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Reaction times of different branch athletes and correlation between reaction time parameters

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Abstract

The purpose of this study was to examine the reaction times of athletes engaged with different sports branches and to examine the correlation between auditory, visual and multiple reaction time parameters. 215 male athletes in different sport branches and 44 non-athlete males participated the study.
As a conclusion non-athletes' reaction time parameters were found worse than the most branch athletes. Reaction time parameters of athletes don't change between sports branches except judokas. The 15 years old athletes have the worst reaction times than 16, 17 and 18 years old athletes. A significant correlation between the visual, auditory and multiple reaction time parameters was determined.

Keywords: Reaction time, sports branches.

1. Introduction

All athletes who are involved in team sports should have some advantages in their motor skills as well. These skills are to be improved by training. It is a fact that strength, agility, endurance, flexibility, and balance all of which are the factors used consecutively in aerobics and anaerobic systems which affect the performance of both team sports and individual sports (Tamer,2000). In order to be successful in sport events, an athlete must show a high performance with regard to physical and motor skills. One of the parameters that enables an athlete to have such performance is reaction time (Koç and Kaya, 2006). 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 physcotroptic substances. (Colakoglu, 1993).

Hand-eye coordination plays an important role especially in individual sports that require high motor hand skills such as handball, volleyball, basketball and racket sports (Menevşe, 2011). Fox and his fellows stated that athletes with better performances also have better reaction time than the others.

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The purpose of this study was to examine the reaction times of athletes engaged with different sports branches and to examine the correlation between auditory, visual and multiple reaction time parameters.

2. Methods

215 male athletes (age, 16.17±0.98 years; height, 172.58±7.50 cm; and weight: 63.08±13.12 kg) in different sport branches (Football, Basketball, Judoka, Track and field, Taekwondo) and 44 non-athlete males (age, 16.25±1.05 years; height,174.12±6.43 cm; and weight, 65.15±9.05 kg) participated the study voluntarily. Age, height, body weight and auditory, visual and multiple reaction time parameters were measured.

Reaction time measurements were used by La Fayette multiple choice reaction scale This device makes visual and auditory reaction timing as 1/1000 seconds. Measurements were done by researcher in laboratory area.

The subject of the experiment, held his hand which he always uses in front of the device on table. He tried to touch the button of the device that gives stimulus as quick as possible. The researcher gave the stimulus 1-3 seconds after the 'ready' order. All subjects repeated the same application 10 times. Excluding the two fastest and the two slowest values, others' arithmetic reaction time average was calculated and recorded in milliseconds.

Statistical analyses

Data were recorded on computer environment by using a program called SPSS 19.0. For statistical analysis One Way ANOVA test and Correlation Analysis test was used. The SPSS 19 package software was used in the statistical analyses of our study's data. Whether or not the data managed a normal distribution was scanned with the Kolmogorov-Smirnov test and a normal distribution was found. The values among three groups were compared by One Way ANOVA test. Also to examine the correlation Correlation Analysis test was used. The level of significance taken into account was 0.01 and 0.05.

3. Results

Table 1: Reaction Time (RT) Values of Non-athletes and Athletes Engaged in Different Sports Branch (n= 215)

Reaction Times	Sports Branches	n	Mean	Std. Deviation	F	Sig
Auditory RT (msn.1/1000)	1) Football	40	336.89	53.34	16.771**	1<3** 6>1,2,4,5**
	2) Basketball	31	349.90	46.78		
	3) Judoka	35	407.06	44.85		
	4) Track and field	33	340.89	53.47		
	5) Taekwondo	32	364.17	58.56		
	6) Non-athletes	44	436.66	66.68		
Simple Right RT (msn.1/1000)	1) Football	40	335.24	50.60	12.482**	1<3** 4<3* 6>1,2,4** 6>5*
	2) Basketball	31	355.52	76.97		
	3) Judoka	35	400.63	59.66		
	4) Track and field	33	321.87	63.58		
	5) Taekwondo	32	360.91	41.26		
	6) Non-athletes	44	416.60	56.22		
Simple Left RT (msn.1/1000)	1) Football	40	326.42	41.75	20.552**	6>1,2,3,4,5**
	2) Basketball	31	347.80	40.75		
	3) Judoka	35	360.50	53.68		
	4) Track and field	33	323.69	62.31		
	5) Taekwondo	32	354.75	43.91		
	6) Non-athletes	44	424.60	56.62		
Multiple RT (msn.1/1000)	1) Football	40	543.88	83.06	1.885	—
	2) Basketball	31	537.42	105.07		
	3) Judoka	35	526.59	45.95		
	4) Track and field	33	557.94	75.23		
	5) Taekwondo	32	546.26	93.26		
	6) Non-athletes	44	594.03	102.84		

*p<0.05 and **p<0.01

Table 2: Reaction Time Values of Athletes According to Their Ages (n=171)

