Introduction

Living matter and evolving organisms are influenced by the Earth's rotation and revolution around the sun with its periodicity of day/light and night/darkness, with periodic changes in the length of the daily light and dark span and with seasons and climatic changes. Therefore, a variety of biological variables oscillate within an organism including: behaviour, physiological functions, and biochemical factors. If any event within a biological system recurs at approximately regular intervals, it is generally referred to as a biological rhythm. Biological rhythms affect a variety of activities, such as the sleep-wake cycle, body temperature, synthesis and/or secretion of many hormones, heart and respiratory rate, blood pressure, glomerular filtration rate, renal plasma flow, electrolyte concentrations in urine etc. **(Refinetti and Menaker, 1992)**.

Circadian rhythms are fluctuations in nearly all bodily functions that recur on a cycle of about 24 hours. The circadian system is composed of many individual tissue-specific cellular clocks whose phases are synchronized by the master circadian pacemaker residing in the suprachiasmatic nucleus (SCN) in the anterior hypothalamus of the brain **(Cuninkova and Brown 2008).**

These endogenous biological clocks are fundamental to all living organisms. They control the release of hormones that have a role in sleep and wakefulness, the metabolic rate, body temperature and many more biochemical and physiological functions. The SCN is actually a pair of pinhead-sized brain structures that together contain about 20,000 neurons. The tissue-specific clocks are located throughout the body, and they can also function independently of the SCN. Light that impinges upon photoreceptors in the retina causes signals to travel along the optic nerve to the SCN. Signals from the SCN travel to several brain and peripheral regions (**Yoo et al., 2004).**

Circadian rhythms allow organisms to anticipate and prepare for precise and regular environmental changes; they have great value in relation to the outside world. The rhythmicity appears to be as important in regulating and coordinating internal metabolic processes **(Sharma, 2003).**

Circadian clocks are crucial not only for daily rhythms but also for maintaining the sleep/wake cycle, metabolic processes, cardiac function, vascular disease and other physiological processes **(Sahar and Sassone Corsi, 2009; Wang et al., 2010).**

Early research into circadian rhythms suggested that most people preferred a day closer to 25 hours when isolated from external stimuli like daylight and timekeeping. However, this research was faulty because it failed to shield the participants from artificial light. Although subjects were shielded from time cues (like clocks) and daylight, the researchers were not aware of the phase-delaying effects of indoor electric lights (**Duffy et al., 2005).**

Failure to adapt to environmental and societal time cues leads to misalignment of internal biological clocks. This ´dysentrainment´ comes with enhanced risk of errors and accidents, loss of productivity, and health risks such as increased propensity for cancer, depression, sleep disturbances, gastrointestinal, metabolic and cardiovascular disorders, decreased immune responses and even life span. Hence, people with circadian rhythm disruption caused by shift work often develop glucose intolerance, diabetes and hypertension, and may be cancer. The recent discovery of the core molecular circadian clock machinery has dramatically increased interest in the impact of circadian dysregulation on mental and physical health (**European College of Neuropsychopharmacology, 2010).**

Circadian variations in renal function were first described in the 19th century, and GFR, renal blood flow, urine production, and electrolyte excretion exhibit daily oscillations. These clinical observations are well established, but the underlying mechanisms that govern circadian fluctuations in kidney are not fully understood **(Lisa Stow and Michelle Gumz, 2011).**

Cardiovascular events such as stroke and myocardial infarction are known to peak with the morning surge in BP and heart rate. BP increases in the early morning, followed by a plateau during the day, and then dips during sleep. Patients who do not exhibit a 10 to 20% decrease in nighttime versus daytime BP are designated “nondippers” and are at increased risk of cardiac death (**Routledge et al., 2007).**

In addition to the role of the kidney in maintaining proper BP rhythms, renal function oscillates in a circadian manner with daily fluctuations in renal blood flow and GFR and the excretion of electrolytes such as sodium and potassium. Likewise, urinary excretion of phosphate, magnesium, and acid oscillates with a circadian pattern **(Cameron et al., 2007)**.