Chapter 1

INTRODUCTION

Sports hold a prominent place in modern life. Millions of people participate in sports activities, watch and read about them and spend billions of dollars annually on sports related activities and equipments.¹

This has lead to the competitive elements in sports, now sportsman participate to win and achieve laurels for them, as well as for their country contrary to earlier philosophy of participation in sports competition for participation sake. In the modern scientific age, in every field of human endeavour, systematic objective and scientific procedure are followed in accordance with principles based on experience, understanding and application of knowledge of science. The field games and sports is no exception to this. In advance countries like USA, Germany, Russia, Austria, Britain and others, the rapid progress in the field of games and sports like athletics, soccer, hockey etc. has taken place and their international achievement have been possible only due to research, experimentation and application

of scientific knowledge.²

Hockey has become one of the most popular game in the world, and of all the major games in the world it is the only one that has been jealously preserved as amateur by all those who play or support it. Its popularity has no doubt, always owned much to the fascination one may find in hitting a ball with a stick. Today, hockey is essentially a team game, and has developed into a fast and highly skillful one.³

Hockey is the national game of India, eversince India won the Olympic title in hockey in 1928 at Amesterdum. India used to lead in this in the International world till it had to surrender the premier position to Pakistan in 1960 in Rome Olympics, its ranking dropped down still further with the challanges from Holland, Australia and Britain.⁴

Modern hockey is fast vigorous game, needs high level of proficiency of motor fitness components and anthropometric

variables specially in playing on artificial turfs for the hockey players. In hockey natural abilities are developed to perform highly technical movements through a combination of speed, strength, agility and endurance. Motor fitness components are highly required by the hockey players along with their skills, techniques and tactics.

Men's performance in sports or any other field depends on his movement oriented behaviour, all those actions which can be noted by others with or without the aid of instruments and which have their roots in the biological phenomena. In other words, the performance of an individual is the result of the integrated and harmonious functioning of the several dynamic process of the body which are either physiological, psychological, psychophysiological and biochemical in nature. Out of the factors mentioned above, the biological phenomenon are the foremost which fluctuates periodically and are quite prone to the diurnal variation which may be interpreted as the circadian rhythm, or biorhythm or biological clock or daily rhythm. The qualitative study of this biological phenomena reveals that biological clock has division of hours, minutes and seconds as a regular clock and also division of measurements of days, weeks, months and years. Throughout the world periodic function takes place in response to periodic changes in the environment, biological clock
also exhibit periodic oscillations ranging from milliseconds to hours, days, years or longer and influence the physiological functions which in turn influence the day today ability.\(^5\)

Stability is a rare feature of nature as most living things exhibit fluctuations in their status. These changes may be regular, recurring on a cyclical and predictable basis. Clocks probably ubiquitous in mammalian tissue and circadian rhythms are not completely isolated from other time structure with different periodicities. These rhythms are found at levels ranging from cell division to whole body activity and so may have implications for exercise and sports performance. The performance rhythms are also linked to the state of biological arousal which affects the readiness for intense physical efforts: a low state of arousal predisposes towards errors and increased injury risk. The influence of time of day on industrial tasks has been thoroughly researched, yet studies in sporting contexts are not so prolific. In experimental work on exercise, the need to control for time of day when measurements are taken is generally accepted. Athletes are creatures of habit and so are acutely aware of departure from their usual time of training or competing. The existence of bio-rhythm is most obvious when they are perturbed by loss or

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disruption of sleep. Crossing time zones causes desynchronisation
of a multitude of biological rhythms leading to disorientation
until all adjust completely to the new environment.

Major sports contests are not evenly distributed over
a sufficiently broad span of the day to yield conclusions about
the optimal time for competing. In practice there seems to be
a preference of evening contests. Heats and qualifying events
frequently take place in the morning, championship finals where
tactics are important are usually in afternoon while organised
records attempts are generally scheduled for the evening.6

All organism including humans, have cyclic variations
inverting all physiological and psychological functions, including
athletic, performance. These variations are adaptations to cyclic
changes in environment factors, called 'Zeitgerbers'. With a shift
in a Zeitgerbers, for example, the physiological cycle shifts slowly,
therefore, it is out of phase for some time and physiological
function is disturbed resulting the performance decreasement.
In physiology, as in most biorhythmicity and individual variability
are ignored. This is unfortunate particularly for applied physiology,
because the ability to perform a given task is greatly affected
by the time at which it is to be performed. Normal physiological

6Donald Macleod et al., Exercise Benefits, Limits and
circadian rhythms and biological processes of sleep will be exploded, as well as the impact of alterations related to travel and other strain.  

A study on 'biorhythms' and men's track and field world records, conducted by Quingly, claims that the athletic performance like all human behaviour, are governed by three invariant 'biorhythms' outstanding performance are said to occur during positively cyclic phase: and poor performances, errors of judgement and accidents, during the negative phase and particularly at crossover points (critical days).

Another study conducted by Das and Bhowmik on biorhythm in physical fitness score, was highest at 4.00 pm. and lowest at 12.00 noon. Significant difference was found among the mean values of physical fitness of different times. They also came with the conclusion that physical fitness score at 4.00 pm. was significantly greater than the mean value of 8.00 am., 12.00 noon, and 8.00 pm. No significant difference was found between


the mean value of 12.00 pm. and 8.00 am., 12.00 noon, and 8.00 pm. and 8.00 am. and 8.00 pm.

Another study by Montelpare, Phyley and Shephard, on the influence of sleep deprivation upon circadian rhythms of exercise metabolism, and came with the conclusion that the several responses to submaximal exercise (heart rate, respiratory minute volume, oxygen intake and resting of perceived exertion) tends to be influenced by both circadian factor and feeding, the feeding effects are the strong of the two and that the regularity of both influence weakens over the course of 60 hours of sleep deprivation.

