A Comparative Study of the Effect of Exhertion on Reaction Time among Individual, Team and Combat Game Players.

Dr. Paramjit Kaur
Assistant Professor,
GHG, Khalsa College.

Abstract

Reaction time is defined as the time that elapses between receiving an immediate and unexpected stimulus and reaction given to it, however, reaction time changes based upon factors such as age, gender, condition, fatigue, high altitude, alcohol, nicotine and use of psychotropic substances. The purpose of this study was to examine the effect of maximal exercise or exhertion on the reaction times of athletes engaged with different sports branches. The study also intended to find whether the nature of the game has any relation on the reacting capacity of the sportspersons. The results of the study indicated that though the nature of the games are different and exhertion itself has its own influence on the psychomotor capacity. The results depicted that the RT of the individual and combat gamers deteriorated, the volley ball players showed an significant change in their RT after exhertion.

Key Words: Reaction Time, Exertion, Individual, Team and Combat Game Players.

Introduction:

Reaction time (RT) is a measure of the quickness with which an organism responds to some sort of stimulus. RT is defined as the interval of time between the presentation of the stimulus and appearance of appropriate voluntary response in the subject. AR Biryuni was the first to describe the concept of RT and Dutch physiologist Franciscus Donders (1865) was among the first to systematically measure human RT using a telegraph like device invented in 1840 by Charles Wheatstone. Prior to his studies, there was no significant observable thread in the literature about human RTs being measured. Human RT works by having a nervous system recognize the stimulus. The neurons then relay the message to the brain. The message then travels from the brain to the spinal cord, which then reaches person's hands and fingers. The motor neurons then tell the hands and fingers how to react. The accepted figures for mean simple RTs for college-age individuals have been about 190 ms for light stimuli and about 160 ms for sound stimuli.

Reaction time is defined as the time that elapses between receiving an immediate unexpected stimulus and reaction given to it. However reaction time changes based upon factors such as age, gender, condition, fatigue, high altitude, alcohol, nicotine and use of psychotropic substances. Hand-eye coordination plays an important role especially in individual sports that require high motor hand skills (Menevşe, 2011).

Luce and Welford described three types of RT.

- Simple RT: Here there is one stimulus and one response.
- Recognition RT: Here there is some stimulus that should be responded to and other that should not get a response.
- Choice RT: Here there are multiple stimulus and multiple responses. Reaction time plays a crucial role in Sports.

Athletes who are involved in team sports should have some advantages in their motor skills and moreover these skills are to be enhanced by training. It is a fact that strength, agility, endurance, flexibility, and balance all of which are the factors used repeatedly in aerobics and anaerobic sports which affect the performance of both team sports and individual sports (Tamer,2000). In order to achieve success in sport events, an athlete must show a high performance with regard to physical and motor skills. One of the important parameters that enables an athlete to have such performance is reaction time. RT in response to a situation can significantly influence the performance due its practical implications. Fast RTs can produce rewards in sports and some

other fields whereas slow RT can produce failures in sports competitions and grave consequences in driving and road safety matters. Factors that can affect the average human Reaction Time include age, sex, left or right hand, central versus speripheral vision, practice, fatigue, fasting, breathing cycle, personality types, exercise, and intelligence of the subject.

In the literature only a few studies can be found determining Reaction Times of various sports categories, though it is one of the essential part of performance. Thus, this study was conducted to scientifically contribute to the field of Reaction Time. The present study seeks to determine

(i) Does reaction time get influenced as an effect of exertion in certain games.

(ii) Whether RT varies with the discipline which the person has chosen or does Reaction ability have any relation with the nature of the sports a person is related to.

Exhertion is a feeling of tiredness or listlessness. Exhertion affects the physical and mental capacity of a person to perform set tasks. It is especially noted in athletes who push themselves to the limits of endurance and is also common among people who engage in strenuous work. The onset of Exhertion can be rapid or the result of cumulative effects after weeks or months of physical effort. The power and intensity required to perform an activity is sometimes unmatched with a person's capacity.

