



CIRCADIAN VARIATIONS IN SELECTED PHYSIOLOGICAL PARAMETERS AND SPORTS SKILLS OF FOOTBALL PLAYERS



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ABSTRACT

The main purpose of the study was to determine significant difference in the selected physiological parameters and sports skills of football players with circadian rhythm. In this study 20 male intercollegiate players of Degree college of physical education (Amravati) were selected as subjects by adopting Simple Random Method (SRS). The age of the subjects were ranged from 18-23 years. The Physiological variables that were selected in this study were Heart rate, Respiratory rate, Vital capacity and the Football skills only Dribbling and Kicking a rolling ball for accuracy were chosen.

The statistical technique (ANOVA) was used to analyse the data and the level of significance was fixed at 0.05.

KEYWORDS: Circadian rhythms, suprachiasmatic nucleus (SCN)

INTRODUCTION

Nobody can deny this fact that the present age is the age of sports. Nowadays people are taking very much interest in participating games. Modern culture games and sports hold a prominent place. Millions of people participate in sporting activities and also spend their money in sporting activities and equipments. The impact of sports in modern society has made it clear that a sport is very legitimate field of academic study.

During the ancient period, people are unaware about the value of games and sports. The uncivilized men used to engage themselves in games and sports mostly to spend the time but with the

advancement of science and culture, men gradually changed their habits and outlook. They become more civilized and consequently the games and sports which were mostly disorganized and unproductive became more organized and purposeful in course of time.

The word circadian rhythm comes from the Latin word *circa*, means “around”, and *dian*, means “day” so the full meaning of it’s “around a day”. Circadian rhythm can be defined as the daily biological rhythm. The biological rhythm, which exists in mammals, plants, insects and so on, and it runs on a 24-hour cycle. Circadian rhythms are self-sustained variations in biological and behavioral functions with a period of 24 hours. Circadian rhythms are internally driven by the brain “suprachiasmatic nucleus” (SCN), the “circadian clock”. These endogenously produced circadian rhythms can be modified by bright light melatonin, and exercise because the SCN receives neural input from the cells in the retina that detect light, melatonin receptors and receives input from the brain areas integrating information about the level of physical activity. These inputs to the SCN allows for an individual’s circadian rhythms to be synchronized to the environment in which they live. The potential for circadian rhythms to influence sport performance is related to the neural outputs of the SCN. Neurons from the SCN project most densely to the hypothalamus, but there are also projections to the forebrain. The hypothalamus plays an important role in regulating a host of body and brain functions with potential relevance to athletic performance.

The rhythmic variations of the timing and duration of biological activity in living organisms occur for many essential biological processes. The daily rising and setting of the sun, and the seasonal variations in day length, temperature, and rainfall are all major factors to which the physiological and behavior of different species must adapt in order to survive. Then most obvious manifestation of human rhythm city is the cycle of sleeping’s and waking. Humans beings are diurnal creatures; that is to say we are active during the light phase of the day and sleep at night. Anyone who has kept a pet hamster will know that these and many other species are nocturnal, i.e. active at night. But the sleep-wake rhythm is obvious, virtually all the rest of our functions have their own, less evident rhythm. In fact it would be reasonable to say that everything that happens in our bodies is rhythm until proved otherwise. The biological clock also provides internal temporal organization and ensures that internal changes take place in coordination with one another studies have found that the internal clock consists of an array of genes and the protein products they encode, which regulate various physiological processes throughout the body. Disruptions of the biological rhythms can impair the health and well-being of the organism. The primary function of these circadian clocks is to organize and synchronize the organism’s cellular and behavioral activities with the outside world.