Ample scope is being provided by modern physiology to the investigation of biorhythms and the subject was discussed in detail in the 25th congress of physiologists in Munich. The alteration of day and night forbidly suggest itself as a beginning factor in connection with the 24 hours or daily rhythm that is why fluctuation in certain biological processes are being explained for possible efforts produced on them by the change from light to darkness.  

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Matches that occur several hours before or after the circadian peak will be potentially subjected to less than optimal performance. The player may have no control over the timing of the matches which are scheduled relatively early or late in the day to accommodate scheduling limits or prime time television demands. Other factors such as sleep duration may also have the effect on the biological clock or day today ability. This type of scheduling may impair performance by forcing athletes to perform at a time several hours before or after peak circadian performance time. This problem may be particularly detrimental for athletics with distinct morning and evening chronotypes who may be compelled to complete near the midpoint or through levels of performance, rhythmic performance efficiency.

Sound sleep is very much related to the sound mental ability. Proper sleep is necessary for mental hygiene. Mental hygiene is a science which deals with the process of attaining mental health and prevent mental illness.

Mental health and play are closely related with each other. For any time of play, sound health is first requirement. If the sportsman are not mentally sound they cannot concentrate on learning and retainment of knowledge. The sleep deprivation cause a mental mall adjustement. On the other hand, there are conditions of semi weakness that are intermediate in character,
possessing some features of both sleep and wakefulness.\textsuperscript{12}

Sleep causes major types of physiological effects. First, the nervous system itself and second, it effect other structure of the body. Physiologically the first of these seems to be more important. Electrical studies of brain indicate that while a person is awake many nerve impulses passes continuously through the nervous system. Thus, the state of wakefulness seems to be caused by a high degree of activity, lack of sleep does not directly affect the intrinsic functions of different organs. However, lack of sleep often causes severe autonomic disturbances and these in turn indirectly lead to gastrointestinal upsets, loss of appetite and other detrimental effects. In this way, loss of sleep can affect the whole body as well as the nervous system itself.\textsuperscript{13}

Little is known about what actually goes on during sleep but much is known about what happens when it is lacking. A chronic sleep shortage of first manifests in poor timing and co-ordination. The muscle ability to answer messages from the central nervous system is affected. The human body cannot work

\textsuperscript{12}Robert A. Young and John Anthony, Parr Parr's Concises Medical Encyclopaedia (1971) : 380.

round the clock. It must have a regular opportunity to catch up its repair activities and to dispose of wastes that have accumulated during the day faster than they could be discarded.

The biorhythm is a major source of variability in performance and the range of amplitude increases with increasing task complexity. Thus, the timing of the matches seems to be an important factor which needs careful investigation. Another important factor is time of sleep. It is well known that tournaments are held at different places and the teams have to move from one place to another, in the same token players have the tendency of going to bed early and late in the night. This factor may also influence the performance of the individual in relation to different times of the day.

Therefore, realizing the importance of biorhythm in this competitive world and the time of sleep, the present study has been undertaken by the research scholar.

**Statement of the Problem**

The purpose of this study was to investigate the effect of selected hockey skill performance on varying sleeping timings.

**Delimitations**

1. The study was delimited to 48 male students of Lakshmi-bai National College of Physical Education, Gwalior, studying in Bachelor and Master Degree of Physical Education classes.
2. The study was confined to the three hockey skill tests.
   a) Angular hitting and stopping.
   b) Pass receiving, dribbling and hitting.
   c) Dribbling and goal shooting.

3. The study was further restricted to four sleeping groups.
   a) Normal group
   b) Early group
   c) Late group
   d) Irregular group.

4. To minimize the effect of extreme hot and cold (during summer and winter) weather conditions of Gwalior, the data collection for the selected skill performance was done only in the day time in the month of September.

   Limitation

Effect of uncontrolable factor that might influence the selected skill performance was accepted as a limitation.

   Hypothesis

On the basis of the literature reviewed, available research findings, experts opinion and scholar's own understanding of the problem, it was hypothesised that - there will be a significant difference in the mean performance of the four groups on the selected hockey skill performance at different times during a 24 hr. cycle.
Definition and Explanation of Terms

Biorhythm

A biological inherent cyclic variation or recurrence of an event of state such as the sleep cycle, circadian rhythm. 14

Normal Group

It is considered that the normal sleep timings are from 10.00 pm. to 6.00 am. i.e. for eight hours. Hence the subjects under normal group were those who followed the above timing. 15

Early Group

The subjects under early group are those who went to bed at least two or more hours earlier than the above schedule.

Late Group

Similarly the subjects who went to bed at least three hour's or more after the normal schedule of going to bed is termed as late group.

Irregular Group

Here the subjects were very irregular of going to bed


it may be any time from 8 O'clock to mid night or even later at different days of week.

Significance of the Study

The sports events are scheduled many days, weeks or even months in advance according to the compulsion faced by the sports organisers.

This type of scheduling may impair performance by forcing the players to perform at a time several hours before or after peak circadian performance times. The players must be prepared to perform at any time on the day of competition. In the course of the day people have high and low points with respect to their standard of performance. This may be due to the influence of day and night rhythm, the habit of living which produce a system of reflexes at different times which control the rhythm of the standard performance. It is unfortunate particularly from sports skill performance point of view that very little is known about biorhythm and there by each sportsman from different nations is working himself without understanding the influence of biorhythm during his peak performance level.

Therefore, the findings of the present study will be significant in the following ways:

1. The findings of the study may add to the existing bonds of knowledge with regards to the study on biorhythm of
selected hockey skill performance on varying sleep timings.

2. The results of the study may provide guidelines which will help the physical educators and coaches in preparing the training schedule for their teams in their respective sports or events.