INTRODUCTION
Sleep-wakefulness is a complex amalgam of physiological and behavioural processes. Sleep is usually accompanied by postural recumbancy, quiescence, closed eyes. It was first classified by Loomis et al. (1937) based on EEG (electroencephalogram, activity from brain) in humans. Earlier, sleep was viewed as passive phenomenon caused by fatigue or cessation of continuous sensory inflows assailing the brain during wakefulness. This view was based on the experiments with transections and EEG recording, showing that when disconnected from the spinal cord, the sleep-waking cycle was not affected, whereas a transection at the upper brainstem level was followed by EEG synchronization (high amplitude and low frequency waves in EEG) (Bremer, 1935). Later on, it was considered as an active phenomenon. The idea of active sleep was supported by experiments which showed that lesions of the anterior hypothalamus resulted in insomnia (Nauta, 1946).

Aserinsky and Kleitman (1953) discovered a state within sleep which was characterized by eye movements and cortical activation. This type of sleep, according to its principal characteristics, has been called REM (rapid eye movement) sleep (Aserinsky and Kleitman, 1953). Electrophysiological parameters namely EEG (activity from the brain), EMG (muscle tone) and EOG (eye movements), have been used for its unbiased, objective classification and quantification. Since then, a search for the brain areas involved in the initiation and maintenance of sleep and REM sleep has started. Dorsolateral pons of brain stem has been implicated in the generation and maintenance of REM sleep. Two types of REM sleep related neurons are identified: REM-on neurons, which increase their firing prior to and during REM sleep (Saito et al., 1977; Sakai, 1980) and REM-off neurons which stop firing during REM sleep (Chu and Bloom, 1974; Aston-Jones and Bloom, 1981; Jacobs, 1986).

The locus coeruleus (LC) within the dorsolateral pons is rich in norepinephrine
(NE)-ergic neurons and is the major source of NE in the brain. However, the role of this area in the regulation of REM sleep is not very clear and controversial. The neurons of LC are REM-off type. Most of the earlier studies made use of lesion and transection techniques (Jouvet, 1972; Jones et al., 1977, Jones, 1979, Ramm, 1979, Siegel, 1990). The primary limitations of earlier lesion studies were that the recovery and phasic effects of the lesioned area could not be investigated. Lesion studies did not conclusively prove the role of LC in REM sleep. Electrical stimulation studies applied non-physiological strength of current (Lucas, 1975; Louis-Coindet and Debru, 1988). The LC neurons (REM off) cease firing during REM sleep (Chu and Bloom, 1974). Moreover, the firing rate of REM-off neurons decreased during REM sleep deprivation. Hence it was hypothesized that 'if cessation of LC REM-off neurons is a must for the generation of REM sleep their continuous activity (non-cessation) should not induce or at least must significantly reduce REM sleep' Thus, LC was electrically stimulated (bilaterally) for prolonged period and its effect on sleep wakefulness cycle, especially on REM sleep were studied. Bipolar stimulating electrodes were preferred to restrict the area of stimulation. It was observed that stimulation of LC reduced REM sleep. Since locus coeruleus is rich in NEergic neurons, its stimulation is likely to increase NE in the projected area (Swann et al., 1981) and NE is likely to increase during REM sleep deprivation (Sinha et al., 1973; Stern et al., 1971; Thakkar and Mallick, 1993). Thus indicating that NE could be mediating the response (i.e. reduction in REM sleep). It was further hypothesized that if LC stimulation induced reduction in REM sleep was due to NE, the effect should be blocked in presence of adrenoceptor blocker. Hence, LC stimulation was done in presence of alpha agonist and antagonist and beta antagonist to investigate whether the effects are mediated by NE, type of adrenoceptor involved in mediating the
response.

This thesis is divided broadly into four sections: in first section, the literature is reviewed followed by the methodology used in this study. After that, results obtained are reported which are later discussed in the light of existing in the section 'Discussion'.