With the circadian cycle, a person usually sleeps approximately 8 hours and is awake 16 hours. During the wakeful hours, mental and physical functions are most active and tissue cell growth increases. During sleep, voluntary muscle (skeletal muscle) activities nearly disappear and there is a decrease in metabolic rate i.e., respiration, heart rate, body temperature, and blood pressure. The activity of the digestive system increases during the resting period but that of the urinary system decreases. Hormones secreted by the body, The circadian cycle is controlled by a region of a brain known as hypothalamus, which is the master center for integrating rhythmic information. A part of hypothalamus called the suprachiasmatic nucleus (SCN) receives signal about light and dark from the retina of the eye. A clock entrained to the natural environment has a 24 hour period, while to a free running (non 24 hour) circadian clock (in constant dark or dim-light conditions) has a slightly different period, with marked variability among species and individuals. In humans, for example, the period is slightly longer than 24 hour, while in most rodents it is slightly less. The components of a circadian

system include the clock itself, which generates the biological rhythms; input pathways that transmit environmental cues to the clock; and output pathways that transmit the clock's rhythms to the rest of the organism, influencing a large number of endocrinology, biochemical, and electrophysiological processes. By applying Cosinor rhythmometry method, a circadian rhythm can be characterized by estimating three parameters such as Mesor, Amplitude and Acrophase. Mesor is the acronym for Midline Estimating Statistic of Rhythm i.e. the mean level of oscillation. Amplitude means the extent of oscillation from the Mesor or half of the total oscillation. Acrophase means timing of the crest of the wave form.

METHODOLOGY

For the purpose of this study 20 male inter-collegiate football players of D.C.P.E Amravati were selected as subjects. The age of the subjects were ranging from 18-23 years.

Physiological Variables which were used in this study are as under:-

1. Heart rate – It was measured by feeling palpation on the radial artery
2. Respiratory rate – The respiratory rate was recorded in number by observing the up and down movements of the abdomen due to exhalation in one movement.
3. Vital capacity- It was measured with the help of dry spirometer.
4. Dribbling ability was measured by using dribbling test of L.Health and E.G Rodger and score was recorded in seconds.
5. Kicking a rolling ball for accuracy was assessed by employing the test suggested by L. Health and E.G.Rodger and score was recorded in numbers.
6. The timings of the day for the collection of data were
 - a. 6:00am to 8:00am
 - b. 10:00am to 12:00Noon
 - c. 2:00pm to 4:00pm
 - d. 6:00pm to 8:00pm

One way analysis of variance (ANOVA) statistical technique was employed independently for each selected variable .the level of significance was set at 0.05 level.

OBSERVATION AND DISCUSSION

The data collected on 20 subjects were computed by using One-Way Analysis of variance (F-ratio) statistical technique. The result pertaining to these data have been depicted in the following table.

TABLE
One way Analysis Of Variance Pertaining To The Circadian Variations In Selected Physiological Parameters And Sports Skills Of Football Players Are Presented In The Table Given Below:-

Variable	Source of variation	Degree of freedom	Sum of squares	Mean sum of squares	F-ratio
Heart rate	Between the groups	3	1420.44	473.48	22.37*
	Within the groups	76	1608.45	21.16	
Respiratory rate	Between the groups	3	127.65	42.55	2.76*
	Within the groups	76	1171.1	15.40	
Vital capacity	Between the groups	3	22358340	7452780	22.935*
	Within the groups	76	24696080	324948.42	
Dribbling	Between the groups	3	64.62	21.54	43.08*
	Within the groups	76	37.93	0.50	
Kicking a rolling ball for accuracy	Between the groups	3	264.6	88.2	25.63*
	Within the groups	76	261.6	3.44	

Significant at 0.05 level

Tabulated $F_{.05}(3,76) = 2.728$

DISCUSSION ON FINDINGS

According to the findings of statistical analysis it is quite clear that the selected physiological variables and skills of football significantly differed while tested in different timings, moreover the selected physiological variables of heart rate and respiratory rate showed significantly less beats/min during 6:00-8:00am and 2:00-4:00pm than the 10:00-12:00 and 6:00-8:00pm, it may be attributed to the fact that the selected subjects were chosen from the profession college of physical education, where the subjects were kept themselves busy with their physical activities during morning (7:00-8:00am) and evening (4:00-6:30pm) session, Hence prior to those periods candidates Circulo-Respiratory system keep remain in resting condition hence such results found in the study. Whereas Football skills were performed by the subjects significantly better during 6:00 to 8:00 pm, it may be because all the footballers used to have regular match practice in the afternoon session (5:00-7:00pm) hence best performance was shown in the above mentioned timing of 6:00-8:00pm.

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