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A study on reaction time and heart rate responses in shuttle run between trained and untrained boys

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Abstract

Introduction: The measurement of reaction time has been used to evaluate the processing speed of Central Nervous System and the co-ordination between the sensory and motor systems. Reaction time is influenced by different factors. Human body responses to a number of external environmental stimuli of different modalities. Human body gives a desired & purposeful voluntary response to different types of stimuli. Reaction is a purposeful voluntary response to stimulus. There is certain time period between application of stimulus and appropriate motor response.

Purpose: To compare a study on reaction time and heart rate responses in shuttle run between trained and untrained boys.

Methods: Thirty boys (15 trained and 15 untrained boys), ages 15-18 years, volunteered to serve as subjects of the study. Reaction time, Heart rate, Shuttle was the selected variables of the study. Independent 't' test and coefficient correlation was used to examine the significant difference, The level of confidence was set at .05.

Findings: The t-value of Resting heart rate [2.68(<.05)], Post-bout heart rate [2.89(<.05)], Reaction time [2.66 (<.05)], and Shuttle run [7.50 (<.05)], between trained and untrained boys were found significant. No significant difference was found between the means of Pre-bout heart rate [1.48(> .05)], and coefficient correlation of Pre-bout heart rate [0.97 (< .05)], Post-bout heart rate [0.99 (<.05)], Reaction time [0.98 (<.05)], and Shuttle run [0.99 (<.05)], between trained and untrained boys were found significant. No significant difference was found between the means of resting heart rate [0.08 (> .05)], of two groups.

Result: Mean value indicates that in resting heart rate, post-bout heart rate, reaction time, and shuttle run trained boys are better than untrained boys. However, in pre-bout heart rate no significant difference is observed between two groups under study.

Keywords: Heart Rate, Reaction Time, Shuttle Run, Trained and Untrained Boys.

1. Introduction

Human body is a gift of nature. Life in the computer age is not less than the blessings of God. Scientific discoveries have changed the entire face of our planet. It has changed the entire face of our planet. It has changed the thorny life into the bed of roses. Good health provides sound and solid foundation on which fitness rests and at the same time fitness provides one of the most important key to health and living ones life to fullest.

Agility is commonly defined as an effective and quick coupling of braking, changing directions and accelerating while maintaining motor control in either a vertical or horizontal direction. An athlete who displays good agility will most likely possess other qualities such as, dynamic balance, spatial awareness, rhythm, as well as visual processing.⁴ Developing agility in children is a process that continues over a long period of time. Basic methodology of agility training implies the learning of a basic walking technique, running technique, change of direction, jumps and landings (Wroble & Moxley, 2001).

Fitness of an individual is a measure of its ability to. Fitness is an individual's trait which enables person of live most effectively and potentially. The functional ability of an individual is governed by the physical, mental, emotional, social and spiritual components of fitness, all of which are related to each other and are mutually interdependent (American Alliance for Health, Physical Education, and recreation, AAHPER)

Agility is highly dependent upon or interrelated with speed, strength, balance and co-ordination. It is developed through practice and confidence in movement. The acquisition of agility is not only important for success in games and sports requiring quick change and dodging objects or opponents in gymnastics, football, basketball, hockey, judo etc.

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Therefore, to develop agility, the daily physical activity programme should include first starts, stop and changes of body direction at the speed (Willmore Jack H, 1977).

Agility is a gracefulness of a person or animal that is quick and nimble. It is the ability to change the body’s position, and requires a combination of balance, coordination speed, flexes and strength. Agility is combination achieved when a person is using his ATP, PC or lactic acid system usually (Fox et al., 1981).

The use of reaction times (RTs) as measures of cognitive functioning has a long history, dating back at least to the 19th century, when Galton used them as part of the battery of tests included in his “anthropometric laboratory” (Pearson, 1924)^[6]. Over a century later, their appeal remains undiminished, particularly in research on aging. There are a number of reasons for this. One is their relative simplicity. RT tasks are simpler to devise and administer than most other cognitive measures or psychometric tests. Nonetheless, they are commonly found to be correlated with other cognitive measures and sometimes to be better predictors of important outcomes. For example, in a recent study (Deary & Der, 2005)^[1], we found RTs to be better predictors of mortality than scores on the Alice Heim 4 Test of General Intelligence (Heim, 1970)^[3].

Reaction time is a measure of how quickly an organism can respond to a particular stimulus.

Reaction time has been widely studied, as its practical implications may be of great consequence, e.g. a slower than normal reaction time while driving can have grave results. Many factors have been shown to affect reaction times, including age, gender, physical fitness, fatigue, distraction, alcohol, personality type, and whether the stimulus is auditory or visual.

