INTRODUCTION
Each minute of the life of man is under the influence of a whole spectrum of biological rhythms with about hourly, 24 hourly, monthly and roughly seasonal periods. These rhythms have been given to human being by nature. They command his mood, determine his work efficiency and inclinations and also control his health.

As adaptive value of the living being and their system to the environmental rhythm was recognized, the theme of chronobiology was initiated. The deeper study in this direction revealed fascinating facts about not only adaptation of system to the external environmental variations but also to indigenous adaptation which were dependent upon internal timing mechanism. These observations have now been justified on the scale of statistics regarding their validity and at the same time, the rhythms of existing knowledge have been clearly defined. Its significance and practical importance in day to day life is giving greater and greater recognition to the science of chronobiology.

Chronobiology, is the science, dealing with the time as it is related to activities, right from the molecular level of a living being, from a unicellular organism to a complex organism as the human being. The investigation of biorhythms has revealed much valuable information about the functions of a living organism. Today it is known that rhythmicity of different physiological functions is inherited in every biological system. Chronobiologic hypotheses admit at least the possibility of obtaining at different predictable times, dramatic differences in the extent of an effect.
and admit even response to the identical stimulus and dose at different predictable times. Hence, chronobiologic variations, if ignored, may confuse the testing of a given hypothesis. If evaluated in work on drugs, chronobiologic information seems to be particularly useful: it can now be documented that the same drug changes the sign of its effect upon cancerous growth from enhancement to inhibition, as a function of timing along two scales, circadian and circaseptan.

Chronobiology aims at studying the apparent matching or co-ordination in times of diverse systems. Of course, the subject is complex, but is of great importance in maintenance of health.

Now a further progress of medicine is unthinkable without a proper appraisal to the changes in the condition of the organism during various times along the 24 hours scale (circadian changes of a healthy organism). Such studies are of great importance in the evaluation of the state of health of a person and particularly in arriving at a diagnosis. The study of biorhythms of the body is helpful not only in diagnosis but it also plays very significant role in the correct application of treatment at right time during a 24 hour period. For example, it is established that in diurnally active, nocturnally resting human being, the pair of adrenal glands functions most actively during the span from 0300 hr until 0700 to 0800 hr whereas during other times such as the evening hours, their functions may be very low. Therefore, corticosteroid preparations should be given according to temporal indications. Another diagnostic use of knowledge of biorhythms lies in conditions where the presence or absence
of a rhythm needs to be ascertained. The most familiar instance of these is in plasma cortisol level, which in adrenal deficiency is low throughout the 24 hours, in Cushing's syndrome it is high throughout the 24 hours period, while in the healthy subjects it oscillates between extremes so that the morning value may not be higher than that observed in Cushing's syndrome and the night value not lower than that observed in adrenal failure.

Overall developments in chronobiology have given us sufficient evidence to support following generalisations:

1- Oscillation is a fundamental characteristic of all living systems.
2- Rhythm can be found at all levels of organisation within an organism.
3- Rhythms are inherited, innate and indigenous.
4- The circadian system serves to adjust the organism continuously, frequently in advance to the changing environment or social routine.
5- A wide range of rhythmic frequencies can be detected within an organism.

Because the biological system is rhythmically changing, it follows that the organism is biochemically different entity at different circadian phases. Therefore it reacts differently to the same stimulus at different times and under different physiological conditions. This differential response to an identical stimulus at different phase of the circadian system repeatedly has been documented for a variety of stimuli. These include drugs, poisons, chemicals, physical agents such as noise, X-ray
radiation, biological agents such as endotoxins and surgical stimulus.

In the last five years the chronobiological aspect has assumed an increasingly more general and decisive significance in clinical research. Chronobiology, in fact, has been transformed from being a new branch of biological research into a new method determining and modifying substantially all the traditional types of investigation. This has primarily occurred as a result of the demonstration that every biological function changes rhythmically with time, so destroying the biological myth of homeostasis. On the basis of the new parameter of 'time', current clinical research is re-examining the significance of so-called 'normal values', determining the existence of personal 'temporal' as well as anatomical features, and improving and arguing diagnostic and therapeutic measures.