Muscle fatigue takes place when there is a decrease in power of the muscle and is experienced in different ways according to the activity performed. This is the natural concept of "over-reaching" or training progressively harder and harder in order to improve the capacity of the cardiovascular system and/or the muscles to do the desired activity. Exhertion can be tolerated to a degree but greater performance is reliant on energy, muscle memory and a level of overall fitness that can only be provided by professional coaching and medical staff. All the best athletes take advantage of such facilities, and regardless of your sporting or fitness goals, so can you.

Objectives: The objectives of the following study were to:

- To study the influence of Physical exhaustion on the Reaction Time on Team, Individual and Combat games.

Methodology:

Sample: The sample of this study included 105 male athletes between the age range of 20 to 26 years in different sport branches like Athletics (Individual game), boxing (Combat game)and volley ball(Team game) were selected as subjects for this study. The only criteria set up for consideration of the sample was that the male players must have been playing the game for at least past five years. A maximum number of players who fitted in the sample of the study were selected for the test.

Material used: Reaction Time measurements were done with the help of electronic chronoscope designed by Medicaid systems .The model used for this study was RTM-608.This apparatus has three types of visual stimulus i.e. green, yellow and blue. The time between the onset of the stimulus and the response was recorded in milliseconds. The stimulus was given 1-3 seconds after the 'ready' order. All subjects repeated the same application 10 times. After familiarization with the data collection procedures, participants performed the pre test of RT. To induce fatigue, participants completed an exhaustive cycling exercise on the ergometer in the laboratory at maximal speed.

Procedure: The RT (pre) and RT (post) were recorded by recording the time between the onset of the stimulus and the response in milliseconds. The stimulus was given 1-3 seconds after the 'ready' order. All subjects repeated the same application 10 times. After familiarization with the data collection procedures, participants performed the pre test of RT. Then the Exhertion was induced with the help of maximal exercise on the bicycle ergometer. As soon as the subject stopped cycling indicating fatigue and could not go any further with the activity his RT(post) recordings were taken.

Excluding the two fastest and the two slowest values, others' arithmetic reaction time average was calculated and recorded in milliseconds. For statistical analysis the means and t-values were calculated and the level of significance was obtained and interpreted. The level of significance taken into account was 0.01 and 0.05.

Results:

Table no.1 shows the mean values for reaction time before(pre-test) and after exercise (post-test)

Game	N	RT(Pre-test)Mean	RT(Post-test)Mean
Athletics(Individual G)	34	166.400	172.544
Boxing(Combat G)	38	169.874	177.076
Volley Ball(Team G)	33	162.421	175.021

Table no.2 shows the t-values and level of significance for RT(Pre&Post) for various games.

Game	N	t-value	Level of Significance
Athletics(Individual G)	34	0.980	NS
Boxing(Combat G)	38	1.109	NS
Volley Ball(Team G)	33	2.404	0.05

Results and Discussion: The study was conducted on 105 sports persons from athletic, boxing and volley ball game groups. The results of this study as showed in Table no 1 show the mean values for the reaction time of all the game groups before and after exhaustive exercise. Table no.2 shows the t-values and levels of significance for all the game groups .Here it is found that there is no significant difference between the reaction time of athletes(Individual games) and boxers(Combat games) but the volley ballers (team games) showed a significance of 0.05 level in the reaction time due to the effect of exertion. Apart from this it was also found in this study that the volley ballers also have the lowest RT as compared to other games whereas the boxers have the slowest reaction time .Though the difference is not of much variance it shows that the nature of the game or being conditioned for a long period for a certain game does not show much effect on the basic reaction ability of the players. Several previous investigations showed similar significant effects of fatigue on overall response performance. With increasing exercise intensity, the reaction times become slower as well as in case of near-maximal or super-maximal performance. On the other hand, physical exercise of a moderate intensity was reported to affect participants' reactions positively decreasing RT and the results of other studies reported no difference in mean reaction times before and after given exercise. Differences in results regarding the effect of fatigue on response performance can thus be explained by the varying levels of induced fatigue and/or differences in exercises employed.

