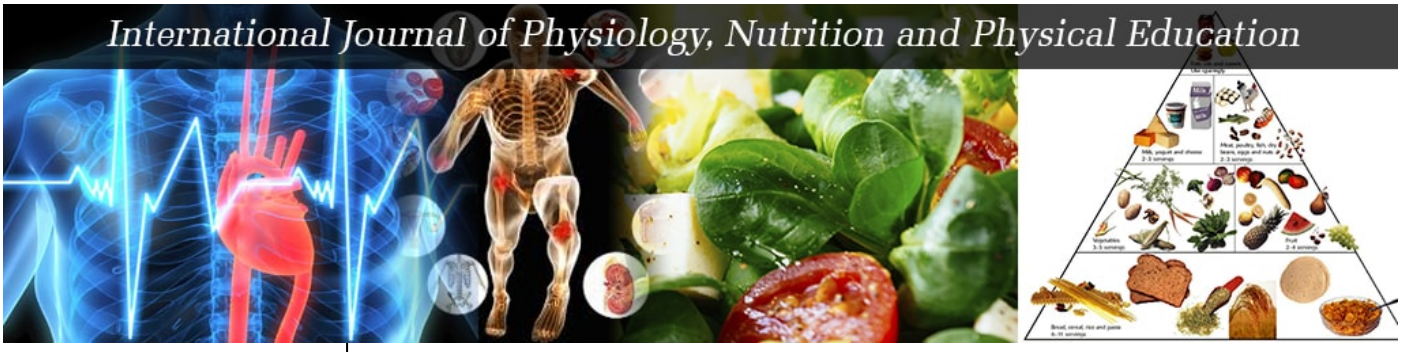

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Analysis of reaction time and speed in basketball players

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Abstract
The purpose of this study was to ascertain the relationship between response time (auditory & visual) and speed (20 meter sprint time) in male Basketball players. A aggregate of 45 manly Basketball players with an average age, height and weight of 21.38 ± 3.15 times, 170.34 ±5.79 cm and 64.17 ± 6.45 kg, respectively, donated to share in this study. Each subject's response time and speed were measured, and the data anatomized using Pearson's correlation and mated t tests. There were no meaningful correlations between response time and speed in the subjects. Still, their auditory response times were significantly better than their visual response times, and there was a negative correlation between body weight and speed ($p<0.01$).

Keywords: Reaction time, basketball, players, pearson's correlation test

Introduction
Reaction time is the interruption between the onset of a stimulus and the inception of a movement response (Magill 1998) [13]. The response time for a visual encouragement is about 250 ms and for an auditory stimulus is about 170ms. Reaction time can be further broken down into three parts. The first part is perception time-the time for the application and perception of the stimulus and giving the essential response to it. The alternate part is decision time, which signifies the time for giving a suitable response to the stimulus. The third part is motor time, which is the time for compliance to the order entered. Singer *et al*. (1993) defined response time as being composed of four stages, videlicet the launch of eye movements, eye movement time, decision time and muscle compression time. Response time is affected by colorful factors similar as age, gender, number of contemporaneous stimulants, nutrition, physical exertion, training and physical fitness and fatigue. The athletes have better response times than non-athletes.

Reaction time is a pivotal factor affecting success in numerous sporting competitions. The reaction times of athletes in different sports and indeed in the same sports but playing in different positions show variations. The response times of high performance sprinters were plant to be shorter than those of low performance sprinters. Exercise induces thrill that supports alertness to external environmental stimulants in largely trained athletes. Explosive power, together with response time, decides the results of competitions in the first 2 – 3 measures. Since Basketball requires 1 – 3-alternate explosive sprints, the significance of this characteristic becomes much more egregious in the performance of players.

