileptic effect of *Bacopa monnieri* by taking into consideration of measurement of specific parameters related to different transmitter systems which may serve as uniquely sensitive screen for neurotoxicity. The study will certainly contribute the understanding of pathophysiological consequences of
epilepsy and compensatory responses during antiepileptic treatment. The author remains 
pardonable for any errors which may have crept in due to oversight, and for any 
investigative lacunae which are due to limitations in infrastructural and laboratory 
facilities. In spite of the shortcomings, best use of the available facilities was made to 
get a comprehensive picture as far as possible. The author invites constructive comments 
from the reviewers on this research work and suggestions for future studies.