The rhythmic variations in several frequencies ranges encountered in most endocrine functions are of considerable physiological and pathological interest and a chronologic approach to sampling and the evaluation of laboratory results relating to the endocrine system is essential to obtain meaningful results. The endocrine rhythms are synchronized and/or modulated by superimposed and juxtaposed controls and by feedback mechanisms. Rhythms of different endocrine functions may interact at one or at several levels, e.g. estrogens and prolactin interact both at the level of a hypothalamic pituitary feedback mechanism and in the epithelial cell of the breast.

The normal periodic changes of the different endocrine components is regarded as characteristic for the state of health and alterations
of these variables by changes in the timing of one or the other endocrine rhythms can be traced to functional disturbances (Haus & Halberg, 1980 and Hermida et al, 1982) including mental disorders (Wetterberg, 1978 and Wehr et al, 1980) and to organic diseases (Tarquini, 1980; Tarquini et al, 1981 and Hermida et al, 1982).

Although the adrenals were known since long, but their physiological significance could be realised only after the description of a clinical syndrome resulting from the destruction of adrenals by Addison in the year 1855. Following these observations Brown Seuard (1856) experimentally showed that adrenalectomy resulted in the death of various animals. He concluded that adrenal glands were essential for life. Later on, it was generally accepted that adrenal cortex, rather than medulla, was essential for the maintenance of life. Subsequently adrenalectomized animals were found to exhibit a number of physiological abnormalities. These included excessive sodium excretion (Harrop et al, 1933), depletion of carbohydrate stores (Coni & Coni, 1927) and hypoglycemia (Porges, 1910). Loss of adrenal cortex either by surgery or by disease induced profound changes in biochemical and physiological function of the body (Ingle, 1944). All these alterations in physiological functions can be reversed to normal by the administration of corticosteroids. Further progress in this field resulted in development of more potent synthetic analogues of adrenocorticoids which have a wide range of therapeutic use especially as anti-inflammatory agents. However, in normal conditions administration of adrenocorticosteroids resulted in hyperglycemia, water and sodium retention, hypertension, oedema, negative
nitrogen balance and muscular wastings. On the other hand adrenal gland itself appears to be quite sensitive to a variety of stimuli and pathological states. Almost all types of stressful stimuli and certain diseases have been shown to alter the adrenocortical functions.

Originally relationship between stress and adrenal cortex was established by Selye (1946). All stressers manifest an increased blood levels of adrenocorticosteroids and hyper activity of adrenal cortex. However, these physiological and biochemical changes occurring in adrenals in response to stress largely depend on the integrity of adenohypophysical-adrenocortical system. Apart from stressful conditions in certain diseases, which are known to get influenced by therapeutic doses of cortisone, the adrenocortical functions have been found to be altered. Adrenocortical function also depend on the nutritional and environmental conditions to some extent.

Huschke (1854), Gray (1852), and Kolliker (1854) described that adrenal gland consisted of two parts i.e. central (medulla) and peripheral (cortex). Adrenal cortex produces a number of substances which are termed as steroids. Almost all of the steroids such as corticoids, Oestrogens, proges- terones, androgens are derived from cholesterol. Originally the term steroid was proposed for all the substances possessing the cyclopentanophenan-threne nucleus by Callow and Young in 1936. The carbon skeleton of adrenocortical hormone is formed by cyclopentanophenan-threne nucleus.

