Effect of Fatigue on Reacting Capacity of Elite Sportspersons

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ABSTRACT

The purpose of the present study was to find out the effect of fatigue on the reaction time of national level sportspersons of different games like Cricket, Hockey, Lawn Tennis, Wrestling and Weightlifting. The sample consisted of 80 male athletes, in the age group of 18-25 yrs, at the of National Institute of Sports, Patiala. The sportspersons were assessed with the help of the electronic chronoscope, for simple visual reaction time of pre and post fatigue. The computerized bicycle ergometer was used to give exercise and induce fatigue. The results showed that, as a result of fatigue, the reaction time of the sportsperson deteriorates.

INTRODUCTION

Reaction time is the delay between the presentation of a stimulus and the initiation of a response. The delay can be due to all the events which have to take place before a person is able to respond. Information in the form of nerve impulses has to travel from the sense organ along nerves to the central nervous system (i.e. the brain or spinal cord) where it is processed. Then a message has to be conveyed to the muscles before they respond. It takes about 14-16 hundredths of a second to respond to an acoustic stimulus (excluding the time it takes for the sound to reach the ear), and 16-18 hundredths of a second to respond to optical stimulus.

Simple reaction time is the motion required for an observer to respond to the presence of a stimulus. For example, a subject might be asked to press a button as soon as a light or sound appears. Mean RT for college-age individuals is about 160 milliseconds to detect an auditory stimulus, and approximately 190 milliseconds to detect visual stimulus.

Reaction time is the interval time between the presentation of a stimulus and the initiation of the muscular response to that stimulus. A primary factor affecting a response is the number of possible stimuli, each requiring their own response, that are presented. If there is only one possible response (simple reaction time) it will only take a short time to react. If there are several possible responses (choice reaction time) then it will take longer to determine which response to carry out. Factors that may influence the performer's response are [Davis, 2000]

- Level of fitness.
- Length of neural pathways.
- Number of possible responses.
- Time available.
- Intensity of the stimuli.
- Anticipation.
- Experience.
- Health.
- Body Temperature - colder the slower.
- Personality - extroverts react quicker.

Fatigue is also called exhaustion,

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tiredness, languidness, languor, lassitude, and listlessness. It is a subjective feeling of tiredness which is distinct from weakness, and has a gradual onset. Fatigue can have physical or mental causes. Physical fatigue is the inability of a muscle to maintain optimal physical performance, and it is made more severe by intense physical exercise. Physical fatigue, or muscle fatigue, is the temporary physical inability of a muscle to perform optimally. The onset of muscle fatigue during physical activity is gradual, and depends upon an individual's level of physical fitness.

Mental fatigue is a temporary inability to maintain optimal cognitive performance. The onset of mental fatigue, during any cognitive activity, is gradual, and it depends upon an individual's cognitive ability, and also upon some other factors. Mental fatigue can also decrease physical performance. It can manifest as somnolence, lethargy, or directed attention fatigue. Decreased attention is known as ego depletion and occurs when the limited 'self-regulatory capacity' is depleted. It may also be described as a more or less decreased level of consciousness.

Objectives

The objective of the present study was to examine the effect of maximum fatigue on reaction time of national level athletes.

Hypothesis

It is expected that reaction time will increase due to fatigue.

It is expected that reaction time will decrease due to fatigue.

Fatigue will have no effect on reaction time.

METHODOLOGY

The sample of the study comprised 80 National level players, belonging to different games like Cricket, Hockey, Lawn Tennis, Weight lifting and Wrestling at the Sai Netaji Subhas National Institute of Sports Patiala. The subjects were only male athletes between the age group of 18 to 25 years.

Tools used

Simple visual reaction time was measured with the help of electronic chronoscope.

Fatigue was induced with the help of computerized bicycle ergo meter .

Procedure.

The sportspersons, selected for study, were given 10 trials of simple visual reaction time, then they were made to exercise on the bicycle ergometer till they were completely exhausted. Then at the highest level of exertion, they were again given 10 trials of simple visual reaction time.

Results & discussion

The score of reaction time before and after exercise was calculated and compared and significant differences were found by calculating the t- test.

Table-1 : Showing the Reaction Time of Athletes before and after Fatigue

Game	N	RT (pre)	RT (post)	SE	t-value	Level of significance
Cricket	19	154.432	159.816	10.588	0.508	NS
Hockey	31	167.065	165.213	6.607	0.28	NS
Lawn Tennis	14	166.4	172.544	6.269	0.98	NS
Weightlifting	6	168.679	163.35	22.548	0.625	NS
Wrestling	10	157.11	167.57	12.121	1.93	NS

From the above Table it is seen that the 't' values were not significant, at any level, for any of the games. Hence, hypothesis no. 1of the study, is accepted and hypothesis no. 2 and 3 are rejected. The results showed that as the sportspersons got exhausted their mental and physical activity also decreased, as a result of fatigue, due to which they showed a delayed reaction ability.. Arcelin and Brisswalter (2000) investigated the relationship between optimal cycle rate and attentional performers, in zero load simultaneous task of pedaling and reaction time. The sample consisted of twelve adults, well trained in cycling, performed eight 6-8 min physical tests on a bicycle ergometer, at various pedaling cadences (from 30 to 100 rpm) with concomitant reaction time measurements. The results revealed that stabilizing a pedaling cadence was costly in attention, whatever the metabolic expenditure of the task may be.Welford (1968, 1980) found that reaction time gets slower when the subject is fatigued. Singleton (1953) observed that this deterioration, due to fatigue, is more marked when the reaction time task is complicated than when it is simple. Mental fatigue, especially sleepiness, has the greatest effect. Kroll (1973) found no effect of purely muscular fatigue on reaction time.

Van den Berg and Neely (2006) found that sleep deprivation caused subjects to have slower reaction times and to miss stimuli over a test period that lasted two hours. Kunde *et al,* (2011) found that Basketball novices were slower to indicate the direction in which a ball was being passed if the player looked in one direction while passing in another (a head fake). This happened whether the observer had a fast or a slow reaction time. Older people seem to be better than younger ones at reacting to targets hidden by visual distraction because they have a better ability to spot known features of the targets (Whiting *et al*, 2013). tion time test, implying that the differences in reaction time are due to processing time.

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