Research has shown that speed can be enhanced by strengthening the muscles (Akgün 1996) [3]. One of the most significant biomotor capacities needed in sports is speed, or capacity to travel or move veritably snappily. From a mechanical point of view, speed is expressed through a rate between space and time. The term speed incorporates three rudiments (i) reaction time; (ii) frequency of movement per time unit & (iii) speed of trip over a given distance (Bompa 1994) [6]. Research Studies have revealed that response time is independent of speed. Although it's also known that physical training has positive goods on both response time and speed, the relationship between response time and speed has not been considerably delved in the literature. The purpose of this study was, thus, to observe the relationship between reaction time (auditory & visual) and speed (20 meter sprint time) in male Basketball players.

Method

Subjects

The subjects in this study were 45 male Basketball players from different professional Basketball Academies/or teams of Maharashtra.

Data were collected in the Exercise Neuro Physiology laboratory of Department of Sports Science, RTM Nagpur University, Nagpur, Maharashtra, India. The body heights and weights of the subjects were measured with anthropometric rod and spring based weigh machine. The 20-meter speed test was carried out in the field and visual and auditory reaction times were measured using the audio & visual reaction time instrument.

Statistical Analysis

Data were statistically evaluated with the paired t test and Pearson's Test using SPSS version 10.0 (SPSS Inc., Chicago, IL, USA) for Windows. Significance was set at the $p < 0.05$ level.

Results

Subjects' mean age, height and body weight were 21.38±3.15 years, 170.34±5.79 cm and 64.17±6.45 kg, respectively (Table 1).

Table 1: Mean ± SD of Physical Profiles & 20 Meter Sprint Speed of the Basketball Players

Age (years)	**21.38 ± 3.15**
Body height (cm)	170.34 ± 5.79
Body weight (kg)	64.17 ± 6.45
Time playing (years)	7.65 ± 2.53
Visual Reaction Time of the Right Hand [VRTRH] (ms)	225.37
Visual Reaction Time of the Left Hand [VRTLH] (ms)	224.63
Auditory Reaction Time of the Right Hand [ARTRH] (ms)	189.13
Auditory Reaction Time of the Left Hand [ARTLH] (ms)	192.70
20-m Sprint Speed (s)	5.08 ± 0.55

There were significant differences between the auditory and visual reaction times of both the right and left hands ($p < 0.01$). The visual reaction time of the right hand (VRTRH), visual reaction time of the left hand (VRTLH), auditory reaction time of the right hand (ARTRH), and auditory reaction time of the left hand (ARTLH) were 225.37ms, 224.63 ms, 189.13ms, and 192.70ms, respectively. There were no significant relationships between the reaction time and speed of the subjects (Table 2). However, there was a negative relationship between the body weights and sprint values of the Basketball players ($p < 0.01$). In other words, the greater the body weight, the shorter the 20-meter sprint time. Moreover, there was a statistically significant positive relationship between the auditory and visual reaction times ($p < 0.01$) of the players.

Table 2: Correlation (Pearson's) Among the Parameters in the Male Basketball Players

	Body weight	**Age**	**VRTRH**	**VRTLH**	**ARTRH**	**ARTLH**
Body weight	-					
Age	0.405**	-				
VRTRH	-0.063	0.057	-			
VRTLH	0.119	0.202*	0.604**	-		
ARTRH	0.085	0.200*	0.463**	0.547**	-	
ARTLH	-0.036	0.232*	0.479**	0.546**	0.650**	-
Speed (20-m)	-0.311**	-0.513**	0.034	-0.007	0.020	-0.147

**p < 0.01; *p < 0.05. VRTRH = visual reaction time of the right hand; VRTLH = visual reaction time of the left hand; ARTRH = auditory reaction time of the right hand; ARTLH = auditory reaction time of the left hand.