In ‘recognition reaction time’ experiments, there are symbols to respond to and symbols to be Ignored. There is still only one correct stimulus and one response. An example would be catching a dropped stick with a word cue, while having to ignore other spoken words which are not cues. In ‘choice reaction time’ experiments, there are multiple stimuli and multiple responses. The reaction must correspond to the correct stimulus. Typing a letter which matches a printed letter prompt is an example of this type of experiment.

Like many organs in the body, the heart is dually innervated. Although a wide range of physiologic factors determine cardiac functions such as heart rate (HR), the autonomic nervous system (ANS) is the most prominent. Importantly, when both cardiac vagal (the primary parasympathetic nerve) and sympathetic inputs are blocked pharmacologically (for example, with atropine plus pro-pranolol, the so-called double blockade), intrinsic HR is higher than the normal resting HR (Jose and Collison, 1970)^[4]. This fact supports the idea that the heart is under tonic inhibitory control by parasympathetic influences. Thus, resting cardiac autonomic balance favors energy conservation by way of parasympathetic dominance over sympathetic influences. In addition, the HR time series is characterized by beat-to-beat variability over a wide range, which also implicates vagal dominance as the sympathetic influence on the heart is too slow to produce beat to beat changes. There is an increasing interest in the study of heart rate variability among researchers from diverse fields. Low heart rate variability (HRV) is associated with increased risk of all-cause mortality, and low HRV has been proposed as a marker for disease (Thayer and Lane, 2007; Thayer et al., 2010b)^[7, 8].

1.1 Purpose of the Study:

To compare a study on reaction time and heart rate responses in shuttle run between trained and untrained boys.

2. Methodology

2.1 Selection of subject

Total 30 (15 trained and 15 untrained boys), Trained subjects were randomly selected from Nimpith Vivekananda sports association in south 24 district, West Bengal, those who are trained under the coach and untrained boys randomly selected from here, their ages 17-20 years. Volunteered to serve as subjects of the study.

2.2 Criterion Measures

In the present study, the investigator has considered the following things such as their resting heart, pre-bout heart rate, post bout heart rate, reaction time and shuttle run.

2.3 Design

The subjects were kept in resting position for at least half an hour before taking the test. At the outset the resting heart rate was recorded, later pre-bout heart rate was recorded prior the commencement of the shuttle run. 4*10m shuttle run was conducted and HR immediate after completion was recorded (PoBHR). After some rest reaction time was recorded by the reaction timer.

2.4 Statistical Procedure

The data analyzed and compared with the help of statistical procedure in which mean, standard deviation, correlation coefficient (r) and ‘t’ test used to compare the data.

3. Results and Discussion

Table 1: Mean and standard deviation of different components of Trained and Untrained computed. Its result has been depicted in table 1.

variables	groups	number	mean	St. Dev.
Resting heart rate	Trained	15	64.4	6.48
	Untrained	15	71.73	7.96
Pre bout heart rate	Trained	15	93.46	11.30
	Untrained	15	85.46	17.43
Post-bout heart rate	Trained	15	155.33	8.16
	Untrained	15	165.46	10.88
Reaction time	Trained	15	0.32	0.05
	Untrained	15	0.40	0.07
Shuttle run	Trained	15	9.06	0.25
	Untrained	15	9.99	0.37

Table 1 depicts that the mean and standard deviation values of Resting Heart Rate, Pre-Bout Heart Rate, Post-Bout Heart Rate, Reaction Time, Shuttle Run in Trained and Untrained. There values were recorded as, Trained resting heart rate 64.4±6.48, pre-bout heart rate 93.46±11.30, post-bout heart rate 155.33±8.16, reaction time 0.32±0.05, shuttle run 9.06 ±0.25 and Untrained Trained resting heart rate 71.93±7.96, pre-bout heart rate 85.46±17.43, post-bout heart rate 165.46±10.88, reaction time 0.40±0.07, shuttle run 9.99±0.37 respectively.

Table 2: Comparative analysis of resting heart rate between Trained and Untrained

Groups	Number	Mean	SD	SED	‘t’ Value
Trained	15	64.4	6.48	2.80	2.68 *
Untrained	15	71.93	7.96		

* t’ 0.05 (28)=2.04 significant at 0.05 level

Table 3: Comparative analysis of pre bout heart rate between Trained and Untrained

Groups	Number	Mean	SD	SED	't' Value
Trained	15	93.46	11.30	5.37	1.48
Untrained	15	85.46	17.43		

* t' 0.05 (28)=2.04 Not significant at 0.05 level

Table 4: Comparative analysis of post bout heart rate between Trained and Untrained

Groups	Number	Mean	SD	SED	't' Value
Trained	15	155.33	8.16	3.50	2.89*
Untrained	15	165.46	10.88		