Adrenal cortex contains three different zones i.e. zona glomerulosa, zona fasciculata and zona reticularis. The outer most zone (zona glomerulosa) is the thinnest and consists of columnar cells arranged in
groups or curved columns. The middle zone (Zona fasciculata) is broadest and consists of large polyhedral cells arranged in parallel strands or columns. The innermost (zona reticularis) consists of cells which are arranged irregularly. The relative volumes of the three zones as determined by Swinyard (1940) are as follows:

- Zona glomerulosa: 15%
- Zona fasciculata: 78%
- Zona reticularis: 7%

The cell of the adrenal cortex have been found to be rich in lipid contents. However, the lipid contents vary in different species though it is particularly abundant in man, rat and carnivorous (Soffer et al. 1961).

All the three zones of adrenal cortex produce different types of hormones. Zona fasciculata and reticularis are almost dependent on ACTH and have been shown to undergo atrophy in hypophysectomized animals (Schenberg, 1970) where zona glomerulosa is relatively independent of ACTH. Zona fasciculata and reticularis possibly produce corticosteroids, androgens and estrogens. Aldosterones is supposed to be produced by zona glomerulosa.

The following is the list of cortical hormones and sites of their origin:

- **Mineralocorticoid**
  - Aldosterone Zona glomerulosa

- **Glucocorticoids**
  - Cortisol

- **Androgenic**
  - Dehydroepiandrosterone
  - Androstenedione
Oestrogenic
- 11-Hydroxyandrostenedione
- Oestrone

Progestagenic
- Progesterone

The adrenocortical hormones exhibit a wide range of their actions. It is obvious from the above discussions that adrenal gland is essential for life and it secretes a number of hormones, the absence of which may be fatal.

During the past three decades, lot of new informations have been added to our knowledge of adrenal glands including fundamental understanding of its function and isolation and identification of various adrenal hormones. During this period a number of steroidal compounds have been isolated from adrenal cortex, out of which cortisol, cortisone, corticosterone, 11-dehydrocorticosterones, 11-deoxycorticosterone, aldosterone and 17-hydroxy-11-deoxy corticosterone were found to be biologically most active.

Alterations in corticosteroid metabolism have been reported in health and disease (Mills, 1966 and Nicolau et al, 1982; Nicolau et al, 1984; Krieger, 1974, 1979; Singh et al, 1975 and Singh & Udupa, 1977; Allen et al, 1957; Bulbrook et al, 1962). Similarly abnormalities of adrenocortical function have been observed in hypertension (Kornel and Motohashi, 1965), Leukemia (Dobriner et al, 1954), obesity (Cohen, 1958 and Sirkkin, 1961), psychiatric disorders (Bliss et al, 1956), peptic ulceration (Green and Pulvertaft, 1962; Stock Bull, 1964 and Moore, 1963), pulmonary tuberculosis (Brahul et al, 1963) and tropical pulmonary eosinophilia (Singh et al, 1987). Corticosteroids are finding very important place amongst the various therapeutic agents.
and are being prescribed in many clinical conditions. Taking into account the wide application and use of corticosteroids and their analogues, it appeared quite reasonable to study the circadian variations of adenocortical functions in terms of secretory and excretory products in healthy young volunteers and in various pathological states where the therapeutic efficacy of corticosteroids is well proved and/or the direct involvement of adrenal cortex is obvious. Rhythms are continuously modulated, modified and adjusted in time or synchronized by periodic events in the environment. The influence and importance of different synchronizers vary from function to function and region to region. There is no mention in available literature regarding circadian variations and amplitude test in young healthy Indians and patients suffering from carcinoma of breast, tropical pulmonary eosinophilia and pulmonary tubercular patients in tropical conditions. Nutritional status, social traditions and environmental factors in a country like ours are quite different from other parts of the world especially the Western countries. Quite possibly ethnic and geographic differences including climatic and dietary factors may influence and/or alter the usual values as reported in Western literature and circadian rhythmic patterns of adrenocortical function in physiological and pathological conditions.

Therefore, the present study was planned to re-examine and explore the circadian changes if any, in adrenocortical function in health and disease in order to have a better understanding of the functioning of normal and abnormal adrenocortical system (values) in various pathological conditions and its rhythmic variations during 24-hour light-dark period in tropical conditions.