Discussion

Reaction time and speed variables have been used in the evaluation of the motor skills of athletes for a considerable time. Although response time is a measure of performance, experimenters generally use it to estimate motor skills. The right and left hand auditory (ARTRH, ARTLH) and visual (VRTRH, VRTLH) response times of the manly Basketball players who shared in this study examining the relationship between response times and speed were 189.13 ms, 192.70 ms, 225.37 ms, and 224.63 ms, independently. Imamog'lu *et al*. (2000) [14] plant the auditory and visual response times of professional Basketball players to be 160.0 ± 19.0 ms and 175.0 ±14.0 ms, independently, and of amateur Basketball players to be 163.0 ±20.0 and 177.0 ±18.0 ms, independently. Hasçelik *et al*. (1989) [12] plant the visual and auditory response times of volleyball players before a training program to be 214.55 ms and 200.0 ms, independently, and after a training program to be 191.3 ms and 175.05 ms, independently. Ziyagil *et al*. (1994), in their study of wrestlers, determined the right and left hand auditory response times to be (1/100 s) 17.46 ± 1.46 and 16.87 ± 1.12, independently, and the right and left hand visual response times to be (1/100 s) 17.38 ± 1.85 and 17.84 ± 1.27, independently. Erog'lu & Senel (2002) plant the following mean response times in their study of wrestlers ARTRH of 182.09 ms, ARTLH of 179.54 ms, VRTRH of 206.09 ms, and VRTLH of 212.91ms. The response times attained in the present study are in good compliance with the values reported in all of these former studies. Imamog'lu *et al*. (2000) [14] reported the 20- meter sprint values of professional and amateur Basketball players as 2.95 ± 0.17 s and 3.07 ± 0.27 s, independently. The 20- meter sprint values of Basketball players at different situations from other studies are as follows Eniseler *et al*. (1996) [10] reported values of 2.86 ±0.10 s for premier league Basketball players, 2.89 ±0.07 s for alternate league Basketball players, 2.94 ±0.07 s for division 3 players, and 2.96 ± 0.08 s for amateur Basketball players. Ziyagil *et al*. (1997) reported values of 2.99 ± 0.1 s for professional Basketball players, and 3.24 ± 0.11 s for reserve team players. Alpay (1999) [4] reported values of 2.84 ±0.9 s for professional

Basketball players, and 2.97 ±0.1 s for amateur Basketball players. Çebi (1999) [2] reported values of 3.01 ±0.1 s for professional Basketball players, and 3.24 ±0.1 s for amateur Basketball players. The mean 20- meter sprint result of 5.08 ±0.55 s attained in this study is in good concordance with the below preliminarily reported values.

Table 2 shows that there was a negative correlation between body weight and sprint speed of the Basketball players ($p < 0.01$). In other words, the greater the body weight, the shorter the 20- meter sprint time. There was a statistically significant positive correlation between the auditory and visual reaction times ($p < 0.01$). The decrease in the visual reaction times of the subjects is accompanied by a decrease in their auditory reaction times. The auditory reaction times of the subjects were significantly shorter than their visual reaction times ($p < 0.01$). This is also supported by data in the literature. In the present study, no significant correlation was observed between reaction time and sprint speed. Paradis *et al*. (2004), in their study of 209 male and female athletes who competed in the Greek, Balkan and European indoor championships in 2002, determined that there was no significant correlation between reaction times and the 60m, 60m hurdles and 200 m race results. Reaction time cannot be an indication of action time performance since these two variables represent different components of performance. In other words, reaction time and action time are not dependent on each other. The most important characteristic of reaction and action times is that they are independent measures. This signifies that the correlation between reaction time and action time is typically low. Thus, one cannot use reaction time to determine or predict action time. Magill (1998) [13] stated that reaction time and action time were independent of each other; he studied 402 subjects between 8 and 30 years of age and found almost zero correlation between reaction time and action time. Action time can be improved by appropriate training. It is known that regular training also has a positive effect on reaction time. Although these two factors are independent of each other, they can both be improved by common strategies such as suitable physical training. Linford *et al*. (2006) [7] reported that a 6-week training program significantly reduced reaction time of the peroneus longus muscle in healthy subjects. The fact that the subjects in this study had similar performance levels may have resulted in the lack of a significant correlation between reaction times (audio & visual) and sprint times.

Conclusion

No significant correlation was established between the audio and visual reaction times and the speed of the Basketball players who shared in this study. Still, there was a negative relationship between the body weights and sprint times of the Basketball players. In addition, there were significant differences between the audio and visual reaction times of the subjects.

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