* t' 0.05 (28)=2.04 significant at 0.05 level

Table 5: Comparative analysis of reaction time between Trained and Untrained

Groups	Number	Mean	SD	SED	't' Value
Trained	15	0.32	0.05	0.03	2.66*
Untrained	15	0.40	0.07		

* t' 0.05 (28)=2.04 significant at 0.05 level

Table 6: Comparative analysis of shuttle run between Trained and Untrained

Groups	Number	Mean	SD	SED	't' Value
Trained	15	9.06	0.25	0.12	7.50 *
Untrained	15	9.99	0.37		

* t' 0.05 (28)=2.04 significant at 0.05 level

Table 7: Coefficient of correlation variables wise between Trained and Untrained

		trained				
	variables	RHR	PBoHR	PoBHR	Reaction time	Shuttle run
untrained	RHR	0.08				
	PBoHR		0.97*			
	PoBHR			0.99*		
	RT				0.98*	
	SR					0.99*

Level of significance 0.05 df (28) = .361 * significant at 0.05 level

The analysis of table 2 shows that the mean and standard deviation values for resting heart rate of Trained and Untrained were recorded as 64.4 ±6.48 and 71.93 ±7.96 respectively. There have found significance difference between trained and untrained. Mean values indicated that trained boys are significantly better than Untrained.

The perusal of table 3 shows that the mean and standard deviation value for pre-bout heart rate heart rate of Trained and Untrained were recorded as 93.46±11.30 and 85.46±17.43 respectively. There have found no significance difference between trained and untrained. Mean values indicated that Trained are significantly better than Untrained.

The analysis of table 4 shows that the mean and standard deviation value for post-bout heart of Trained and Untrained were recorded as 155.33 ±8.16 and 165.46±10.88 respectively. There have found significance difference between trained and untrained. Mean values indicated that Trained are significantly better than Untrained.

The perusal of table 5 shows that the mean and standard deviation value for reaction time of Trained and Untrained were recorded as 0.32±0.05 and 0.40±0.07 respectively. There have found significance difference between trained and untrained. Mean values indicated that Trained are significantly better than Untrained.

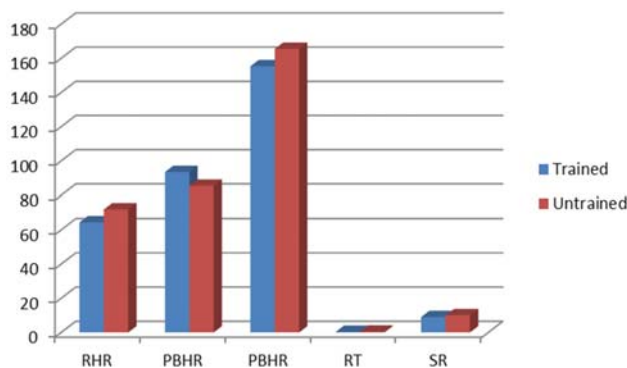
The analysis of table 6 shows that the mean and standard deviation value for shuttle run of Trained and Untrained were

recorded as 9.06±0.25 and 9.99 ±0.37 respectively. There have found significance difference between trained and untrained. Mean values indicated that Trained are significantly better than Untrained.

This study was aimed to the find out comparative relationship different components between trained and untrained boys. There are various factors that influence; these factors include physical activity, environment, heredity, life style, food habit and maturation. Mechanism and the development of life wealth and facilities have changed the mankind tendency towards the nature.

The results of this study showed that trained boys are significantly better in resting heart rate, pre bout heart rate, post bout heart rate, reaction time, and shuttle run. The finding of this study suggests that there is a significant difference between trained and untrained boys in resting heart rate, post-bout heart rate, reaction time, shuttle run and not significance difference in pre-bout heart rate. The study also shows the similar findings (Edward L. Fox et al. 1973) showed that resting heart rate is reduced as a result of bradycardia.

There have positive relation of reaction time and heart responses during shuttle run. The relation between reaction time and shuttle run develops both and get cardiovascular benefits at the same time. Begin with the warm up and dynamic stretching perform a longer warm up and more though stretching since the athlete will be performing high intensity movements in the drill. The researcher backdrop would like to find out whether any relationships exist between intensity of muscular work and changes in the frequency of heart rate.



Graphical representation of different components of Trained and Untrained

4. Conclusion

From the computation and analysis of data following conclusion may be drawn.

1. The trained boys are having lower resting heart rate (RHR) between in comparison to untrained boys.
2. There was no significance in pre bout heart rate (PBHR) between trained and untrained boys.
3. There was significance differences post bout heart rate (PoBHR) following 4*10m shuttle run between trained and untrained boys.
4. There was a significance difference in reaction time between trained and untrained boys.
5. A significance difference was observed in the shuttle run between trained and untrained boys.

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