Reaction Times	Age	n	Mean	Std. Deviation	F	Sig
Auditory RT (msn.1/1000)	1) 15 years old	55	359.07	59.05	4.343**	1>4*
	2) 16 years old	38	352.82	47.25		
	3) 17 years old	46	340.43	57.99		
	4) 18 years old	32	317.66	52.25		
Simple Visual Right Hand RT (msn.1/1000)	1) 15 years old	35	372.75	54.04	3.235*	1>2,3,4*
	2) 16 years old	28	344.15	66.04		
	3) 17 years old	46	344.74	49.18		
	4) 18 years old	22	334.66	68.56		
Simple Visual Left Hand RT (msn.1/1000)	1) 15 years old	35	357.56	48.18	3.987*	1>2,3,4*
	2) 16 years old	28	334.52	54.33		
	3) 17 years old	46	332.51	39.14		
	4) 18 years old	22	332.24	43.77		
Multiple RT (msn.1/1000)	1) 15 years old	35	532.63	70.70	0.504	—
	2) 16 years old	28	546.79	77.67		
	3) 17 years old	46	551.28	96.11		
	4) 18 years old	22	536.83	91.56		

*p<0.05 and **p<0.01

Table 3: Correlation of auditory, visual and multiple reaction times of athletes (n=171)

	R	p
Auditory RT- Simple Visual Right Hand RT	.473(**)	.000
Auditory RT- Simple Visual Left Hand RT	.492(**)	.000
Auditory RT- Multiple RT	.278(**)	.002
Simple Visual Left Hand RT- Simple Visual Right Hand RT	.480(**)	.000
Multiple RT- Simple Visual Left Hand RT	.306(**)	.000
Multiple RT- Simple Visual Right Hand RT	.287(**)	.001

** Correlation is significant at the 0.01 level (2-tailed).

4. Discussion

In this study, athletes' engaged with different sports branches and non-athletes' reaction times were examined.

When the reaction time values were compared between the athletes engaged in different sports branches, the fastest reaction values were found in football players. Auditory reaction time values of judokas were higher than football players ($p<0.01$); simple right reaction time was found higher in judokas than football and track and field athletes ($p<0.05$ and $p<0.01$). No significantly differences were found between the other sports branch athletes ($p>0.05$). Non-athletes' reaction times were found higher than most of the athletes ($p<0.05$ and $p<0.01$).

Koç and his colleagues concluded in their studies that the reaction time of basketball players and handball players were confirmed to be alike. Savas and Ugras' studies show that average auditory reaction time of young taekwondo athletes is 205.07±23.11miliseconds(ms) and their visual reaction time is 209.47±17.48 ms (Savas and Ugras 2004). In Catıkkas and his colleagues' studies with regard to affects of hand choice of martial arts athletes in simple visual and audial reaction, it is seen that Judokas' right hand audial reaction time is 160.86±14.75 ms, left hand audial reaction time is 147.40±21.52 ms. It was also seen that among martial arts athletes there is not a reaction time difference between left hand and right hand except for the judokas' (Catıkkas 2011).

Koc and his colleagues' research conducted on football players and tennis players shows that between the two groups, the difference between right hand time reaction and left hand reaction time, also the difference between right foot reaction time and left foot reaction time is in favor of football players (Koc, 2006). Kashihare and Nakahara's study made it clear that reaction time increases after exercise (Kashiara and Nakahara, 2005).

Complex reaction times are an important aspect of elite sports. A goalkeeper has to decide in an instant which part of the goal to defend. A tennis player must rapidly react to the serve of the opponent. A judoka must react fast to an attack. In all cases the athlete reacts to a complex stimulus situation. Complex reaction times are an important aspect of elite sports (Nederhof, 2008). Zemkova et.al (2004) made a study which deals with the agility test as a diagnostic method for the assessment of the multi choice reaction time of the lower limbs. 236 subjects cross

sectional tests' revealed that competitors in table tennis, fencing, karate, ice hockey, soccer, basketball, volleyball, and aikido performed significantly better than physical education students, judokas and wrestlers.

Ozmerdivenli et al (2004) evaluated the reaction time in response to light and sound stimuluses of athletes and sedantaries. They found significantly difference between athletes and sedentaries in right and left hand reaction time parameters to light and sound stimulus. Chandra et. al conducted their research on effects of college stduents' training and heat load over simple reaction time, and as a consequence that found out that after the exercise there is a decrease in visual and audial reaction time (Chandra, 2010). Collardeau et.al.(2009) examined faster reaction time during exercise but not after exercise.

In this study, auditory and simple reaction time values were found higher in 15 years old athletes than the other 16, 17 and 18 age group athletes ($p<0.05$ and $p<0.01$). Koç and Aslan (2010) pointed out that they could not find any difference between volleyball players and handball players' reaction time due to the fact that subject groups are almost the same age.

When the correlation was examined between auditory, visual and multiple reaction times; a significant correlation was found especially between auditory and simple visual reaction times ($p<0.01$).

As a conclusion non-athletes' reaction time parameters were found worse than the most branch athletes. Reaction time parameters of athletes do not change between sports branches except judokas. Judokas have the worst reaction times between the other sports branch athletes. Judokas have lowest age between the athletes, so the reason of this finding could be judokas' ages. Already the 15 years old athletes have the worst reaction times than 16, 17 and 18 years old athletes. A significant correlation between the parameters of the reaction time was determined in this study.

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