The current research has been supported by Chandra et.al (2010) who conducted their research on effects of college students' training and heat load over simple reaction time, and as a consequence that found out that after the exercise there is decrease in audio and visual reaction time. Collardeau et.al.(2009) examined faster reaction time during exercise but not after exercise. Kashihara and Nakahara (2005) found that choice reaction times are improved after physical exercise with moderate intensity effort in comparison with a non-

exercise period in amateur level athletes. Similarly in a sample of elite volleyball players, the RT significantly improved in the first game set compared to the pre-game set . Further, Malhotra et al. reported the lowest RT immediately after moderate intensity exercise.

References:

1.Collardeau, M., Brisswalter, C., & Audiffren, M.(2009). Effects of a prolonged run on simple reaction time well-trained runners. Perceptual and Motor Skills.93(3), 679.

2.Chandra, AM, Ghosh, S., Barman, S., Iqbal, R., & Sadhu, N. (2010). Effect of exercise and heat-load on simple reaction time of university students. Int J Occup Saf Ergon, 16 (4), 497- 505.

3.Fox, EL., Bowers, RW., & Foss, LM. (1999). Beden Eğitimi ve Sporun Fizyolojik Temelleri (cev. Cerit, M) Bagırgan Yayınevi, Ankara, s.

4.Kashihara, K., & Nakahara, Y. (2005). Short-term effect of physical exercise at lactate threshold on choice reaction time. Perceptual and Motor Skills. 100 (2), 275-281.

5.Koc, H., & Aslan, C. S. (2010). Erkek Hentbol Ve Voleybol Sporcularının Seçilmiş Fiziksel ve Motorik Özelliklerinin Karşılaştırılması. Selçuk Unıversıty Journal Of Physıcal Educatıon And Sport Scıence ; 12 (3), 227–231.

6.Menevşe, A.(2011). Examination of the relationship between muscle palmaris longus and reaction time. World Applied Sciences Journal, 12 (1), 114-116.

7.Tamer, K. (2000). Sporda fiziksel-fizyolojik performansın ölçülmesi ve degerlendirilmesi, Bagırgan Yayımevi, 140-147, Ankara .

8.Karia RM, Ghuntla TP, Mehta HB, Gokhale PA, Shah CJ. Effect of gender difference on visual reaction time: A study on medical students of Bhavnagar region. IOSR-PHR. 2012;2:452–

9.Pain MT, Hibbs A. Sprint starts and the minimum auditory reaction time. J Sports Sci. 2007;25:79–86.

10. Kemp BJ. Reaction time of young and elderly subjects in relation to perceptual deprivation and signal-on versus signal-off condition. Dev Psychol. 1973;8:268–72.

11. Luce RD. London: Academic Press; 1968. [Last accessed on 2011 Aug 08]. Information Theory of Choice. Reaction Times. Available from: http://www.biology.clemson.edu/bpc/bp/Lab/110/reaction.htm .

12. Misra N, Mahajan KK, Maini BK. Comparative study of visual and auditory reaction time of hands and feet in males and females. Indian J Physiol Pharmacol. 1985;29:213-8.

13. Nikam LH, Gadkari JV. Effect of age, gender and body mass index on visual and auditory reaction times in Indian population. Indian J Physiol Pharmacol. 2012;56:94–9.

14 Shelton J, Kumar GP. Comparison between auditory and visual simple reaction times. Neurosci Med. 2010;1:30–2. [Google Scholar]

15. Tomporowski PD, Ellis NR. Effects of exercise on cognitive processes: A review. Psychol Bull. 1986;99:338–46. [Google Scholar]

16. Welford AT. Choice reaction time: Basic concepts. In: Welford AT, editor. Reaction Times. New York: Academic Press; 1980. pp. 73–128. [Google Scholar]